

**Changes in Agriculture in Alberta
and
Associated Potential Programming Implications at
Northern Colleges**

Prepared for

The Northern Alberta Labour Market Information Clearinghouse Project

By

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Northern Labour Market Information Clearinghouse

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Chapter 1 – Introduction

I. Purpose of the Study

The Northern Labour Market Information Clearinghouse Project, under the direction of the Northern Alberta Development Council, is a partnership of four northern colleges (Fairview College, Grande Prairie Regional College, Keyano College, and Northern Lakes College).

Each year, a number of priority topics are identified by the Clearinghouse Project stakeholders and arrangements are made for additional research. At this time, the recently published 2001 Agricultural Census has identified a number of significant changes to agriculture in Alberta and Canada. The members of the Clearinghouse have an interest in acquiring more in-depth information about the changes so that they might consider how the program offerings of the member colleges can best meet the needs of Albertans in the future.

II. Methodology

The majority of the report was completed over the period of November 29 to December 31, 2002. To complete the project, the following steps were taken:

- The 2001 Census of Agriculture was reviewed to highlight changes;
- Discussions were held with Dalin Bullock, Dean of Agriculture of Fairview College and Sam Warrior, Project Manager, to gain a better understanding of specific needs and priorities for the project;
- Based upon the findings of the census and input received from stakeholders and other trends, a number of sectors were selected as “potentially promising”, and became the subject of additional research. The discussion of the relevant sectors is presented in Chapters 3 through 10.
- For each sector to be researched, a review of current literature and information sources was undertaken, and in a number of cases the information was augmented by discussions with industry experts to attempt to obtain the most recent information to enable a discussion of as best possible and/or among other things:
 - An overview of the current industry encompassing
 - Size, composition and outlook (domestically and internationally)
 - Major markets
 - Financial/economic basics
 - Regulatory aspects
 - Issues and problems
 - Experts and contacts for additional information
 - People
 - Other resources
 - A discussion of Employment Opportunities and Training Needs.

- The information was analyzed and the report of the findings, conclusions and recommendations was presented to the Manager of the Clearinghouse Project.

III. Organization of Report

The balance of this report is comprised of the following chapters:

- Chapter 2 - An Analysis of Changes Between 1996 and 2001;
- Chapter 3 - The Greenhouse Industry;
- Chapter 4 - Functional Foods and Nutraceuticals;
- Chapter 5 - Non-Timber Forest Products;
- Chapter 6 - Certified Organic Farming;
- Chapter 7 - Transgenic (Genetically Modified) Foods;
- Chapter 8 - Agri-Tourism;
- Chapter 9 - Non-Traditional Livestock; and
- Chapter 10 - Other Miscellaneous Crops and Sectors (including potatoes, pulses, the value-added sector and game birds).

Several appendices provide additional information. In particular:

- Appendix 1 provides northern Alberta details of the changes discussed in Chapter 2.
- Appendix 2 provides an in-depth overview of organic food consumers in Canada.
- Appendix 3 details the individuals that were contacted in preparing the report.
- Appendix 4 details the major literature sources of information used.

The information in Chapters 3 through 10 and appendices 1 and 2 has been compiled to provide Clearinghouse stakeholders with a broad cross section of insights and “hard facts” regarding the industries presented. It is hoped that it will be useful not only from the perspective of general knowledge, but that it may also provide some direction of additional research needs in the development of courses.

Chapter 2 **Analysis of Major Changes Between 1996 and 2001**

This Chapter provides an analysis of some of the changes that have occurred in Agriculture between 1996 and 2001. Based upon a comparison of 1996 and 2001 Census of Agriculture findings, it compares a number of nation-wide changes with those in Alberta and Northern Alberta. With respect to the data for “Northern Alberta”, a more detailed breakdown, based upon the two Agricultural Regions that include northern Alberta (Census Agricultural Region 6 encompassing Census Divisions 12, 13, and 14, and Census Agricultural Region 7 encompassing Census Divisions 17, 18 and 19) is presented in Appendix 1 “Details of Northern Alberta Changes”. Further breakdown of the data into the six Census Divisions is beyond the scope of this project from a time and/or cost perspective.

I. Crops

A. Field Crops

Key Findings

- 1. The top five field crops in both Canada and Alberta in both 1996 and 2001 were, in descending order of area planted, Spring Wheat, Barley, Alfalfa, Canola, and “Other Tame Hay and Fodder”. On the other hand, for Northern Alberta, alfalfa was the leading crop followed closely by spring wheat, “other tame hay and fodder”, and with relatively smaller amounts of barley and canola.**

The total area planted in these five crops has declined slightly nationwide and in Alberta (3.4% and 2.6% respectively) but rose by 2.1% in northern Alberta. Total area planted for 2001, however, remains at approximately: 24 million hectares across Canada, 8 million hectares in Alberta, and 2.3 million hectares in northern Alberta. Alberta accounts for approximately 1/3 of associated area planted.

Notwithstanding the above, there have been significant changes within the five crops. The area planted with Spring Wheat and Barley has declined between 1996 and 2001. On the other hand, planting of Alfalfa has increased by more than 25% across Canada and in Alberta, and by 15% in northern Alberta. Canola area nationwide increased by approximately 7%, but declined by approximately 16% in Alberta and 19% in northern Alberta. “Other Tame hay And Fodder” crops have shown modest gains of approximately 7.5% nation-wide and a more significant almost 30% in Alberta and almost 20% in northern Alberta. Furthermore, other crops such as pulses are gaining prominence.

For comparison purposes, based upon Statistic Canada’s Land Tenure data (please reference pages 19 and 20 of this document for further details) in 2001, the area dedicated to the top five field crops accounted for approximately 35.7% of total agricultural land use nationwide (24.1 million out of a total of 67.5 million hectares), approximately 32.7% in Alberta (7.9 million out of a total of 24.1 million hectares) and approximately 41.7% in northern Alberta (approximately 2.3 million out of 5.4 million hectares).

The following table summarizes the major changes that have occurred with respect to the top five crop types planted.

TOP FIVE FIELD CROPS BY AREA (HECTARES 000 ¹)

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Spring Wheat	9,969	8,302	(16.7)	2,610	2,351	(9.9)	537,196	501,115	(6.7%)
Barley	5,241	4,697	(10.4)	2,337	1,984	(15.1)	388,712	344,076	(11.5%)
Alfalfa	3,598	4,504	25.2	1,213	1,585	30.6	554,657	640,717	15.5%
Canola	3,531	3,783	7.1	1,275	1,076	(15.6)	449,739	366,311	(18.6%)
Other Tame Hay /Fodder	2,612	2,810	7.6	710	923	29.9	335,479	401,913	19.8%
Total	24,951	24,096	(3.4)	8,145	7,919	(2.6)	2,208,090	2,254,132	2.1%

1. 1 hectare is equivalent to 2.471 acres

B. Fruits and Vegetables

Key Findings

1. **The total area planted with the top five fruits and vegetables has increased slightly; however, the composition has shifted and there are major regional differences (as might be expected with differing climates and soil conditions).**

Nationwide

The total area planted has increased by approximately 4.8% from 267,000 hectares to 279,000 hectares. However, this area represents only approximately 0.7% of the total area planted with crops in Canada in 2001. The top fruits and vegetables in 2001 in descending order are: vegetables; blueberries; sweet corn; apples; green peas; green beans; and grapes. Grapes and blueberries enjoyed the largest percentage growth, while apple and sweet corn plantings declined to the point where sweet corn dropped from the number two crop to the number three crop. The following table summarizes the major changes that have occurred with respect to the top fruit and vegetable types planted.

TOP FRUITS AND VEGETABLES - CANADA (HECTARES)

	1996	2001	% Change
Total	266,526	279,336	4.8
Vegetables	127,700	133,854	4.8
Sweet Corn	37,881	35,490	(6.3)
Green Peas	16,360	17,455	6.7
Blueberries	36,222	43,982	21.4
Green (Wax) Beans	9,256	12,141	31.2
Apples	31,592	25,825	(18.3)
Grapes	7,515	10,589	40.9

Alberta

The total area planted has increased by approximately 10.4% (from 9,754 to 10,764 hectares). This area represents only approximately 0.1% of the total area planted with crops in Alberta in 2001. The top fruits and vegetables in 2001 in descending order are: vegetables; sweet corn; green peas; “other vegetables”; saskatoons, strawberries and “other fruit”. “While still a relatively small portion of overall crop area, “other vegetables” (not specified) and “other fruits” (not specified) and saskatoons enjoyed the largest percentage increases, reflecting a trend to value-added, specialty production. Plantings of strawberries and sweet corn suffered declines in the area planted, possibly due to competition from cheaper United States and Mexican producers. The following table summarizes the major changes that have occurred with respect to the top fruit and vegetable types planted.

TOP FRUITS AND VEGETABLES - ALBERTA (HECTARES)

	1996	2001	% Change
Total	9,754	10,764	10.4
Vegetables	5,562	5,744	3.3
Sweet Corn	2,164	2,145	(0.9)
Green Peas	1,248	1,359	8.9
Saskatoons	351	617	75.8
Other Vegetables	196	630	221.4
Strawberries	184	145	(21.2)
Other Fruits	49	124	153.1

Northern Alberta

Comparisons for northern Alberta are perhaps less meaningful as the total area involved is relatively insignificant. For example, the total vegetable area in 1996 was only 250 hectares. Furthermore, there have been considerable changes among the predominant crops, although the amounts are minor. For the top seven crops planted in 1996, the total area planted has declined by approximately 68% (from 377 to 119 hectares). This area represents approximately 0.04% of the total area planted with crops in northern Alberta in 2001. The top seven fruits and vegetables in 2001, based upon their respective places in 1996, in descending order are: strawberries, “other fruits”, (not specified) other vegetables (not specified); turnips; sweet corn; cucumbers; and green peas. The following table summarizes the major changes that have occurred with respect to the top fruit and vegetable types planted.

TOP FRUITS AND VEGETABLES - NORTHERN ALBERTA (HECTARES)

	1996	2001	% Change
Total	377	119	(68.4%)
Strawberries	127	35	(72.4%)
Other Fruits	121	12	(90.0%)
Other Vegetables	50	25	(50.0%)
Sweet Corn	26	18	(30.7%)
Green Peas	8	17	112.5%
Cucumber	18	12	(50.0%)
Turnips	27	X	NA

C. Greenhouse, Mushroom, Nursery, Sod and Christmas Trees

Key Findings

- 1. The greenhouse area under cover has increased significantly nationwide and in Alberta but at a much smaller rate in northern Alberta.**

Nationwide, covered greenhouse space has increased by over 42% (from 12.9 million sq ft to 18.4 million sq ft). In Alberta, covered greenhouse space has increased 36% (from 752,000 sq ft to over 1 million sq ft.) This increased capacity helps to support the large increases in “specialty” crops and vegetables noted in other sections of this report. On the other hand, covered greenhouse space in northern Alberta has grown by only 5%.

- 2. Mushroom production capacity has declined slightly nationwide but increased slightly in Alberta, and is virtually non-existent in northern Alberta.**

Nationwide, mushroom area declined by 6.5% but remains at approximately 650,000 sq ft. A modest increase in mushroom capacity in Alberta of 4.8% raises capacity to approximately 44,000 sq ft. While there are some commercial mushroom growers, the amounts produced are very small and, the associated data were treated as confidential by Statistics Canada.

- 3. Nursery products have enjoyed modest increases in production area nationwide and in Alberta but actually declined significantly in northern Alberta.**

Nationwide, the capacity for nursery products increased by 5.8% to slightly less than 23,000 hectares (or, for perspective, about 0.0096% of the total of 24 million hectares of crops in Canada). In Alberta, nursery products capacity increased 7.8% to approximately 2,700 hectares. Significant increases in residential construction are largely accountable for the increased demand. In northern Alberta, despite heavy residential construction, nursery area declined almost 29% from 342 hectares to 243 hectares.

- 4. Sod capacity has increased the greatest in northern Alberta.**

Sod capacity increased by over 68% in northern Alberta as opposed to 13% in Alberta and 2% nationwide. The increase in sod capacity in northern Alberta (from 128 hectares to 216 hectares) is largely attributable to the landscaping needs of the strong housing and construction market in the areas of the province.

- 5. Areas dedicated to Christmas trees have declined by approximately 20% nationwide and in Alberta and by over 65% in northern Alberta.**

Nationwide, areas dedicated to Christmas tree plantations area declined by over 26% (from approximately 51,000 hectares to approximately 36,600 hectares). A similar decline (21.1%) occurred in Alberta, (where area decreased from 640 hectares to 505 hectares). Lower cost products from the United States and a trend to artificial trees account for the declines. The associated decline in northern Alberta was from 325 hectares to 113 hectares, or approximately 65%.

The following table compares and summarizes the major changes that have occurred with respect to the Greenhouse, Mushroom, Nursery, Sod and Christmas Trees sectors nationwide and in Alberta between 1996 and 2001.

GREENHOUSE, MUSHROOM, NURSERY, SOD AND CHRISTMAS TREES

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Greenhouse Area Under Cover^a	12,913,404	18,352,645	42.1	752,284	1,024,698	36.2	97,697	102,628	5.0
Mushrooms^a	673,345	629,644	(6.5)	41,672	43,666	4.8	0	0	0
Sub-total	13,586,749	18,982,289	39.7	793,956	1,068,364	34.5	97,696	102,628	5.9
Nursery Products^b	21,522	22,777	5.8	2,493	2,688	7.8	342	243	(28.9)
Sod^b	21,964	22,467	2.3	2,538	2,871	13.1	128	216	68.8
Christmas Trees^b	51,071	36,613	(26.4)	640	505	(21.1)	325	113	(65.2)

a) Square Metres

b) Hectares

II. Livestock and Animals

A. Non-Traditional Livestock

Key Findings

1. The types of “non-traditional” livestock that have enjoyed the largest percentage increase in numbers, nationwide and in Alberta and northern Alberta include: Elk; Bison; Llamas and Alpacas; and Deer.

On a percentage growth basis, each of the preceding sectors experienced growth of close to or in excess of 200% nationwide and in Alberta. In Alberta: Bison numbers increased by 250% from approximately 23,000 to approximately 79,000; Elk increased by almost 300% from approximately 7,000 to approximately 31,000; Llamas and Alpacas increased by almost 250% from approximately 4,000 to approximately 13,000; and Deer increased by almost 200% from approximately 3,000 to approximately 8,000.

2. “Non-traditional livestock types experiencing more modest or “mixed” rates of growth include: Wild Boar; Fox; Mink; Goats; and Horses and Ponies.

Wild Boar numbers increased by approximately 80% in Alberta and almost 4,000 new animals were introduced to northern Alberta, however, numbers declined by 12% on a nationwide basis. Foxes declined by approximately 63% nationwide. Mink increased by approximately 3% nationwide and constituted the largest group on an absolute number basis (in excess of 1.3 million); however, numbers in Alberta and northern Alberta dropped significantly. Goat numbers increased by over 45% nationwide, 28% in Alberta and 72% in northern Alberta, largely on the popularity of goat’s milk and cheese. Horse and Pony numbers increased by almost 4% nationwide, by almost 7% in Alberta and by 32% in northern Alberta.

3. The sector experiencing the largest decline was rabbits.

Nationwide, rabbit inventories declined by approximately 10%. In Alberta, the decline was more than 70%, although it is noted that the rabbit inventory is not particularly large (declining from approximately 19,000 to approximately 6,000).

The following table compares and summarizes the major changes that have occurred with respect to “Other Livestock” nationwide and in Alberta between 1996 and 2001.

OTHER LIVESTOCK (NUMBER OF ANIMALS)

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Horses/ Ponies	443,889	460,569	3.8	149,960	159,962	6.7	31,391	41,538	32.3
Goats	125,819	182,851	45.3	32,960	42,270	28.2	7,941	13,682	72.3
Wild Boar	37,659	33,131	(12.0)	4,499	8,067	79.3	-	3,985	Not Appl
Fox	41,997	15,346	(63.5)	1,030	X	X	-	-	-
Mink	1,306,961	1,349,412	3.2	44,976	X	X	-	-	-
Bison	45,437	145,094	219.3	22,782	79,731	250.0	13,094	35,770	173.2
Llamas/ Alpacas	8,669	25,782	197.4	3,692	12,894	249.2	443	5,897	1,231.2
Deer	50,859	53,285	4.7	2,812	8,331	196.3	a	3,500	a
Elk	19,024	74,478	291.5	7,875	31,304	297.5	a	19,825	a
Rabbits	285,366	255,762	(10.4)	18,982	5,666	(70.2)	7,627	1,800	(76.4)
Total	2,365,680	2,595,710	9.7	289,568	348,225	20.2	64,557	125,997	95.2

X Data hidden for reasons of confidentiality.

a Due to reasons of confidentiality and changes to Deer and Elk records in 1996 a comparison for northern Alberta was not possible. The aggregate Deer and Elk numbers in 1996 were 4,061 resulting in a combined Deer and Elk percentage increase of 474.4%.

B. Sheep and Lambs

Key Findings

- 1. The number of farms reporting Sheep and Lambs has grown modestly, despite the decline in the total number of farms.**

Nationwide, the number of farms with Sheep and Lambs has grown by almost 12% from approximately 12,000 to approximately 13,000. In Alberta, the corresponding growth rate has been approximately 6% (from approximately 2,800 farms to approximately 3,000 farms). In northern Alberta, the number of farms with sheep and lambs grew 12% from 682 to 763. Farms with Sheep and Lambs constitute approximately 5% of the total number of farms nationwide in Alberta and in northern Alberta.

- 2. The percentage increase in the absolute number of Sheep and Lambs has grown more rapidly nationwide than in Alberta and northern Alberta.**

Nationwide, the number of sheep has grown by almost 46%, or from approximately 865,000 to almost 1.3 million. All Sheep and Lamb types (Rams, Ewes and Lambs) have experienced approximately the same level of growth. In Alberta, the rate of growth has been closer to 18%; however, there has been a slightly larger increase in the number of Rams. Sheep and Lamb numbers grew by approximately 12% in northern Alberta; however, Rams and Ewes increased over 25% and Lambs by only 2%.

The following table compares and summarizes the major changes that have occurred with respect to "Sheep and Lambs" nationwide and in Alberta between 1996 and 2001.

SHEEP AND LAMBS (NUMBER OF ANIMALS)

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Farms									
All Farms	276,548	246,923	(10.7)	59,007	53,652	(9.1)	17,107	15,775	(7.8)
Farms With Sheep and Lambs	11,790	13,232	12.2	2,814	2,987	6.1	682	763	11.9
Animals									
Rams	19,683	29,539	50.1	5,265	6,621	25.8	1,141	1,463	28.2
Ewes	427,851	621,151	45.2	111,792	131,077	17.3	25,619	32,151	25.5
Lambs	417,316	611,758	46.6	142,760	169,604	18.8	39,079	39,905	2.1
Total	864,850	1,262,448	45.9	259,817	307,302	18.2	65,839	73,519	11.7

C. Cattle and Calves

Key Findings

1. The number of farms reporting Cattle and Calves has declined at all levels (nationwide and in Alberta and northern Alberta).

Nationwide, the number of farms with Cattle and Calves has declined by 14% from approximately 142,000 to approximately 122,000. In Alberta, the corresponding decline has been approximately 13% (from approximately 37,000 farms to approximately 32,000 farms). In northern Alberta, the decline was 11.2%, or from 9,683 to 8,595. Farms with Cattle and Calves constitute approximately 50% of the total number of farms nationwide, approximately 60% in Alberta, and 55% in northern Alberta.

2. The total number of Cattle and Calves has; however, increased modestly.

Nationwide, the number of Cattle increased by approximately 4% (from approximately 15 million to approximately 15.5 million. In Alberta, the growth rate was approximately 11% (or from approximately 5.9 million to 6.6 million animals). In northern Alberta the increase was 6.7% from 1.18 million to 1.26 million.

3. Dairy Cows and Bulls have experienced the largest declines in numbers, while Calves Under 1 year old and Heifers 1 Year and Older have experienced the largest percentage growth in numbers.

The number of Dairy Cows declined by approximately 14% nationwide (from approximately 1.2 million to approximately 1.1 million). In Alberta, the corresponding decline was a sharper 18% (from approximately 102,000 to approximately 84,000). In northern Alberta it was even more severe from approximately 14,000 to 9,000, or 36%. Calves Under 1 Year Old increased by approximately 11% nationwide (from approximately 4.7 million to approximately 5.2 million). In Alberta, the corresponding increase was almost 17%, or from approximately 1.9 million to 2.2 million. In northern Alberta, the increase was 14% or from approximately 415,000 to 475,000 animals. The number of Heifers 1 Year Old or Older increased by; approximately 9% nationwide (from approximately 2.3 million to approximately 2.5 million); increased approximately 22% in Alberta (from approximately .9 million to approximately 1.2 million); and increased approximately 15% (from 144,000 to 166,000) in northern Alberta.

4. Calves Under 1 Year and Beef Cows comprise the largest portions of the Cattle and Calves inventories nationwide and in Alberta and northern Alberta.

Nationwide and in Alberta, Calves Under 1 Year Old make up approximately 33% of the total number of animals; however, the figure for northern Alberta is slightly higher at almost 38%. Beef

Cows make up an additional approximately 31% of the total nationwide and in Alberta but almost 40% in northern Alberta. The following table compares the “herds” for the year 2001.

COMPOSITION OF CATTLE AND CALF HERDS

	Canada		Alberta		Northern Alberta	
	2001	% of Total	2001	% of Total		% of Total
Animals						
Calves Under 1 Year	5,203,770	33.6	2,169,607	32.8	474,874	37.6
Steers 1 Year and Older	1,731,100	11.1	991,554	15.0	84,988	6.8
Heifers 1 Year and Older	2,492,996	16.0	1,159,329	17.5	166,410	13.1
Dairy Cows	1,060,965	6.8	84,044	1.3	9,225	0.7
Beef Cows	4,802,400	30.9	2,099,288	31.7	504,007	39.9
Bulls 1 Year and Over	260,218	1.6	111,379	1.7	24,634	1.9
Total	15,551,449	100	6,615,201	100	1,264,138	100

5. Cattle farms are the most common type in Alberta.

Cattle farms accounted for 44% of total farms (in contrast to 25% for wheat, grain and oilseeds). These proportions are essentially unchanged since 1996.

The following table compares and summarizes the major changes that have occurred with respect to “Cattle and Calves” nationwide and in Alberta between 1996 and 2001.

CATTLE AND CALVES (NUMBER OF FARMS AND NUMBER OF ANIMALS)

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Farms									
All Farms	276,548	246,923	(10.7)	59,007	53,652	(9.1)	17,107	15,765	(7.8)
Cattle / Calf Farms	142,157	122,066	(14.1)	36,560	31,774	(13.1)	9,683	8,595	(11.2)
Animals									
Calves Under 1 Year	4,673,641	5,203,770	11.3	1,858,679	2,169,607	16.7	414,741	474,874	14.2
Steers 1 Year and Older	1,734,113	1,731,100	(0.2)	892,696	991,554	11.1	107,705	84,988	(21.1)
Heifers 1 Year and Older	2,285,988	2,492,996	9.1	952,563	1,159,329	21.7	144,709	166,410	15.0
Dairy Cows	1,227,732	1,060,965	(13.6)	102,830	84,044	(18.3)	14,474	9,225	(36.3)
Beef Cows	4,680,585	4,802,400	2.6	2,016,889	2,099,288	4.1	475,683	504,007	6.0
Bulls 1 Year and Over	290,975	2,60,218	(10.6)	118,600	111,379	(6.1)	26,023	24,634	(5.3)
Total	14,893,034	15,551,449	4.4	5,942,257	6,615,201	11.3	1,184,335	1,264,138	6.7

D. Pigs

Key Findings

1. On a percentage basis, the number of farms with pigs has declined fairly significantly.

Nationwide, the number of farms with pigs has declined by almost 27% (from approximately 21,000 to approximately 15,000). In Alberta, the corresponding decline has been almost 36% (from approximately 4,200 to approximately 2,700). In northern Alberta, the decline was slightly more pronounced at almost 39% (from 1,385 to 849). Nationwide, the number of farms with pigs was 6.2% of the total number of farms; for Alberta, the corresponding figure was 4.9%; and for northern Alberta the figure was 5.4%.

2. Notwithstanding “1”, above, the number of pigs has increased moderately, nationwide and in Alberta, but has declined in northern Alberta.

Nationwide, the number of pigs increased by approximately 26% (or from 11 million to 14 million). The corresponding increase for Alberta was a smaller 17% (or from 1.7 million to 2.0 million). On the other hand, the number of pigs in northern Alberta declined by 9.7% to 223,000.

Pigs for breeding stock increased by approximately 29% nationwide and 15% in Alberta. “Other Pigs”, the largest grouping representing about 88% of the total numbers increased by 26% nationwide and approximately 18% in Alberta. Boars, while a relatively small portion of the total, decreased by 23% nationwide and approximately 19% in Alberta, and 31% in northern Alberta.

The following table compares and summarizes the major changes that have occurred with respect to Pigs nationwide and in Alberta between 1996 and 2001.

PIGS (NUMBER OF FARMS AND ANIMALS)

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Farms									
All Farms	276,548	246,923	(10.7)	59,007	53,652	(9.1)	17,107	15,765	(7.8)
Farms With Pigs	21,105	15,472	(26.7)	4,173	2,677	(35.8)	1,385	849	(38.7)
Animals									
Boars	59,416	45,771	(23.0)	11,471	9,324	(18.7)	2,240	1,541	(31.2)
Breeding Sows and Gilts	1,089,007	1,410,724	29.5	174,195	200,478	15.1	26,729	24,547	(8.2)
Other Pigs	9,892,039	12,502,277	26.4	1,544,144	1,817,731	17.7	217,708	196,717	(9.6)
Total	11,040,462	13,958,772	26.4	1,729,810	2,027,533	17.2	246,677	222,805	(9.7)

“Other pigs” includes nursing and weaner pigs, and growing and finishing pigs.

E. Poultry Inventory

Key Findings

- 1. In general, poultry inventories increased by approximately 25% nationwide and in Alberta and by almost 34% in northern Alberta between 1996 and 2001.**

Nationwide, inventories increased by almost 23% to exceed 265 million birds. The corresponding increase for Alberta was almost 27% to exceed 25 million birds. Northern Alberta inventories increased by 34% to approximately 2.9 million birds. Changes in types of birds comprising the overall inventory were comparable nationwide and in Alberta with the exceptions of Turkey and "Other Birds". Nationwide, the number of Turkeys declined by 5.5% to approximately 8.1 million, while in Alberta they increased by 2.6% to approximately 864,000. Northern Alberta experienced a 32% decline in the number of turkeys (from approximately 145,000 to approximately 98,000) "Other Poultry", encompassing geese, ducks, roosters, ostriches, emus, pheasants, quail, wild turkeys etc. increased by almost 60% nationwide to approximately 5.3 million birds, and declined by 3.5% to approximately 220,000 birds in Alberta. In northern Alberta "Other Poultry" experienced a 270% increase from 30,000 to approximately 115,000 birds.

- 2. On the basis of percentage distribution between the total numbers, the composition of the poultry inventories nationwide and in Alberta is similar, however, northern Alberta has a higher proportion of Laying Hens and a lower proportion of Broilers, Roaster and Cornish Game Hens.**

The following table compares and contrasts the nationwide and Alberta poultry inventories for the year 2001.

	Canada		Alberta		Northern Alberta	
	2001	% of Total	2001	% of Total	2001	% of Total
Animals						
Hens and Chickens	126,159	47.5	12,175	47.9	1,351,291	46.4
Broilers, Roasters and Cornish Hens	87,437	32.9	8,792	34.5	748,103	25.8
Pullets for Laying Under 19 Weeks	12,470	4.7	1,067	4.2	176,141	6.0
Laying Hens 19 Weeks and Over	26,252	9.9	2,316	9.1	427,039	14.6
Turkeys	8,116	3.1	864	3.4	98,771	3.3
Other Poultry	5,312	1.9	220	.9	114,856	3.9
Total	265,746	100	25,434	100	2,916,201	100

The following table summarizes the changes in Canada and Alberta poultry inventory between 1996 and 2001.

POULTRY INVENTORY (NUMBER OF BIRDS 000s)

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Animals									
Hens and Chickens	102,255	126,159	23.4	9,486	12,175	28.4	1,000	1,351	34.9
Broilers, Roasters and Cornish Hens	68,936	87,437	26.8	6,584	8,792	33.5	485	748	54.0
Pullets for Laying Under 19 Weeks	10,467	12,470	19.1	877	1,067	21.7	171	176	3.2
Laying Hens 19 Weeks and Over	22,851	26,252	14.9	2,024	2,316	14.4	345	427	23.8
Turkeys	8,586	8,116	(5.5)	843	864	2.6	145	98	(32.2)
Other Poultry ¹	3,321	5,312	59.9	228	220	(3.5)	31	115	271.4
Total	216,417	265,746	22.7	20,042	25,434	26.9	2,179	2,916	33.8

1. Includes geese, ducks, roosters, ostriches, emus, pheasants, quail, wild turkeys etc.

F. Chicken and Turkey Production

Key Findings

- 1. Production (and consumption) of chicken and turkey has increased considerably; however, the number of producers has declined.**

The number of farms producing chickens and turkeys has declined 43.7% nationwide (from 17,855 to 10,051) and 56.6% (from 3,165 to 1,374) in Alberta. However, the remaining producers (presumably larger and more competitive) have enjoyed a market that has grown by 31.4% nationwide and by 40.6% in Alberta. Smaller birds such as Broilers, Roasters and Cornish Game Hens (immature birds) account for the largest increase. As detailed in the following table, production/consumption of poultry on a per capita basis has increased over 20% since 1996 and now stands at approximately 40 kg per capita.

	Canada			Alberta		
	1996	2001	% Change	1996	2001	% Change
Production	960,800,593	1,262,989,693	31.4	85,644,981	120,455,726	40.6
Population	28,847,000	31,110,600	8.9	2,697,000	3,059,100	13.4
Per Capita	33.3	40.6	21.9	31.8	39.3	23.6

In comparison, the annual per capita poultry consumption in 1977 and 1987 were approximately 19.1 kg and 25.7 kg respectively, according to Alberta Agriculture Food and Rural Development.

The following table summarizes the changes in Canada and Alberta chicken and turkey production between 1996 and 2001.

CHICKEN AND TURKEY PRODUCTION

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Total Farms	276,548	246,923	(10.7)	59,007	53,652	(9.1)	17,107	15,765	(7.8)
Poultry Farms									
Broilers, Roasters and Cornish Hens	13,051	7,162	(45.1)	2,218	953	(57.0)	724	233	(67.8)
Turkeys	4,804	2,889	(39.9)	947	421	(55.5)	293	87	(70.3)
Sub-total	17,855	10,051	(43.7)	3,165	1,374	(56.6)	1,017	320	(68.5)
Kilograms of Production									
Broilers, Roasters and Cornish Hens	803,497,386	1,084,811,510	35.0	72,660,726	105,387,692	45.0	5,525,714	8,958,801	62.1
Turkeys	157,303,207	178,178,183	13.3	12,984,255	15,068,034	16.0	2,358,469	2,638,696	11.9
Total Production	960,800,593	1,262,989,693	31.4	85,644,981	120,455,726	40.6	7,884,183	11,597,497	47.1

III. Farm Management

A. Certified Organic Farms

Key Findings

- 1. The number of farms reporting “Certified Organic” production, in comparison to the total number of farms nationwide and in Alberta is still very small.**

2001 is the first year for which information was collected in the Agricultural Census pertaining to Certified Organic farming. As such, it is not possible to make comparisons with an earlier year. Nationwide, 2,230 farms out of a total of approximately 246,000 reported to be “Certified Organic”. The corresponding figure for Alberta was 197 out of a total of approximately 54,000 farms, and for northern Alberta, a slightly higher .006% or 93 out of 15,775 farms. Field crops comprise the largest type of organic production, although some farms have more than one type of production.

By comparison, "Organic farming is one of the fastest growing segments of U.S. agriculture during the 1990s. USDA estimates that the value of retail sales of organic foods in 1999 was approximately \$6 billion. The number of organic farmers is increasing by about 12 percent per year and now stands at about 12,200 nationwide, most of them small-scale producers. According to a recent USDA study, certified organic cropland more than doubled from 1992 to 1997. Two organic livestock sectors, eggs and dairy, grew even faster." ¹ Additional commentary regarding the Certified Organic industry in the United States and other parts of the world is contained in Chapter 6.

The following table provides a summary and comparison of Certified Organic farms and production in Canada and Alberta for the year 2001.

CERTIFIED ORGANIC PRODUCTION IN 2001

	Canada		Alberta		Northern Alberta	
	Number	As a % of All Farms	Number	As a % of All Farms	Number	As a % of All Farms
Total Farms	246,923		59,007		15,775	
Farms Reporting Certified Organic Products	2,230	.009	197	.004	93	.006
Type of Products		Type as a % of All COFs		Type as a % of all COFs		Type as a % of all COFs
Fruits, Vegetables or Greenhouse Crops	614	27.5	21	10.7	5	5.4
Field Crops	1,442	64.7	142	72.1	75	80.6
Animal or Animal Products	381	17.1	60	30.5	27	29.0
Other (Maple Syrup, Herbs etc.)	340	15.2	30	15.2	12	12.9

B. Land and Tenure

Key Findings

1. The proportion of land used for farming that is owned has declined slightly.

Nationwide, the proportion of farming land that is owned has declined by approximately 1.8% (from 43.1 million hectares to approximately 42.3 million hectares). The corresponding decline for Alberta is 2.1% (from approximately 12.7 million hectares to 12.4 million hectares), and for northern Alberta it is 1.6% (down from 3.4 million to 3.3 million hectares). The portion of land that is rented or leased from sources **other than** government has increased by 4.6% nationwide, by 7.1% in Alberta, and 14.1% in northern Alberta. The area leased from government has also

¹ ([USDA News Release, no. 0425.00](#), Dec. 20, 2000)

declined by approximately 5% nationwide but has stayed more or less constant in Alberta, and has increased by 4.6% in northern Alberta.

2. The overall land in production has declined slightly.

Nationwide, total farmland decreased by 0.8% (from approximately 68.06 million hectares to approximately 67.5 million hectares). The corresponding decline was less in Alberta (0.2%) or from approximately 21.7 million hectares to approximately 21.1 million hectares. In northern Alberta, agricultural land increased by 2.3% from approximately 5.3 million to 5.4 million hectares. Improved agricultural practices account for a large portion of the decline in land required.

The following table summarizes the changes in Land Tenure in Canada and Alberta between 1996 and 2001.

OVERVIEW OF LAND TENURE (HECTARES)

Land Area	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Owned	43,061,905	42,266,632	(1.8)	12,685,104	12,424,756	(2.1)	3,443,860	3,389,128	(1.6)
Rented, Leased or Shared from non-Gov't	15,140,575	15,837,148	4.6	4,244,276	4,544,907	7.1	952,447	1,086,640	14.1
Leased From Government	9,853,865	9,400,144	(4.6)	4,100,308	4,098,285	0.0	888,256	929,506	4.6
Total	68,056,445	67,503,924	(0.8)	21,685,104	21,067,947	0.2	5,284,563	5,404,274	2.3

C. Applications to the Land

Key Findings

1. The proportion of overall lands used for growing crops has increased marginally.

Nationwide, land in crops increased by 4.2% (from approximately 34.9 million hectares to 36.4 million hectares). The corresponding increase for Alberta was 1.9%, (an increase from approximately 9.5 million hectares to 9.7 million hectares). The corresponding increase for northern Alberta was a slightly larger 5.2% (an increase from approximately 2.6 million hectares to 2.7 million hectares). In comparison to total agricultural lands, those used for crops represented approximately 54% of the 67.5 million hectare total for the nation; approximately 46% of the 21.0 million hectare total for Alberta, and approximately 50% of the 5.4 million hectare total for northern Alberta.

2. Commercial fertilizers and herbicides represented the two most frequently used applications.

Commercial fertilizers and herbicides were applied to approximately 70% of lands nationwide in 2001; approximately 68% of lands in Alberta; and approximately 56% of land in northern Alberta. Use of commercial fertilizers declined by approximately 4% nationwide and in Alberta, and by 9% in northern Alberta. The use of herbicides increased by approximately 7% to 10% “across the board”.

3. Other noteworthy changes and differences include a general decline in irrigation and differences (some significant) in the use of fungicides, insecticides and manure.

Use of irrigation declined by approximately 8% nationwide to encompass approximately 2% of total croplands nationwide (784,000 hectares out of 36.4 million). In Alberta use of irrigation declined by approximately 3% to include approximately 5.1% of croplands (approximately 500,000 hectares out of 9.7 million) in 2000. The drop in northern Alberta was a sharper 55% from 3, 200 hectares to 1,400 hectares.

Use of fungicides increased by over 41% nationwide to encompass approximately 7% of total croplands nationwide (2.6 million hectares out of 36.4 million). On the other hand, use actually declined in Alberta by 0.3% to include approximately 5.6% of croplands (approximately 542,000 hectares out of 9.7 million) in 2000. In northern Alberta the decline was 8% from 97,000 hectares to 84,000 hectares.

Nationwide, manure was applied to approximately 7.5% of croplands (2.7 million hectares out of 36.4 million hectares in 2000); however, the corresponding figure for Alberta was approximately 5.2% (515,000 hectares out of 9.7 million hectares). In northern Alberta manure was applied to approximately 104,000 out of 2.7 million hectares. The most significant decline in type of application was via irrigation systems where the practice declined 27% nationwide and 55% in Alberta (likely over concerns for ground water contamination, in part from concentrated feedlots). The most significant increase in type of application was via liquid injection into the soil (where the practice increased by 145% nationwide and by 37% in Alberta). Injected Liquid spreading increased 98% in northern Alberta; however, the land involved was less than 2,500 hectares.

The following table compares and summarizes the changes in Applications to the Land in Canada and Alberta between 1995 and 2000.

APPLICATIONS TO THE LAND (HECTARES)

	Canada			Alberta			Northern Alberta		
	1995	2000	% Change	1995	2000	% Change	1995	2000	% Change
Total Land	68,056,445	67,503,924	(0.8)	21,685,104	21,067,947	0.2	5,284,563	5,404,274	2.3
Land in Crops	34,919,497	36,395,948	4.2	9,546,756	9,728,394	1.9	2,565,996	2,700,233	5.2%
Applications									
Herbicides	23,265,200	25,901,478	11.3	6,049,812	6,624,090	9.5	1,294,699	1,386,958	7.1%
Insecticides	2,935,208	2,225,986	(24.2)	299,565	342,910	14.5	52,350	97,100	85.5%
Fungicides	1,818,476	2,572,445	41.5	543,389	541,801	(0.3)	96,555	88,406	(8.4%)
Irrigation	856,151	784,486	(8.4)	516,611	499,251	(3.3)	3,242	1,442	(55.5%)
Commercial Fertilizer	24,943,181	24,015,340	(3.7)	7,031,584	6,700,191	(4.7)	1,693,863	1,533,012	(9.5%)
Method of Manure Application									
Solid Spreader	1,881,459	1,828,574	(2.8)	389,807	419,215	7.5	74,148	87,937	18.6%
Irrigation System	66,878	48,288	(27.8)	4,389	1,969	(55.1)	342	-	100.0%
Surface Liquid Spreader	579,190	718,178	24.0	68,834	76,686	11.4	13,620	14,536	6.7%
Injected Liquid Spreader	51,513	126,309	145.2	12,373	17,000	37.4	1,174	2,346	99.8%
Total	2,579,040	2,721,349	5.5	475,403	514,870	8.2	89,284	104,819	17.4%

D. Paid Agricultural Work

Key Findings

- 1. The number of weeks of paid work, both year round and seasonal or temporary has increased nationwide and in Alberta.**

This observation would support the shift to larger, corporate farms that has been noted.

- 2. The decline in the number of farms reporting paid work has not been as severe in northern Alberta as in other parts of Canada.**

Nationwide between 1995 and 2000, the number of farms reporting paid work declined by 14.1% from 120,172 to 103,280. In Alberta, the decline was 11.2% from 23,890 to 21,218; however, in northern Alberta, the decline was only 0.07% (from 2,314 to 2,297).

3. Notwithstanding the above, the number of farms reporting paid work is less than 50% of the total number of farms, and the situation is even worse in northern Alberta.

In 1995, the number of farms reporting paid work was 120,172 nationwide (or approximately 44% of total farms); the corresponding figure for Alberta was 23,890 (or approximately 40% of total farms); and the figure for northern Alberta was 2,297 (or approximately 15% of the total of 15,775 farms).

The following table provides a summary and comparison of Paid Work on Farms and in Canada and Alberta between 1996 and 2001.

PAID AGRICULTURAL WORK

Canada				Alberta			Northern Alberta		
	1995	2000	% Change	1995	2000	% Change	1995	2000	% Change
Farms Reporting Paid Work	120,172	103,280	(14.1)	23,890	21,218	(11.2)	2,314	2,297	(0.07)
Weeks of Paid Work									
Year Round	3,987,070	4,597,758	15.3	745,227	805,212	8.0	125,251	125,228	- -
Seasonal or Temporary	2,373,283	2,503,494	5.5	262,837	279,640	6.4	59,340	64,769	9.1

E. Gross Receipts

Key Findings

1. In general, there is a trend that sees the number of farms with very low incomes declining rapidly and the number with large incomes increasing to offset the “dying” small farms.

The number of farms with incomes of less than \$10,000 per year declined by approximately 25% nationwide and in all of Alberta, but by only 17% in northern Alberta. In contrast, the number of farms with incomes greater than \$500,000 increased by over 50% nationwide, in Alberta and in northern Alberta, reflecting a trend toward more “corporate” farms with more sophisticated skill requirements. The number of farms with incomes over \$500,000 per year increased to almost 13,000 nationwide, almost 2,800 in Alberta and 400 in northern Alberta. The largest group of farms, in all cases, is that in the \$100,000 to \$29,999 income band.

The following table, using Gross Receipts at 2000 prices, compares and summarizes farm income nationwide and in Alberta and makes comparisons with 1995.

GROSS RECEIPTS AT 2000 PRICES

	Canada			Alberta			Northern Alberta		
	1995	2000	% Change	1995	2000	% Change	1995	2000	% Change
Less than \$10,000	71,175	54,166	(23.9)	13,924	10,089	(27.5)	4,383	3,645	(16.8)
\$10,000 to \$49,999	85,608	76,284	(10.9)	19,602	17,900	(8.7)	5,915	5,963	0.8
\$50,000 to \$99,999	42,587	35,255	(17.2)	9,694	8,526	(12.0)	2,792	2,599	(6.9)
\$100,000 to \$249,999	51,221	47,079	(8.1)	10,619	10,131	(4.6)	2,511	2,439	(2.9)
\$250,000 to \$499,999	17,579	21,396	21.7	3,412	4,230	24.0	650	785	20.8
\$500,000 and Over	8,378	12,743	52.1	1,756	2,776	58.1	252	388	54.0
Total	276,548	246,923	(10.7)	59,007	53,653	(9.1)	16,503	15,819	(4.1)

F. Gross Farm Receipts and Expenses

Key Findings

1. Farm expenses have exceeded the cost of inflation, and receipts have not kept pace.

Nationwide, expenses increased by approximately 25% between 1995 and 2000. In Alberta, the corresponding increase was even greater at approximately 34%, but was only 21.3% in northern Alberta. In contrast, gross receipts increased by only approximately 19% nationwide, 25% in Alberta and 14.4% in northern Alberta.

2. Farmers have also experienced sharp drops in revenue from other sources such as Sales of Forest Products.

Sales of Forest Products represent a very small portion of overall farm receipts (\$117 million compared to approximately \$38 billion nationwide, \$7 million compared to \$9.9 billion in Alberta and \$5 million out of \$1.5 billion in northern Alberta), however, the declines exacerbate an already poor situation.

The following table compares and summarizes the changes in Gross Receipts and Expenses in Canada and Alberta between 1996 and 2001.

GROSS FARM RECEIPTS AND EXPENSES (\$MILLIONS)

	Canada			Alberta			Northern Alberta		
	1995	2000	% Change	1995	2000	% Change	1995	2000	% Change
Operating Expenses	26,669.7	33,213.1	24.5	6,669.5	8,908.5	33.6	1,160.5	1,408	21.3
Gross Farm Receipts	32,230.4	38,298.7	18.8	7,911.1	9,919.5	25.4	1,350	1,545	14.4
Sales of Forest Products	180.1	117.4	(34.8)	26.5	7.1	(73.0)	13	5	(62.8)

G. Computer Use

Key Findings

1. Computer use in northern Alberta is still relatively low.

The number of farms using computers has increased by over 60% nationwide and in Alberta between 1996 and 2001 but only 24% in northern Alberta. Furthermore, the number of farms using computers as a percentage of total farms is only 34% as opposed to approximately 40% for Alberta and nationwide. By comparison, approximately 59% of Canadian households used computers in 2001. Greater access to the Internet in urban areas is the primary reason for the difference.

2. Bookkeeping was the most common use of computers in 2001.

Nationwide, approximately 78% of farms with computers used them for bookkeeping; the corresponding figure for Alberta was also 78%, and that for northern Alberta 76%. The other major uses of computers in declining order of use were: Internet; Word processing; E-mail; and Livestock Record Keeping.

The following table provides a summary and comparison of the use of computers in Canada and Alberta in 1996 and 2001. It is noted that specific uses of computers were not recorded before 2001.

COMPUTER USE

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Farms	276,548	246,923	(10.7)	59,007	53,652	(9.1)	17,107	15,775	(7.8)
Farms Using Computers	58,724	97,378	65.8	13,491	21,813	61.6	4,366	5,414	24.0
Farms Using Computers as a % of Total Farms	21.2	39.4		22.9	40.1		25.5	34.3	
Use									
Bookkeeping		75,522			17,039			4,126	
Livestock Record Keeping		39,854			10,035			2,302	
Word Processing		62,874			15,062			3,661	
Internet		68,549			15,658			3,768	
E-mail		61,507			14,468			3,413	
Other		537			141			28	

IV. Concluding Comments

While users of the preceding information may draw additional conclusions and /or may wish to undertake analysis of other sectors according to their own needs and interests, the balance of this report (Chapters 3 through 10) provides a more detailed discussion of a number of sectors deemed to be important, as a result of changes noted in this chapter, or on the basis of requests received from Clearinghouse stakeholders. The presentations in each chapter are primarily based upon a review of secondary literature sources along with some interviews that could be scheduled. The issues or sectors, as first presented in the “Organization of the Report” section in Chapter 1, are:

- ❑ Chapter 3 – The Greenhouse Industry;
- ❑ Chapter 4 – Functional Foods and Nutraceuticals;
- ❑ Chapter 5 – Non-Timber Forest Products;
- ❑ Chapter 6 - Certified Organic Farming;
- ❑ Chapter 7 – Transgenic (Genetically Modified) Foods;
- ❑ Chapter 8 – Agri-Tourism;
- ❑ Chapter 9 - Non-Traditional Livestock; and
- ❑ Chapter 10 – Other Miscellaneous Crops and Sectors.

In each chapter an attempt is made to provide an overview of size and growth potential as well as issues and dynamics; many of which have an impact on the discussion of the “Employment Opportunities and Training Needs” section that follows each chapter. It should be noted that the stage of development within sectors has had an impact on the literature available, and consequently the detail and precision of discussions in some cases. For example, the Transgenic Foods sector is relatively new and evolving, and encompass a very broad area, resulting a more “general discussion”. On the other hand, Agri-Tourism or

aspects of Non-Traditional Livestock are more “hands on” and lend themselves to more detailed discussions.

The distinction between Chapter 4 “Functional Foods and Nutraceuticals” and Chapter 5 “Non-Timber Forest Products” is not precise in all cases. For example, there are a number of spices and herbal remedies that could be in either category. However, this report attempts to address issues based upon the literature and statistics available over the shorter-term nature of the assignment.

Notwithstanding the specific discussions of “Employment Opportunities and Training Needs” in each chapter, a number of common “themes” or needs must be superimposed in all cases, as the agricultural landscape has changed in more ways than can be enumerated in the Agricultural Census. Two fundamental themes that **must** underlie all programming include:

- **Fostering innovation and entrepreneurship and adding value** – the future of agriculture is moving away from a “commodity mindset” to more sophisticated niche markets, in many cases driven for the foreseeable future by the aging “baby boomers”. At the risk of being cliché, the best futures will go to those who are best able to tap into the changing dynamics whether it be as a result of the development of superior technology, or perhaps at the other extreme via the a better ability to meet the needs of the “clients”.

- **More sophisticated management skills** – much of agriculture is increasingly moving in the direction of being “big business”. The sums of money and risks involved are huge in some cases. Farmers are also finding it necessary to develop their own markets. In the future it will be vital for farmers to have the skills - or at least know how to create partnerships with others who are like minded or with service providers such as relevant professionals or “Community Futures” organizations or “Innovation Centres” - to develop business and marketing plans, make contacts in foreign markets, manage larger sums of money, develop and foster contacts to best manage supply and demand, communicate (sometimes in foreign languages) and possibly even manage larger numbers of staff.

“Value-added Agriculture” is addressed briefly, along with some other issues, in Chapter 10; however, a separate, major chapter has not been prepared. The rationale is that “value-added” transcends all areas or sectors of agriculture. Based upon the innovation and entrepreneurial nature of individuals, the opportunities for combinations and overlap between the sectors are substantial - for example the greenhouse and certified organic sector - to supply fresh local organic produce in the winter. Each overlap, or potential overlap may present a unique set of opportunities to add value, or training issues or implications that cannot be foreseen within the context of his report.

Finally, the discussion that follows is intended to be of a “general path finding” nature to help to determine priorities and potential future direction. In all cases, the risks and costs associated with new programming are substantial, and additional detailed research and discussion with a variety of stakeholders (students, industry, other colleges, and assorted professionals) will be necessary to make the decision to proceed in a certain area and to begin to develop concise and effective course material.

Chapter 3 **The Greenhouse Industry**

I. Introduction

The greenhouse industry encompasses the growing of vegetables, flowers and other crops such as ornamental and seedlings under protected cover. The protected cover allows year-round growing as immature crops are protected from weather and predators under controlled conditions. As a result, a wider array of crops can be grown and it is possible to supply fresh product year round, although costs are typically higher due to heating and other infrastructure requirements, such as watering systems. Greenhouse operations typically also have an area of field crops or operations that are not protected.

II. Market Overview

Much of the commentary in this section is based upon the results of a survey conducted by the Alberta Greenhouse Growers Association in June 2000. Where possible, in some cases, comparisons are made with Canada's nationwide industry.

A. Indicators of General Size

The size of the Alberta greenhouse industry is estimated at 11.761 million square feet (1.09 million sq. metres) with approximately 400 operations. The year 2000 value of the industry is estimated to be about CDN \$ 95 million. Industry experts expect steady growth of 2% to 4% per year. The \$95 million total for greenhouse production in Alberta does not include North America's fastest-growing hobby - home gardening.

As presented in the following table, Medicine Hat and Edmonton are the two cities with the largest concentration of greenhouses.

GREENHOUSE AREA BY REGION

Region	Greenhouse Area (ft ²)	Percent of Total
1. Fort McMurray	30,900	.003
2. Grande Prairie	940,334	8
3. Whitecourt	274,972	2
4. Edmonton	1,722,512	15
5. Bonnyville	917,058	8
6. Lloydminster	279,530	2
7. Red Deer	1,910,868	16
8. Calgary	1,556,816	13
9. Medicine Hat	3,778,252	32
10. Lethbridge	350,709	3
Total	11,761,951	100

The portion of the industry that falls within “northern Alberta” is approximately 18%.

The Alberta industry accounts for approximately 7% of greenhouse space in Canada. In contrast, Ontario, accounting for approximately 50% of the total greenhouse space in Canada, has the largest share of the market. British Columbia was second with approximately 32% of the total of 158,000 sq ft in 2001.

Forty-two percent of the greenhouses are under 10,000 sq feet while 18% are over 40,000 sq. feet. The size distribution of the operations is summarized in the following table.

SIZE OF GREENHOUSE OPERATIONS

Size	No. of GHs	Percent of Total
<10,000 ft sq.	162	42
>19,999 ft sq.	77	20
>40,000 ft sq.	76	20
>40,000 ft sq.	71	18
Total	386	100

The industry has grown rapidly since 1981. The Alberta industry’s space has grown by close to 27% in the 20-year period 1981 to 2000. This compares to nationwide growth of 220%. The following table summarizes the growth of Alberta greenhouse space and makes comparisons with the total greenhouse space in Canada.

COMPARISONS OF ALBERTA AND CANADA INDUSTRIES

	1981	1986	1991	1996	2000
Alberta					
Acreage	96	128	132	183	257
Sq Ft (000)	4.2	5.6	5.7	8.0	11.3
Canada					
Acreage	1,643	1,776	2,085	3,148	3,627
Sq Ft. (000)	71.6	77.4	90.8	137.1	158.0

Alberta expansions in 1999 included 12 operations and 139,000 sq ft; and in 2000 four operations added 23,000 sq ft. for a total of 162,000 sq ft. in the past two years.

B. Major Crops

The Major crops grown in Alberta are vegetables, bedding plants, cut flowers, potted ornamentals, foliage plants and tree seedlings. The following table provides an overview of the relative magnitude of the area devoted to the preceding crops.

GREENHOUSE AREA BY CROPS

Provincial Area		
Crop	No. of Growers	Sq. ft
Vegetable		
Cucumbers	76	2,339,585
Tomatoes	68	948,399
Egg Plant	2	2000
Peppers	28	462,457
Lettuce	9	108,750
Other Crops	6	75,032
Sub-Total	189	3,936,223
Floriculture		
Bedding Plants	265	2,988,041
Potted Flowers & Ornamentals	53	618,480
Cut Flowers	26	463,750
Herbs	40	184,173
Perennials	170	1,237,914
Sub-Total	554	5,492,358
Tree Seedlings	27	2,282,770
TOTAL	770	11,711,351

C. Other Noteworthy Points

- The industry employs 1,360 full time and 2,841 part time people.
- Fifty two percent of greenhouses are seasonal and they include primarily bedding plants while 48% are year round operations which include mostly vegetables.
- Eighty eight percent of greenhouses use forced air furnaces as their heating systems, 31% have hot water and 15% have steam heating systems. Only two percent of all greenhouses are using coal at this time. The interest in co-generation systems has increased considerably due to an increase in the price of natural gas and it is likely that a few greenhouses will use energy from such facilities during the next few years.
- Market specialization and a trend towards increased farm-gate sales, including wholesale-to-retail and direct-to-consumer sales at farmers' markets, are key thrusts of the industry.
- The biological controls most used (Encarsia Formosa - 19%, Hypoaspis miles - 12% and Amblyseius cucumeris - 11%).
- The major Insect pests (Aphids - 57% Whitefly - 47% Thrips - 41%).
- The most common irrigation systems (Hand Watering - 72%, Drip Irrigation - 50%, Overhead Sprinkler - 22%).
- Major disease problems (Pythium/Damping off - 61%, Botrytis - 47% , Powdery Mildew - 46%)
- Fertilizer Injector Systems (Dosatron - 33% , Anderson - 19% , Smith - 10%)

D. Comments Pertaining to Specific Sectors of the Alberta Industry

1. Vegetables

The greenhouse vegetable industry is relatively small in Alberta; however, the sector is an important and growing segment of the Canadian agri-food industry (estimated value: \$80 M in 1988; \$600 M in 2000). Statistics Canada (Publ. 20-202 for 2000) estimates the value of the Canadian greenhouse industry at \$1.7 billion and the greenhouse vegetable portion at \$505 million. Other industry, however, industry analysts claim that the corresponding values in 2001 are actually approaching \$2.0 billion and \$750 million, respectively.

There are 54.0 acres of greenhouse space devoted to the production of seedless cucumbers, 21 acres to tomatoes, 10.6 acres to peppers and 2.5 acres to lettuce. (In comparison, the Ontario industry, centred around Leamington, claims more than half the greenhouse vegetables produced in Canada [480 ha (1,200 acres)] compared to a national total of 825 ha (2,060 acres) and the estimated 2001 vegetable greenhouse areas for the United States and Mexico are 280 ha (850 acres), and 180 ha (1,400 acres), respectively.)

This distribution of space is unique when compared to the greenhouse industries in Ontario, British Columbia and Quebec where a higher proportion of space is devoted to the production of tomatoes and less for cucumbers. Over the last 10 years, the average size of a vegetable greenhouse operation has increased to one acre. One acre is considered to be an economic unit for vegetable production.

The strong growth in vegetable production can be attributed to two packing facilities. The Red Hat Co-op is located in Redcliff (southern Alberta) and has a membership of about 60 growers. The acreage devoted to the production of the three major crops changes every year based on the success of each grower. In 1999, the Red Hat Co-op upgraded and expanded their cucumber, tomato and pepper packing facility. They now have one of the most automated packing machines located in a 56,000 sq. feet building. The Pik-N-Pak is located around the village of Gull Lake, which is 10 kilometers west of the town of Lacombe in central Alberta. It has a membership of six growers.

Cucumber producers can grow two or three crops per year because it is a relatively fast growing crop. Growers in southern Alberta tend to have a two-crop system while growers in the central region prefer three crops per year.

With the two crop system, cucumbers are seeded in the middle of November and harvest begins in early February. Cloudy periods in late January can delay the harvest by one to two weeks. A second crop is seeded in June, planted in July with harvest beginning in early August. This crop continues until late November or early December.

In a three crop system, the spring crop is terminated in late May and a second crop is planted by the end of May or early June. Harvest continues until the middle of August. The third crop is

planted by late August and harvest continues until late November or early December. A three crop system generally produces better quality fruit although the production costs are higher.

Tomato crops are seeded in the middle of November and planted by early January. Harvest begins about 110 days from seeding and continues until late November. Only one crop is produced in a year. Recently there is considerable interest in the production of cluster tomatoes. Unlike the beefsteak type of tomatoes that are harvested as individual fruits, cluster tomatoes are harvested as a cluster of five to nine fruit attached together to a stem. The entire cluster of uniform-sized fruit ripens more uniformly and has more flavour.

Pepper is a more difficult crop to grow. Production takes about 140 days from seed to harvest. The crop is seeded in the middle of October and harvest begins in the middle of March until November. Because of the time to produce a crop, growers have no income for five months. In addition, the greenhouse structure must have excellent environmental controls because peppers need precise day and night temperature to set flowers and fruit. This means higher investments costs for the construction of a greenhouse to grow peppers.

Lettuce production is gradually increasing because of more interest in loose leaf and specialty lettuce. It is still not economical to grow crisp lettuce in a greenhouse. Hydroponic systems like NFT (nutrient film technique) or floating raft systems are gaining popularity for lettuce production. It takes about 3-4 weeks from seed to planting of a seedling and another 6-8 weeks to harvest. Crops are planted on a weekly basis. Up to 12 crops per year can be grown. Gross revenue potential for lettuce is around \$8/sq.ft.

The average gross revenue per year for cucumbers in 1998 was \$7.40/sq.foot and for tomatoes it was around \$8.38/sq.ft/year. Peppers average around \$8.78/sq.ft. The gross revenue for the vegetable industry is more than \$23 million. Operating costs vary with the crops. In 1999 the greenhouse fuel costs have increased significantly and will remain the second highest operating cost after labour. Return to management in case of cucumbers was \$.85, \$0.37 in case of tomatoes and \$ 1.86 for peppers. Return to management is calculated after deducting the operating and investment costs. Investment costs include operator's labour, interest costs and depreciation.

At this time, there is some limited production of hot peppers and Chinese vegetables but it is not a significant amount. Production of vegetables for ethnic markets has some potential.

Future Trends

Product quality and safety are seen as key elements on which to build the strength of the greenhouse vegetable market. The optimism about the future is derived from a comparison of our levels of fruit and vegetable consumption with those of the Europeans. Statistics show, for example, that Europeans eat ten times the cucumbers that Canadians eat and that Americans eat ten times less than what we eat. The on-going change in consumer preferences towards

fresh, natural, healthy foods can be expected to result in increased demand for greenhouse vegetables. Furthermore, it is proposed that the future prosperity of the Canadian greenhouse vegetable industry lies largely in the US market because of the untapped consumer potential of big cities like New York, Boston, Detroit and Chicago. It is widely believed within the industry that a lot of work can be done in all provinces, and abroad, to stimulate the consumption of our greenhouse vegetables. The flourishing greenhouse ornamental industry in both Canada and USA, and its reliance on the benefits of promotion, advertising, information, research, and education is seen as an example to be followed. Given the market potential, a continuous research and technology transfer effort will be required to ensure high production efficiency and marketability of the final product.

2. Cut Flowers

Cut roses and lilies, including alstroemerias, are the two major crops being grown in Alberta. Chrysanthemums and asters are also grown as cut flowers. There are about 10 acres devoted to the production of cut flowers. Growers are trying other cut flowers like sunflowers, lizianthus and snapdragons. The demand for good quality flowers is continuing to grow. Many growers have their own flower shops so they are able to market much of their crop through this channel with the remainder being sold to the wholesalers.

The industry is seeing new developments in greenhouse design and cultural practices. One grower is utilizing coconut peat as a growing medium for an acre of roses. He is also recycling the water from the roses for his cut lily production. This greenhouse also has no mechanical ventilation, but uses ridge venting instead. Such greenhouses are able to maintain better temperature control and levels of carbon dioxide which improves the quality of the cut flowers. Rose production requires the use of artificial lights so initial investment costs will be higher. Gross revenue potential for roses is between \$10-12/ft² per year based on 20 stems/ft² per year and a price of between 50-55 cents/stem. Alstroemeria, Asiatic and oriental lilies have a gross revenue potential of between \$8-10/ft²/year.

3. Potted Flowers and Ornamentals

Chrysanthemum is the main potted flowering crop being grown for commercial markets. Other potted ornamentals grown include: poinsettias, geraniums, dahlias, begonias and hanging baskets. High quality poinsettias are grown in Alberta. Rooted cuttings are planted in late July and plants are ready for sale by late November. The trend is to have the crop ready for early November, which requires a black-out system to induce the change of color in bracts. The gross revenue potential varies between \$6-\$ 8/ft² based on wholesaling and retailing. Poinsettias are grown from July to December and the gross revenue is around \$2.50/ft².

4. Bedding Plants

Out of 270 acres of greenhouse space in Alberta, approximately 126 acres are devoted to the production of bedding plants. There are more than 300 species of plants produced for bedding out purposes. Geraniums, begonias, New Guinea Impatiens, marigolds, petunias, and pansies are among the top 10 species grown.

The trend is for growers to buy plugs instead of seeding the transplants themselves. The plug industry is well established in Alberta with the plugs being grown for sale through the wholesalers. Most of the bedding plant crop is sold by the end of June although many retail greenhouses are keeping their customers until late August through the sale of hanging baskets. The number of garden centers/greenhouses has steadily increased. Local growers supply a significant amount to large retail chains and this trend is going to continue because we are able to produce high quality plants.

Gross revenue may vary from \$6/sq.foot to up to \$20/sq.foot based on wholesaling or retailing. Those growers who extend their season by using other flowers, use multiple seeding or grow plugs have the higher gross revenue.

5. Plug Production

During the past 10 years the production of plugs and rooted material has increased considerably. Two commercial wholesalers buy plant material from local greenhouses and ship across western Canada. Production of good quality plugs requires a greenhouse facility with better environmental controls and excellent skills to manage insects and diseases. Several seeding dates are used to grow these plugs. Rooting of virus indexed geraniums is done in a greenhouse in Alberta. Gross revenue potential is between 12-15 \$/sq.foot.

6. Tree Seedlings

Approximately 50 acres are devoted to the production of tree seedlings. Almost all of the tree seedlings are now grown by the private sector. Over 100 million seedling were produced in 2000. White spruce and lodgepole pine are the two major crops being grown. In 1999 there was a limited production of hybrid poplars and other deciduous material. This is expected to be a growth area as interest grows in cheaper and more accessible supplies of fibre.

PRT, in Beaverlodge, (a branch of Pacific Regeneration Technologies, Inc., headquartered in Victoria) is likely the largest producer of seedlings. In addition, there are eight other "significant" growers who are organized under the Alberta Seedling Supply Group. This group purchased the Pine Ridge Nursery at Smoky Lake. It is now called Smoky Lake Forest Nursery.

Tree seedlings are seeded in early January for June or July delivery. It is a challenge to have the seedlings set buds and harden off under May and June light and temperature conditions. These

seedlings are planted directly outdoors. Some seeding is done in late February to early March for harvest in November. These seedlings are placed in freezer storage and planted outdoors the following May.

There are different stock types of seedlings grown based on the type of container used for production. In the early nineties, 160 to 190 cavity styroblocks were used which gave a very high density of seedlings. Currently, most of the crop is grown in 112cavity block. The gross revenue is around \$8/sq.ft. Tree seedlings are not grown on speculation, but grown on contract.

7. Other Materials Grown

There are a few greenhouses, which are involved in the rooting and production of specialized material from tissue culture. This includes the production of different fruit species such as saskatoon and chokecherry, nursery material and nuclear seed potatoes. Production of tissue culture material has increased in Alberta and has become a specialized business. Capital costs are higher for the construction of greenhouses for rooting of tissue culture material because of the need for bottom heat, flood floors, artificial lights and fogging systems. The gross revenue is considerably higher in such specialized greenhouses when compared to greenhouses producing other plant material.

Research in the production of medicinal plants is increasing. More research is being done on crops such as: Echinacea, calendula, St. John's wort and other herbs.

E. Trends in the Construction of Greenhouses

Computerized environmental controls are the major focus in new greenhouses. The computers monitor and regulate temperature, relative humidity, air movement, condensation, carbon dioxide enrichment, fertilizing and irrigation. The trend is to build taller greenhouses with gutter heights of 18 feet and ridge heights of over 30 feet. The greenhouses utilize ridge venting instead of mechanical ventilation, central inflation of double plastic structures, carbon dioxide recovery from the boiler stacks and recycling of leached water. These innovations are increasing the average cost of construction to more than \$15/ft².

1. Impact of Increase in the Price of Natural Gas

The price of natural gas significantly increased during 2000 and this directly impacted the cost of production. It was estimated that the break even point was around \$5.00/Giga Joule and some areas of Alberta were paying up to \$13.00 a GJ. The government came up with a FIAP (Farm Income Assistance Program) which was a one time program for \$0.40/ ft² and also a natural gas rebate program was instituted. Many growers are considering to switch over to coal for heating but the capital costs are higher. Co-generation is being talked about and there are possibilities in this area. Energy conservation is on growers priority list and is practiced by many growers. Use of

alternative fuels is being talked about. Realistically speaking growers have to pay close attention to all management practices to increase yields, conserve energy and pay attention to data

III. Industry Experts and Other Resources

Local, Alberta experts include:

Dr. Mohyuddin Mirza, P.Ag.
Greenhouse Crops Specialist
Crop Diversification Centre North,
Edmonton, AB, T5B 4K3
Phone: 780-415-2303
Fax: 780-422-6096
Email: mohyuddin.mirza@gov.ab.ca

Jim Calpas, P.Ag.
Greenhouse Crops Specialist
Crop Diversification Centre South
SS4, Brooks, AB, T1R 1E6
Phone: 403-362-1312
Fax: 403-362-1306
Email: James.calpas@gov.ab.ca

Some of the leading and influential growers in the Alberta industry include:

Mr. Lyle Conway, Past President of the Alberta Greenhouse Growers Association
Tel: (403) 746-2257

Mr. Harold Good, a central Alberta florist
Tel: (403) 885-4606

Mr. Phil Dickson, Manager, Sunfresh Farms (very knowledgeable regarding purchasing)
Tel: (780) 413-4802

On a national basis, other significant research programs on greenhouse crops are supported by:

- Agriculture and Agri-Food Canada;
- The Pacific Agricultural Research Centre (Agassiz, BC);
- Laval University;
- The Greenhouse Vegetable Research Team at the Greenhouse and Processing Crops Research Centre in Guelph; and
- MacDonald College in Quebec.

IV. Employment Opportunities and Training Needs

At the present time, the greenhouse industry in Alberta is relatively small (less than 400 operations), and as noted above employs approximately 1,400 people per year full-time and approximately on a seasonal basis. The numbers equate to average employment per operation of say three full-time and seven on a seasonal basis. These numbers might grow in keeping with the growth of the industry of in the range of two to four percent per year.

Furthermore, the colder climates in northern Alberta and lack of the availability of an inexpensive supply of heating fuel such as natural gas in the Medicine Hat region, will likely mean that the future development of the industry and roles for northern colleges will relate to niche markets,

rather than the “mainstream” industry, or be dependent upon a cogeneration concept in which the heat from a source, such as a power plant, is used by the greenhouse as a by-product. With ambitious energy related construction in northern Alberta, such a scenario may not be far fetched. In addition, there may be opportunities to combine the nursery and certified organic sectors to have year round, fresh, local produce.

Notwithstanding the above, several areas in which there may be “voids” in the industry, according to Dr. M. Mirza, may present opportunities for northern colleges, particularly as the industry starts to migrate to central Alberta (Red Deer region) due to market saturation in the south. A brief discussion of each follows.

Aquaponics –Aquaponics is the combination of re-circulating aquaculture (intensive culture of fish) and hydroponics (growing plants without soil). In an aquaponic system, fish consume food and excrete waste, primarily in the form of ammonia. Bacteria convert the ammonia to nitrite and then to nitrate, which the plants consume. It may be possible to combine the aquaponics concepts with other emerging and growing areas such as medicinal herbs and/or certified organic farming. Additional information pertaining to these two areas is contained in Chapter 5 and Chapter 6, respectively.

Hardy Plant Nurseries – interest in hardy and native plants is increasing as people attempt to keep areas as “natural” as possible. At present, there is no program in Alberta that specializes in these types of plants. Accordingly, there may be a need for shorter, specialized courses in this area. In addition, developments within the forest industry pertaining to faster growing hybrid poplars may support some specialization in this emerging field as further stress is placed upon forest resources.

General Management and Scientific Training – according to Dr Mirza, to a large extent, graduates of greenhouse programs at colleges are of a “minimum wage” mindset, and the future development of the industry is hampered in several ways including:

- ❑ A need for improved research skills specific to the industry;
- ❑ A need for more up-to-date skills in the operation of greenhouse infrastructure such as computerized watering and climate control systems;
- ❑ A need for management, marketing, finance, interpersonal and communication skills; and
- ❑ A lack of contact and liaison with leading organizations in the industry.

Dr. Mirza has suggested that, provided adequate facilities are available, there is a “place” for a one to three week” course for which the phrase “from college to knowledge” has been coined that would act as a “finishing school” for nursery operators.

Chapter 4 - Functional Foods and Nutraceuticals

Issues relevant to the new and fast-growing Functional Foods and Nutraceutical industries and markets are discussed in this section.

I. Introduction

Functional foods and nutraceuticals are products that are demonstrated to have physiological (health) benefits and/or reduce the risk of chronic disease beyond their basic nutritional functions. According to Agriculture Canada ¹.

A **Functional Food** is similar in appearance to a conventional food that is consumed as a part of a usual diet, and is demonstrated to have physiological benefits and/or reduce the risk of chronic disease beyond basic nutritional functions. Examples include: Low saturated fat margarine, soy-based products (meat & dairy replacements), flax bread, breakfast cereals containing oat bran or soy protein clusters, milk containing higher levels of calcium and yogurt containing probiotic bacteria.

A **Nutraceutical** is a product isolated or purified from foods that is generally sold in medicinal forms not usually associated with food. A nutraceutical is demonstrated to have a physiological benefit or provide protection against chronic disease. Examples include flax oil capsules, supplements containing carotenoids such as lutein or lycopene, and concentrated forms of other plant phytochemicals such as isoflavones from soy.

Some additional examples of functional foods and nutraceutical components and their benefits are summarized in the following table produced by the International Food Information Council.

COMPONENTS, SOURCES AND BENEFITS

Functional components	Source	Potential Benefit
Carotenoids		
Alpha-carotene	carrots	Neutralize free radicals, which may cause damage to cells
Beta-carotene	fruits, vegetables	
Lutein	green vegetables	Reduce the risk of macular degeneration
Lycopene	tomato products (ketchup,	Reduce the risk of prostate cancer
Dietary Fibre		
Insoluble Fibre	wheat bran	Reduce risk of breast or colon cancer
Beta-Glucan	oats	Reduce risk of cardiovascular disease
Soluble Fibre	psyllium	

¹ <http://www.agr.gc.ca/food/nff/enutrance.html>

Fatty Acids		
Omega-3 Fatty Acids-	tuna and other fish oils	Reduce risk of cardiovascular disease
Conjugated Linoleic Acid	cheese, meat products	Improve body composition
Flavonoids		
Anthocyanidins	fruits	Neutralize free radicals; reduce risk of cancer
Catechins	tea	
Flavonones	citrus	
Flavones	fruits/vegetables	
Plant Sterols		
Stanol ester	corn, soy, wheat, wood oils	Lower blood cholesterol levels by inhibiting
Prebiotics/Probiotics		
Fructo-oligosaccharides	Jerusalem artichokes, shallots,	Improve quality of intestinal microflora; gastrointestinal health
Lactobacillus	yogurt, other dairy	
Soy Proteins: Phytoestrogens		
Isoflavones:	soybeans and soy-based foods	Menopause symptoms, such as hot flashes
Lignans	flax, rye, vegetables	Protect against heart disease and some
Tannins		
Proanthocyanidins	cranberries, cranberry products,	Improve urinary tract health

II. Market Size and Potential

A. Global Market

Interest by the general public is growing worldwide in the prospect that food and food products can promote and maintain health. Predictions are that the value of the functional foods and nutraceuticals industry will expand ten-fold over the next decade, promising to become a major segment of the agri-food industry. BIOTECanada ² has estimated that the value of the industry will reach \$500 billion globally by 2010.

More current statistics on the nutraceuticals functional foods industry and market are difficult to come by, because the industry is so new and definitions vary from one country to another. The world market for functional foods and nutraceuticals is large and growing, with recent (1999) estimates of market size well over US \$50 billion, as summarized in the following table ³.

² <http://www.umanitoba.ca/afs/ffnc/>

³ <http://www.agr.gc.ca/food/nff/ffnmarket/ffnmarket.html>

APPARENT SIZE OF MAJOR MARKETS FOR FUNCTIONAL FOODS AND NUTRACEUTICALS

Market	Estimated Size
United States	\$10.5 to \$37.5 billion
Europe	\$15.0 to \$20.0 billion
Japan	\$10.5 to \$14.0 billion
Canada	\$1.0 to \$2.0 billion

Market Drivers

Factors affecting demand for functional foods and nutraceuticals in markets around the world are consumer awareness, culture, ethnicity, traditions, education, age, regulatory environment and income. Europe, Japan and Asia are more receptive to nutraceuticals and functional food products because of the historical use of natural medicinal products in those parts of the world. Many of the functional food products sold in Europe are dairy products, margarines and spreads. Popular products in Japan include those for balancing the intestinal flora, 'comforting' the GI tract, improving the GI condition, and for mineral absorption. Functional foods and beverages are popular sold in vending machines in Japan.

B. Canadian Market

Canada has an active, research oriented functional food and nutraceutical industry. It is estimated that the Canadian industry has over 300 companies involved in the functional food and nutraceutical industry, from small start up companies to multinational organizations with an estimated market size of between \$1 and 2 billion. Exact industry statistics are difficult to determine as companies are classified from the agriculture and biotechnology categories, all the way through to the food and pharmaceutical industries. Agriculture and Agri-Food Canada is currently working on an industry survey with Statistics Canada to obtain official statistics.

According to a report prepared by Elizabeth Sloan and cited by Agriculture and Agri-Food Canada ⁴, the approximate composition of expenditures in the Canadian market is estimated as summarized in the following table.

Category	Percentage Composition
Functional Foods	49
Medicinal Herbs	27
Nutraceuticals	13
Vitamins/Minerals	4
Dietary Supplements	3
Sports Beverages	5

⁴ <http://www.agr.gc.ca/food/nff/ffnmarket/ffnmarket.html>

Functional foods and nutraceuticals have the potential to increase jobs and growth in Canada through value-added product sales in domestic and export markets. As an important element of the new *Life Sciences* economy, the category offers vast opportunities for a multi-disciplinary set of stakeholders, including: diversification for producers, value-added growth for manufacturers, and direct health benefits for consumers. All regions of Canada, from British Columbia to the Atlantic, have much promise in this regard. The value-added sector of the agri-food industry in Alberta, Saskatchewan and Manitoba, for example, has tremendous opportunity to grow. All three Prairie Provinces are convinced that functional foods and nutraceuticals will be an extremely important element of that growth. It is also evident that many prairie producers consider functional foods and nutraceuticals a way to diversify their crop production -- many are experimenting with such crops as herbs, flax and borage. New prairie companies typically enter the industry as part of a farm diversification strategy to increase farm incomes. Because functional foods and nutraceuticals are a category with the ability to increase value-added product development and sales, domestically and abroad, they could make a significant contribution to achieving the "4% of world agri-food trade" export goal set by the Canadian Agri-Food Marketing Council.

In a 1997 poll (CTV/Angus-Reid), 42% of Canadians said they used alternative medicines and/or practices, an 81% increase over the previous 5-year period. A more recent survey (Angus Reid, 2000) indicates that Canadians are ingesting vitamins, minerals and herbal supplements in unprecedented numbers to ward off illness, prolong their lives and maintain youthful looks and energy. This survey of 1,501 Canadians aged 18 to 65 suggests that 68% of adult Canadians had taken some form of nutritional supplement - from glucosamine for arthritic joints to antioxidant vitamins for healthier skin - in the month before the survey, fueling a market for the products. The consumers surveyed read about the nutritional supplements in magazines, newspapers, books and on the Internet; they also asked for information from pharmacy staff, friends and colleagues, and medical professionals.

Challenges to the Canadian Industry

While the general outlook is extremely positive over the long-term, the Canadian industry faces several challenges at this time:

- Research efforts are needed across a broad spectrum of scientific, clinical and engineering areas that will support health claims, and encourage the development and commercialization of products, processes and technologies that will give Canada the competitive edge for the new technology-based economy.
- The health benefits and disease risk reduction properties of food components is a growing area of research worldwide bringing about a high demand of skilled human resources. Current training and recruitment levels may not be sufficient to sustain development of the industry in Canada.
- Although Canada's functional food and nutraceutical industry has been experiencing considerable growth over the last few years, Canada is currently lagging behind the

US, Japan, Australia, and the United Kingdom. These markets, where health claims backed by scientific evidence are allowed, have experienced growth in terms of development and marketing of products. Presently in Canada, health claims are not permitted; however, Health Canada has recognized the need to review the regulatory framework and is now in the process of evaluating 10 of the 17 existing generic health claims authorized in the US. Health Canada is also developing standards of evidence that will eventually allow companies to make scientifically validated, product-specific health claims.

III. The Industry Dynamics

A. Players

A number of large food and pharmaceutical companies, such as Kellogg, Heinz, Quaker, Unilever, Dupont, Novartis, Cargill, Hormel, Abott Laboratories, Royal Numico, Amway, and American Home Products are active in the field because they consider the market extremely promising.

Both food and pharmaceutical companies are involved in functional foods and nutraceuticals. Many functional food and nutraceutical companies are part of larger food or pharmaceutical companies. In general, the pharmaceutical industry is better positioned to produce nutraceuticals, while the food industry is better positioned to produce functional foods, however there are companies that operate in both areas through strategic alliances.

Many pharmaceutical companies have subsidiaries that sell into the nutritionals market and/or the supplements markets either as suppliers or retailers. Many have active nutraceutical research programs as well. The average profit levels associated with the food industry are usually only 15% of those of the pharmaceutical industry and there has not been a great deal of commercial interest in clinical trials for potential nutraceuticals as a result. Similarly, many of the companies in the nutraceutical industry are either very small or built their original business as marketers of nutrition supplements. As such they are not well placed to prosper in a market which ultimately will be driven by the ability to make approved health claims on behalf of the product unless they partner or merge with companies capable of providing the research necessary to establishing health claims.

There is, however, evidence of cross investment occurring among the food, nutraceutical, and pharmaceutical sectors. Industry competitors are still seeking the business model and market approach that will achieve sustainable success. Successful development and marketing of functional foods will require many competitors to develop new competencies or to form alliances.

B. Information and Distribution

There are four main distribution channels for functional foods and nutraceuticals in North America: health food stores, pharmacies, supermarkets and direct sales. Health food stores and dedicated retailers will continue to be the largest distribution channel, but will eventually be overtaken by conventional retail outlets as larger manufacturers enter the business. (KPMG, 1999)

On-line shopping will become more and more important. E-commerce (business-to-business and business-to-consumer) is expected to increase dramatically over the next few years. The benefit to Internet buying for the functional food and nutraceutical industry will be enormous, particularly as product lines continue to grow rapidly. (Roby, 1999) Examples of health-related Internet retailers include: Drugstore.com, Mothernature.com, PlanetRx.com, HealthShop.com, and HealthZone.com.

C. Market Regulation

While the regulation of the “industry” has not kept pace with scientific developments, many information web sites are being established that perform a “surrogate regulatory function”.. SupplementWatch, Inc, is an example of a privately held corporation located in Utah; its new web site, supplementwatch.com, claims to be the Consumer Reports of dietary supplements, providing unbiased reviews, ratings and recommendations. The unique content for this site is developed by an interdisciplinary team of scientists, nutritionists, dieticians and physiologists to help educate health-conscious consumers about dietary supplements, nutrition and health. Dupont has also recently invested in an Internet health care program with WebMD, to provide life-sciences information, which includes over the counter medicines, food and nutritional supplements. To address growing uncertainty regarding the accurate labeling, efficacy and safety of nutritional supplements, a new company, Vitacost, has also developed a web site (www.vitacost.com) that offers consumers an independent lab analysis of the top natural health products and a competitive ranking by the company's scientific advisory board. The site is also the first to offer a wide selection of natural health products at the published wholesale cost.

IV. Other Trends in the Industry

Services, as well as the products being offered in the marketplace, will more and more be customized to specific niches of consumers or even individualized. Informed markets, rather than mass markets, are indicative of the future. According to Guy Miller, M.D., Ph.D., chairman and CEO of Galileo Laboratories, Incorporated (a U.S. biotechnology company working on cell-based therapeutic nutritionals), “nutrigenomics”, the next wave in nutrition research, “will revolutionize wellness and disease management. Specifically, by being able to elucidate genetic profiles of individuals, diets will be formulated from crop to fork to confer prevention or retard disease

progression. As basic science advances converge with e-commerce, new opportunities will emerge to deliver to consumers, whose genetic susceptibility to specific diets and diseases are known, products tailored to individual dietary needs. "One driving force for nutrigenomics will be cost savings realized by consumers, employers, government and third party providers, through retarding and preventing disease," he continued. We are embarking on a new era to deliver to consumers exciting technologies to enable wellness."

Not only are consumers seeking products, but related health information. Surveys (National Institute of Nutrition, 2000) show that quality information for consumers about the potential benefits of specific functional foods and food components will be extremely important, beginning with the food-disease associations that are already top-of-mind (e.g., milk and a reduced risk of osteoporosis) and the diseases that are of significant concern to consumers (e.g., heart disease and cancer). Information provided by the health/medical community would be considered by consumers as the most credible. On labels and in advertising, consumers said they would prefer health claims to content claims -- they want to know what benefit can be achieved by eating a functional food.

Consumers are also looking to the Internet for information; in fact, there is evidence that online health information seekers are growing twice as fast as the online population in general. But because of the nature of functional food and nutraceutical products, there can be both high consumer interest and equally high consumer confusion. Sales and development of brand loyalty will depend on providing information to consumers easily and interactively across the Internet. (Roby, 1999)

V. Experts and Additional Sources of Information

The following individuals and resources may be referenced as a starting point to obtain additional information pertaining to the industry.

Experts

Robin Flockton,
Executive Director
Canadian Institute for Food Science and Technology
P.O. Box 152
19168 - 1st Kenyon Road
Apple Hill, ON, K0C 1B0
Tel: (613) 525-2833
Fax: (613) 525-4328
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Kelley Fitzpatrick,

President

Saskatchewan Nutraceutical Network

105 North Road, Saskatoon, SK. S7N 4L5, Canada

Tel: (306) 652-2783

Fax: (306) 933-7208

e-mail: KFitzpatrick@nutranet.sk.ca

Ms. Allison Rodriguez,

Market and Industry Services Branch,

Agriculture and Agri-Food Canada,

5th Floor, Sir John Carling Building,

930 Carling Avenue,

Ottawa, ON K1A 0C5

Tel: (613) 759-7702

E-mail: Rodriguez@em.agr.ca

Other Sources of Information

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VI. Employment Opportunities and Training Needs

While there is no specific “target market” that can be “pin-pointed” and training demand estimates are difficult to make because of the early stage of the industry, the huge market potential and promising future for nutraceuticals, functional foods (and herbal medications), driven by the “baby boom” generation and an increased awareness of health and well-being suggest strongly that the area should be incorporated into the future focus of the colleges in the Clearinghouse system. It is suggested that a two stage or two “front” strategy be considered. In the first stage or “front” the emphasis would be placed upon supplying and meeting the needs of existing companies in the functional foods, nutraceuticals and herbal industries. In “stage 2”, as the local industry gradually develops and the necessary critical masses emerge, programming emphasis can start to incorporate commercialization and transfer of technology, technical skills for the manufacturing and quality control of local and more value-added production. Additional detail pertaining to each stage or front is discussed below.

A. Stage/Front 1

It is suggested that this stage include shorter courses or seminars of up to a week’s length and cover the following issues:

1. Initial “one day” seminars that will help students/clients to become aware of major global, demographic, technological and psychological issues that may influence agriculture in the future.
2. Short seminars that will help students/clients to develop a better understanding of other crops that can be grown in the area, or are indigenous to meet the needs of the functional foods, nutraceutical and herbal medication industries.
3. Short courses that will help to demonstrate how alternate crops are used in other parts of the world as treatments or supplements (Aroma therapy as an example is widely used in French hospitals according to Robert Rogers of the Alberta New Crops Network Society).
4. As specific demand develops, longer specialized seminars or courses can be introduced that will focus on the production, science or agronomical aspect of certain crops including:
 - ❑ Costs and returns per acre, particularly in comparison with other competing crops;
 - ❑ Types of inoculations and their respective benefits;
 - ❑ Application of inoculants;
 - ❑ Plant diseases and their causes and controls;
 - ❑ Harvesting and conditioning;
 - ❑ Loss calculation;
 - ❑ Storage and a variety of drying systems; and
 - ❑ Handling.

5. In concert with the course material in “4” above, information will be needed such as:

- ❑ Markets' size, characteristics and major players;
- ❑ Purchasing patterns and requirements;
- ❑ Product grading;
- ❑ Types of contracts;
- ❑ Understanding the intended end-use and end-user (for example the baby boomer's desire to avoid the appearance of aging and desire for instant product information and special, unique or custom formulations) of the production so to be in a position to best meet niche markets and attain the highest potential value-added price;
- ❑ Financial, regulatory and other issues pertinent to certain markets;
- ❑ Ways and means of being entrepreneurial, niche and service oriented that may be a major departure from the current “commodity” mindset held by some; and
- ❑ Ways and means of forging alliances and networks to increase strengths and stay abreast of cutting edge science linkages and market and demographic developments.

B. Stage/Front 2

As the local industry matures, producers will be striving for ways and means to achieve more value-added. Initially, the emphasis might be on helping local “cooperatives” with production issues via shorter courses or seminars. Increased demand and confidence is likely to lead to a demand for assistance with the science and business issues of technology transfer and commercialization, equipment selection and production set –up. Further maturity may lead to a demand for “certified technicians” for a particular production, particularly given the global interest in product quality, and standards such as the ISO series.

Chapter 5 - Non-Timber Forest Products

I. Introduction

Non-Timber forest products (NTFPs) are botanical products harvested or originated from forest-based species. They exclude primary timber products, industrial boards and composites, and paper products.

Non-Timber forest products may be categorized as foods, health and personal care products, materials and manufacturing products, environmental products, landscape and garden products, and decorative and aesthetic products, and in some cases, functional foods and nutraceuticals and herbal remedies. An Ontario report, “Non-Timber Forest Products in Ontario: An Overview, Forest Research Information Paper No 145”, identified approximately 50 types of products – such as nuts, essential oils, specialty wood products, dyes, mulches and biofuels – along with hundreds of specific items. Some specific examples of products available from cultivated, semi-cultivated and/or wild sources are summarized in the following table.

TYPES OF NON-TIMBER FOREST PRODUCTS

Type of Product	Examples
Food	Mushrooms, nuts, honey and wild rice
Health and Personal Care	Herbal natural health products and drugs from plants, shampoos, and pet care products
Materials and Manufacturing	Specialty wood products, resins, essential oils and fragrances
Environmental	Fuels from biomass, recycled wood materials, and biological pesticides
Landscape and Garden	A wide variety of trees, shrubs and wild flowers
Decorative and Aesthetic	Florals and craft products, carvings and natural dyes

II. Market Size and Characteristics

Estimates of the value of the markets for non-timber forest products have proven to be difficult to obtain. In general, relatively little is known regarding the structure and dynamics of the markets and distribution methods, and based upon what is known, the markets are not well organized. Furthermore, the potential final uses and forms of the products are extremely diverse, which makes tracking more difficult. It is expected that the availability and quality of information will improve as the sector receives more attention in the future. For the meantime, the Ontario report, cited above, provides an overview (albeit slightly dated and focused on Ontario) of current products, prices, distribution methods and other organizations and resources that can be referenced by those interested to gain a greater understating of the industry.

Notwithstanding the above, several studies and experts can provide us with some insight to the markets. A study of NTFPs in Canada estimated their value at \$241 million in 1997 ¹. Included were maple syrup products (\$120 million), mushrooms (\$100 million), and berries (\$20 million), with small contributions of less than \$1 million each from medicinal plants, essential oils and ornamentals. The estimate did not include specialty wood products such as Christmas trees, cultivated crops such as ginseng and other NTFPs referenced above. As such, the value may be higher. In other jurisdictions, the value of NTFPs is well recognized. For example, in Washington and Oregon alone, Special Forest Products (SFPs) are worth an estimated \$200 million annually ².

While the current market values are relatively small, for reasons such as lack of general knowledge and distribution and marketing systems, the potential for the sector can be very large, based upon use and demand in other parts of the world. The sector with the greatest potential growth for Alberta players is that of Health and Personal Care Products, by the provision of herbs and botanicals, as referenced in the table above.

The global retail market specifically for medicinal herbs and botanicals in 1999 was \$US 19.4 billion, as summarized in the following table ³.

GLOBAL MARKET FOR MEDICINAL HERBS AND BOTANICALS

Market	Estimated Size
North America	\$4 billion
Europe	\$6.7 billion
Asia	\$5.1 billion
Japan	\$2.2 billion
Balance of World	\$1.4 billion

As other indicators of the above amount, the National Aboriginal Forestry Association, in 1997, estimated the market for cosmetics and fragrances to be approximately \$ billion globally and \$3.5 million in the United States. Market growth in this category averaged 11.6% a year between 1994 and 1998, and a number of forecasts (by groups such as Kalorama Information and Freedonia Group) estimate growth to be in the range of 7% to 10% annually. The pet care products market, makes heavy use of herbs and botanicals and is estimated by Kalorama Information to be worth US\$5.3 billion in 2002.

¹ Duchesne, L. C. and I. Davidson-Hunt. 1998. Non-timber forest products exploitation in Canada. Proceedings North American Forestry Association (NAFA). Annual Meeting, Merida, Mexico, June 21-24, 1998.

² J. Freed, Washington State University Cooperative Extension. Reported in the Daily Southtown, February 25, 1998.

³ <http://www.agr.gc.ca/food/nff/ffnmarket/ffnmrket.html>

Herbs and botanicals were humankind's first medicines; and increasingly, traditional medicines derived from plants, herbs and other natural sources are being sought as alternatives to modern medicine and pharmaceuticals. Worldwide there are 750,000 flower or seed bearing plants. Herbs are technically defined as non-woody vascular plants with specialized systems of vessels for conducting water and nutrition. More commonly, herbs refer to various aromatic plants used especially for medicine and seasoning. The demand for herbs increased in the 1990s along with interest in alternate health products. The World Health Organization (WHO) estimates there are more than 20,000 medicinal plants and 4,000 plant drugs (400 now in use in Europe). "Medicinal plants are also important for pharmacological research and drug development, not only when plant constituents are used directly as therapeutic agents, but also when they are used as basic materials for the synthesis of drugs or as models for pharmacologically active compounds." (WHO) In the U.S., 25% of pharmaceuticals are derived from plants. WHO estimates that 80% of the world population is dependent on plant medication.

In the U.S., the natural products business reached nearly \$15 billion last year with 60 million reported trying herbal medicines. Over the next three years, natural products are expected to increase at a rate of 10-13% per year, dietary supplements 8-10%, herbs and botanicals 12-18% and natural personal care products, 10-12%.

Canadian herbs (and spices) include, but are not limited to, the following: angelica (*Archangelica*), anise (*Pimpinella anisum*), borage (*Borago officinalis*), coriander (*Coriandrum sativum*), cumin (*Cuminum cyminum*), dill (*Anethum graveolens*), echinacea, evening primrose (*Oenothera biennis*), fenugreek (*Trigonella foenum-graecum*), feverfew (*Tenacetum parthenium*), ginseng, goldenseal (*Hydrastis canadensis*), milk thistle (*Silybum marianum*), mint (*Mentha*), stevia (*Stevia rebaudiana-Berdoni*), St.-John's wort (*Hypericum perforatum*), valerian (*Valeriana officinalis*) and yarrow (*Achillea millefolium*).

III. Some Issues in Exploiting the Market Potential

There are a number of issues that may act as barriers to the exploitation of the full potential of the markets for non-timber forest products including:

- Many of the products are highly perishable and (northern) Alberta is far from many of the larger global markets. It will be necessary to develop more sophisticated storage and transportation systems.
- It may be difficult for northern Albertans to be cost competitive with other places in the world that have similar forest ecosystems, such as Russia.
- The current market structures and distribution systems are relatively "primitive". Greater sophistication will be required in terms of matching producers with users and obtaining a more precise understanding of product needs.

- Relatively little is known by northern Albertans about the plants (perhaps outside of some Aboriginal communities) and a considerable educational effort may be required, particularly if potential hazards such as poisonous mushrooms are to be avoided.
- The market is not well regulated at this time. Better regulation and standards can be expected to help to focus the market. In addition, regulations may be required regarding the management of the natural resource, and limits and restrictions on harvesting.
- Greater research may be required regarding the cultivation and harvesting of NTFPs and use of differing technologies to optimize harvests.
- Greater research is still required regarding the medical and other benefits of NTFPs as well as their uses and benefits for other applications (such as resins and adhesives and dyes).
- In the early stages at least, it is likely that exploitation of non-timber resources will provide a permanent, full-time livelihood for relatively few. For most others, the endeavors will be part-time, supplementary activities. Although the potential for income supplementation in, for example, certain Aboriginal communities, may be significant at certain times of the year, particularly if distribution and marketing issues can be addressed.

IV. Additional Resources and Sources of Information

In addition to a large number of industrial associations and research contacts listed in the report “Non-Timber Forest Products in Ontario: An Overview, Forest Research Information Paper No 145”, a copy of which may be obtained via telephoning the Ontario Forest Research Institute in Sault Ste Marie, Ontario at (705) 946- 2981, Ext 214, some local resources that may be drawn upon include:

Mr. Toso Bozic, Woodlot Specialist/Agroforester, Alberta Agriculture Food and Rural Development, Crop Diversification Centre North, RR6, 17507 Fort Road, Edmonton, AB T5B 4K3 Tel: (780) 415-2681 Fax: (780) 422-6096 E-mail: toso.bozic@gov.ab.ca	Mr. Robert Rogers, Vice President, Alberta New Crops Network Society, Upper, 5303 – 91 Street, Edmonton, AB T6E 6E2 Tel: (780) 490-6462/ (780) 433-7882 Fax: (780) 490-6472 E-mail: scents@planet.eon.net
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V. Employment Opportunities and Training Needs

In the early stages, the employment opportunities in this sector are likely limited to part-time activities and some work of a seasonal nature for enterprising groups. Specific estimates are extremely difficult to make due to the relatively “undeveloped” infrastructure at this time and the

lack of attention that has been paid to the sector until recently. However, if the size of the potential markets is an indicator, the potential for employment gains is strong, particularly if linkages with users can be made and their needs can be met. Later, there should also be opportunities as a result of value-added activities as the local industry matures and efforts are focused with land owners and managers.

The target market group for this sector is large and diverse; however, segments that may be of importance in early stages include:

- Woodlot owners
- Forest company staff
- Aboriginal communities
- Those interested in combining the sector with agr-tourism

The training needs will include:

- An introduction to the wide array of non-timber forest products and applications that might, for example, be combined with general interest or agr-tourism opportunities, or to capture the interest of forest companies to additional income generating opportunities as they manage their responsible lands over the entire rotation period. Capturing the interest of forest companies may act as a catalyst to further develop this sector and they would have the critical mass of land required and could provide additional credence.
- More specialized courses that focus on specific sectors such as herbal remedies or food products like mushrooms, or health care products such as soaps that can be made from some components. It will be necessary to cover basic issues such as identification of plants (and avoiding poisonous varieties), protection of the environment and any existing regulations.
- Should there be sufficient interest, shorter courses with a greater “commercial” orientation might follow. Topics to be covered would be expanded and enriched to cover more sophisticated topics such as markets and marketing, quality control and standards, larger scale harvesting, storage and distribution as well as the business and economic issues of the sector.
- Eventually, demand may warrant the introduction of more specialized training to do with local manufacture of value-added products or components, or in specialized quality control or “technician” programs.

Chapter 6 - Certified Organic Farming

I. Introduction/Definition

Organic agriculture is a holistic system of production with a principle goal to develop productive enterprises that are sustainable and harmonious with the environment. Organic foods are produced without the use of chemical fertilizers or synthetic pesticides, processed without the use of irradiation, and are not derived through genetic engineering. Livestock are provided ethical animal husbandry that promotes good health and prevents disease.

II. Market Size

A. United States and Global Market

According to ERS Food Review ¹ after struggling to build market recognition and supply capacity for many years, the organic farming industry is now one of the fastest growing segments of U.S. agriculture. USDA estimates that certified organic cropland more than doubled in the United States between 1992 and 1997, and two organic livestock sectors—eggs and dairy—grew even faster.

Recent data suggest that this momentum continued or accelerated in 1998 and 1999. While processed foods made with organic ingredients and sold through national distributors account for much of this growth, fresh vegetables, milk, and other perishables marketed directly to consumers, chefs, and retailers are still a major focus of this sector.

Sales of organic products through natural food stores, direct markets, conventional grocery stores, and exports more than doubled between 1992 and 1996, to \$3.5 billion, according to industry data, mirroring the growth in acreage during this period. Exports accounted for about five percent of sales during this period and are currently under five percent.

More recent industry data on organic sales through natural food stores, the largest outlet for organic products in the United States, showed sales continuing to grow at 20 to 25% annually through this channel and reaching \$4 billion in 1999. Fresh fruits and vegetables are still the top product category for organic sales in natural food stores.

The World Trade Organization/ United Nations International Trade Centre estimates that combined retail sales of organic food and beverages in major world markets—the United States, Japan, Denmark, France, Germany, the Netherlands, Sweden, Switzerland, and the United Kingdom was \$11 billion in 1997 and more than \$13 billion in 1998.

Organic food sales in 1997 accounted for 1-2 % of total food sales in most of these countries,

¹ ERS FoodReview No. 24-1. July 2001.

including the United States, and annual growth rates are forecast at 20 percent or more for the next five to ten years for most of these countries, according to the International Trade Centre.

B. The Canadian Market

Based upon the 2001 Census of Agriculture, the number of certified farmers in 2001, with approximately 340,000 hectares of associated land, was approximately: 2,200 nationwide; approximately 200 in Alberta; and a relatively high 93 in northern Alberta, where lands have not yet been “contaminated” by agricultural applications such as herbicides. In addition, nationwide, there are more than 320 processors and handlers.

There is a wide range in the estimated value of Canada's organic food market. Lack of accurate data is one problem. Following a spurt of interest in the late 1980s, government research and support of this sector had fallen off, and until interest in the sector started to increase recently, (for example, Statistics Canada started to monitor the sector in 2001 and other federal government endeavors, such as the establishment of an organic farming training center in Truro, Nova Scotia, were implemented), there has been relatively little in the way of literature published since 1997. In addition, there is a problem of definition. At present, for every one certified grower, there may be 10 who are near organic or non-certified organic producers. Taking the above factors into account, the Canadian organic food market is estimated to be valued at between \$200 million and \$1 billion (depending upon whether grains are included) and is estimated at about 1% of the total retail food market ².

Canada's organic food and farming sector is not as advanced as the USA and several European nations. In recent years, the industry has continued to expand, but at modest rates, however, if the trend starts to keep pace with developments in other parts of the world, growth could be as high as 20% per year, approaching \$3.1 billion in 2005. The industry has as a goal to increase its market share to 10 per cent of the Canadian retail market by 2010. At present, the Canadian agri-food system is estimated to be worth approximately \$130 billion “farm gate to plate”.

The appendix to this chapter provides detailed information pertaining to the characteristics of organic food purchases in Canada, and may be useful information in the development of any course material regarding marketing aspects in the certified organic sector.

Additional Details

- Saskatchewan, Ontario, Quebec and British Columbia are the main exporting provinces.
- Approximately one in twenty fruit and vegetable farms in Canada consider themselves to be organic producers.

² http://eap.mcgill.ca/_private/vl_head.htm

- Most of Canada's organic products are exported, primarily to the United States where much of it is processed and resold to other markets. Canada also exports organic products to the European Union and Japan.
- Canada is among the top five world producers of organic grains and oilseeds, with an estimated retail/food service value between \$700 million and \$1 billion, including processed and non-processed products. Organic grain is the fastest growing segment.
- The number of certified producers increased 34 per cent between 1999 and 2000.

A Brief History of Organic Farming in Canada

The organic agriculture “movement” in Canada was started in the 1950s, following visits to Canada by international experts. Formal organizations were created such as the “Canadian Organic Soil Association” and these trends continued in the 1960s. By the 1970s, organic farming organizations were established in a number of provinces. By the 1980s interest was building and the first formal surveys of organic farmers were undertaken. Government support for research also increased modestly. By the late 1980s discussion began regarding the regulatory aspects of the “industry”.

Barriers to the Canadian Market

According to Hill and MacRae ³ the Canadian organic industry still faces a number of barriers including:

- Many federal and provincial regulations act as restraints;
- Consumer understanding of organic food and farming remains low; and
- There is some evidence that credit agencies are reluctant to finance organic farmers because of their relatively small size and the lenders’ lack of understanding of how the industry operates.

III. Regulatory Issues

The National Standard of Canada for Organic Agriculture was published in June 1999. The Standards Council of Canada is an internationally recognized accreditation body that accredits organic certification bodies in Canada in accordance with International Standards Organization guidelines. Organic food production methods conform to national organic standards as regulated through over 40 certification agencies, (the principal three being The Canadian Organic Advisory Board, The Canadian Organic Growers, Inc., and The Canadian Standards Council) many with accreditation from international bodies. This means that all certified organic food is produced according to specific rules. In general, these rules entail ⁴:

³ Organic Farming in Canada, Hill and MacRae, EAP Publication 104, 1997.

⁴ <http://www.statcan.ca/english/kits/agric/organ.htm>

- Not using herbicides and pesticides or commercial fertilizers for at least three years before receiving initial certification. During this transition period—as long as five years—foods can be advertised as "transitional organic."
- Feeding animals 100% organic feed and not giving them hormones or growth promoters and unnecessary medications. The animals must be raised in humane conditions.
- Being committed to following soil-building management techniques.
- Providing an annual production plan when being converted to organic that describes the organic details of the soil management, rotation practices, fertilization, crop protection, harvests, post-harvest treatments and livestock practices.
- Segregating organic products to avoid contamination from pesticides used to protect conventional products from insects, rodents and fungi during transportation and storage.
- Providing clear records of all materials applied to fields and crops or used in processing, production, handling or sales.
- Allowing a third-party inspector hired by the certification agency to assess the farm on site and submit a comprehensive report to the certification committee. The inspector may also conduct spot checks at any time.

An additional overview of these rules was provided in Clearinghouse Report # 87, prepared in November of 2001.

IV. Other Certifying Bodies and Useful Links

Other certifying bodies that are of importance to the Alberta industry are referenced below.

<p>Organic Food Growers Associations O.C.I.A. Chapter 1 Rochester, AB</p> <p>Organic Crop Improvement Association (O.C.I.A.) 1001 Y Street, Suite B Lincoln, NE 68508-1172</p> <p>Canadian Organic Growers www.cog.ca</p> <p>Organic Agriculture Centre of Canada www.organiccentre.ca</p> <p>Organic_Centre.htm Standards Council of Canada http://www.scc.ca/certific/index.html</p>	<p>Canadian General Standards Board http://w3.pwgsc.gc.ca/cgsb</p> <p>Canadian Food Inspection Agency www.inspection.gc.ca</p> <p>Education McGill University www.eap.mcgill.ca</p> <p>University of Guelph www.uoguelph.ca</p>
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V. Employment Opportunities and Training Needs

It is not unreasonable to expect that employment growth in this sector will keep pace with the rapid expansion that is forecast (possibly as high as 10% of a \$130 billion industry by 2010, as noted earlier). While specific estimates cannot be facilitated at this time, and may be small at first as a result of part-time and transitional issues, future employment opportunities (beyond “self-employment of farmers”) are likely to revolve around the need for a sound understanding of the crop management and animal husbandry requirements (train the trainer) and the need for stringent quality control (ie “inspectors”). Eventually, a range of other services (even including legal and accounting) may be dependent upon at least a basic understanding of the unique requirements of the industry.

The relatively rapid growth forecast for this sector of agriculture, and the “competitive advantage” that northern regions have in the way of a higher proportion of lands that could easily be used for organic farming (due to lower incidences of prior “contamination”) suggest that that could be a strong niche for northern colleges in this area. Initial target markets are likely to be a wide variety of crop and livestock farmers interested in starting to diversify their operations. The existing program at the Organic Agriculture Centre of Canada in Truro, Nova Scotia (www.organicagcentre.ca) should be reviewed for strengths and weaknesses as relevant to Alberta, and for opportunities for sharing course material or areas of specialization.

With the caveat that the input costs may be high and the learning curves steep, the training needs can be split into a “business” and “crop or animal management” component.

Business

For the business component, there is a need for a range of “basic” business training such as marketing, financing, networking, business planning, working with lenders etc., In addition, there may be a need for specialized training particular to the crops grown or animals raised (from cows to bees, for example) that may also encompass special record keeping, transition to organic, and certification and/or regulatory issues.

Animal or Crop Management

For animal management, the training needs can be categorized as: animal nutrition, welfare and healthcare and also include issues such as parasite control, land/grazing management, manure management and fly control. For the crop component, the issues to be covered might include: crop rotation, tilling, seeding, weed management, nutrition management, as well as the operation of specialized equipment.

Chapter 7 – Transgenic (Genetically Modified) Foods

I. Introduction

According to the definition used by Colorado State University,¹ a transgenic crop plant contains a gene or genes, which have been artificially inserted instead of the plant acquiring them through pollination. The inserted gene sequence (known as the **transgene**) may come from another unrelated plant, or from a completely different species: transgenic Bt corn, for example, which produces its own insecticide, contains a gene from a bacterium. Plants containing transgenes are often called **genetically modified** or **GM crops**, although in reality all crops have been genetically modified from their original wild state by domestication, selection and controlled breeding over long periods of time.

Transgenic technology enables plant breeders to bring together in one plant useful genes from a wide range of living sources, rather than from within the crop species or from closely related plants. This technology provides the means for identifying and isolating genes controlling specific characteristics in one kind of organism, and for moving copies of those genes into another quite different organism, which will then also have those characteristics that are not normally available through pollination (such as higher yield or improved quality, pest or disease resistance, or tolerance to heat, cold and drought).

II. Market Characteristics

A. Size and Predominate Crops

The worldwide production area of transgenic crops in 1999 was estimated to be approximately between 40 and 44 million hectares. The United States (30.3 million hectares), Argentina (10.0 million hectares) and Canada (3.0 million hectares) have the greatest production areas of transgenic crops, accounting for over 95% of the total². In Canada, plantings of approximately 3.0 million transgenic hectares equates to approximately 8.2% of the total 36.4 million hectare crop area (as reported in the 2001 Census of Agriculture).

The most important transgenic crop in terms of acreage planted is soybean, followed by corn, cotton, and canola. Most of the transgenic crop varieties currently grown by farmers are either herbicide tolerant or insect pest-resistant. In addition to the crops listed below, minor acreages were planted to transgenic potato, squash, and papaya.

The following two tables present: a) the transgenic crop area by country; and b) type of crop distribution.

¹ www.coloradostate.edu/programs/lifesciences/transgeniccrops/index.html

² Ibid

TRANSGENIC CROP PRODUCTION AREA BY COUNTRY (SOURCE: JAMES, 2000B)

Country	Area planted in 2000 (millions of hectares)	Crops grown
USA	30.3	soybean, corn, cotton, canola
Argentina	10.0	soybean, corn, cotton
Canada	3.0	soybean, corn, canola
China	0.48	cotton
South Africa	0.2	corn, cotton
Australia	0.2	cotton
Mexico	minor	cotton
Bulgaria	minor	corn
Romania	minor	soybean, potato
Spain	minor	corn
Germany	minor	corn
France	minor	corn
Uruguay	minor	soybean
Estimated Total	44.0	

**WORLDWIDE PRODUCTION AREA OF TRANSGENIC CROPS AND TRAITS
 (SOURCE: SCIENCE 286:1663, 1999).**

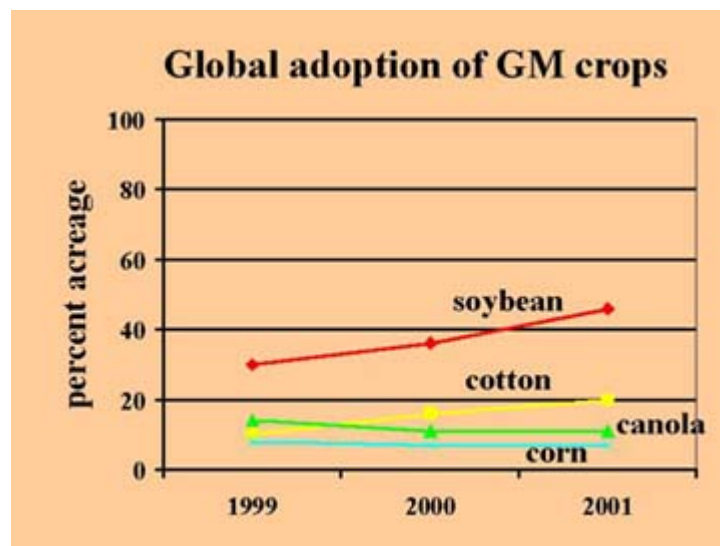
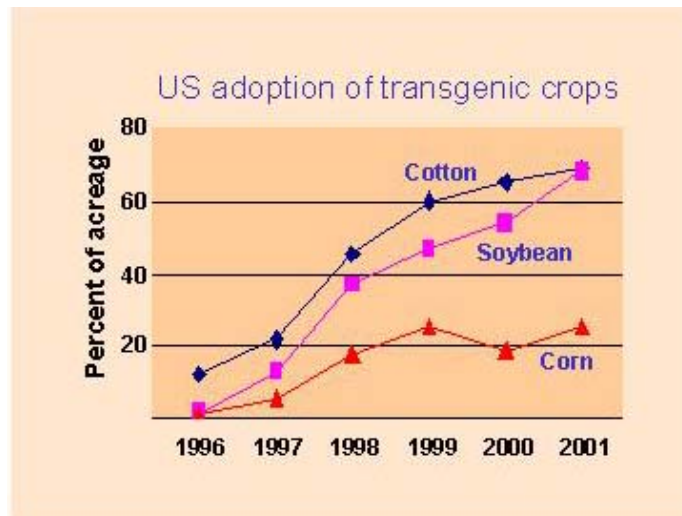
	Area planted in 1999 (Millions of hectares)
A. Crop	
Soybean	21.6
Corn	11.1
Cotton	3.7
Canola	3.4
Potato	.12
Squash	.12
Papaya	.12
Subtotal	40.16
B. Trait	
Herbicide tolerance	28.2
Bt insect resistance	8.9
Bt + herbicide tolerance	3.0
Virus resistance	.13
Subtotal	40.23

Note: Totals do not match due to rounding.

B. Rate of Growth

Adoption of transgenic crops in the United States has been far greater than in many other countries. In 1999, the area planted to transgenic varieties was approximately half of the U.S. soybean crop and about 25% of the U.S. corn crop. Global adoption of transgenic crops has proceeded at a slower rate than in the United States. The estimated worldwide area planted to transgenic varieties in 2000 increased 11% over the 1999 area ([James, 2000b](#)).

The following graph shows the acreage of transgenic crops in the United States from 1996 to 2001 with comparable global figures for the period 1999 to 2001.



Predictions for the 2000-growing season in the U.S. were that the percentage of crop area planted to transgenic varieties would decrease somewhat from their peak in 1999.

C. Current Transgenic Foods in Canada

At least a dozen crop species have been introduced in Canada along with several dozen genetically engineered food enzymes, used as aids in food processing. This could be the tip of the iceberg as over 4,000 field projects are in progress worldwide ³. Some of the more common transgenic foods in existence in Canada are summarized in the following table.

Food	Comments
Transgenic tomatoes	Used in canned tomato products including puree, imported ketchup and pizza sauces. These tomatoes can carry anti-ripening genes, antibiotic markers and genes to make the plants resistant to herbicides. Flounder genes have been added to some varieties to make them more resistant to bruising.
Insect-resistant potatoes	The bacterium toxin <i>Basillus thuringiensis</i> (BT) has been added to potato genes to kill insects, as a substitute to spraying with insecticides. Scientists try to confine the toxin to the leaves or roots of the plant, but because current techniques are not that selective, the toxin becomes expressed in varying degrees throughout the plant. These potatoes are marketed in Canada even though scientists claim they could cause allergies in certain people or toxicity in individuals with lower stomach acidity due to ulcer medications or antacids.
Corn	BT (see above) has also been added to the genes of corn to kill insects, in spite of concerns that these products may be toxic or allergenic to certain individuals. Herbicide resistant varieties have also been approved.
Soybeans and canola oil	These are among the first of many approved foods genetically engineered to be resistant to herbicides. This means that farmers can spray fields with higher levels of chemicals to kill the weeds without damaging crops. Effects may include increased contamination of our food and environment, the unknown effects of gene pollution, and disruption of the environment due to herbicide-resistant super-weeds that may result from cross-pollination.
Yeast	Genetically engineered varieties are approved and could be used in some beer, bread, spreads, food supplements, pizza crust, and other processed foods.
Rennet	Manufactured using genetically engineered bacteria used to make cheese; the whey residues are then used in chocolate and margarine production.
Enzymes	Bread, baby foods, sugar, fruit juices, beer, baking powder, etc. often contain genetically engineered enzymes utilized in the manufacturing processes.
Other foods	Other plants already in field trials in Canada or awaiting approval for marketing include strawberries, mustard, flax, spring wheat and tobacco. Products to come to Canada through imports in the near future include long shelf life pineapples, slow ripening bananas, papaya, sugar beets and low-caffeine, aromatic coffee beans. Nutrasweet, used widely in soft drinks, is also made by genetic biotechnology.

³ http://www.veg.ca/newsletr/marapr97/genfood_cda.html

D. Future Transgenic Foods

Based upon the discussion at the Colorado State University transgenic foods web site ⁴, some of the crops and trends that may be expected to emerge in the foreseeable future, and that are suitable to Canada's agronomic conditions, are discussed briefly below.

Corn hybrids resistant to corn rootworm

Corn rootworm (*Diabrotica* spp.) is a serious pest of corn in many U.S. growing areas. It damages roots of young corn seedlings, resulting in reduced growth and poor standability of the plant. This insect is responsible for the application of the largest amount of insecticide to U.S. corn fields. At present, to control this pest the insecticide must be applied directly to the soil, where it may leave residues or leach into the ground water. By replacing these chemical insecticides, corn rootworm resistant hybrids may provide major benefits to environmental quality.

Tomato

Because tomatoes are one of the world's most popular vegetables, they have benefited from a long history of genetic improvement that continues in the transgenic age. Lycopene, a naturally occurring constituent of tomato, is a nutritional factor related to Vitamin A. Tomato varieties with transgenically enhanced lycopene content are under investigation. Another trait of interest is delayed ripening. Tomatoes that ripen slower can remain on the vine longer and develop improved flavor, compared to commercial varieties that are picked at the green stage. The Flavr-Savr® tomato, one of the earliest approved transgenic crop varieties, was a delayed ripening variety. Because the trait was incorporated into a variety that performed poorly otherwise, it was not a commercial success.

Salty soils are an increasing problem in many parts of the world. Many crop plants, including tomatoes, are killed by high salt levels in soil and irrigation water. The development of a salt-tolerant tomato offers the possibility that tomatoes could be grown on land that was previously unavailable for agriculture. Scientists ([Zhang and Blumwald, 2001](#)) at the University of California and the University of Toronto have developed a tomato plant that is able to tolerate high levels of salt and that holds the salt in its leaves, so the fruit will not taste salty. It will take an estimated three years (approximately 2005) before salt-tolerant tomatoes are available commercially.

Canola

Canola is a major oilseed crop. Transgenic research has focused on improving the nutritional quality of canola oil by enhancing the Vitamin E content or by modifying the balance of fatty acids.

Turfgrass

There are a number of environmental concerns associated with the current use of turfgrass. These include:

⁴ www.coloradostate.edu/programs/lifesciences/transgeniccrops/future_foods.html

- ❑ the amount of chemicals applied (fertilizers, herbicides, fungicides, and even green dyes);
- ❑ the large quantity of water required to keep lawns healthy, especially in the West; and
- ❑ the energy required to mow lawns.

New transgenic turfgrass varieties will address some of these concerns by incorporating genes for herbicide tolerance, disease and insect resistance, reduced growth rates (meaning less mowing), and tolerance to drought, heat, and cold. The first such product on the market will most likely be Roundup Ready® varieties of Kentucky bluegrass, creeping bentgrass, and buffalograss. Weed control in lawns of these varieties can be accomplished with the herbicide Roundup, which is more environmentally friendly than currently used herbicides like 2,4-D.

Plant-based Vaccines

Food crops engineered to produce edible vaccines against infectious diseases would make vaccination more readily available to children around the world. (While not suitable to the Canadian climate), because of their palatability and adaptation to tropical and subtropical environments, bananas have received considerable research attention as a vehicle for vaccine delivery. Transgenic bananas containing inactivated viruses that cause cholera, hepatitis B, and diarrhea have been produced and are currently undergoing evaluation.

Sunflower

A disease-resistance trait, an anti-pest trait, and a herbicide-resistance trait are all being pursued, but no commercial varieties are now on the market. White mold (*Sclerotinia*) is a serious problem for sunflower producers in some areas. Resistance to this disease would expand the area in which sunflowers can be grown and might improve yields in areas of current cultivation. A commercially available cultivar is not expected before 2005. Resistance to the Argentina looper, an insect that eats sunflower leaves, is also being investigated. Some research has been done on developing sunflowers that can tolerate being sprayed with the weed killer Roundup. This trait would allow a farmer to spray his field for weeds while not killing the crop.

Grapes

Grape vines (*Vitis vinifera*) are susceptible to several diseases that reduce the amount and the quality of wine grapes and table grapes or even kill the vine. Genes that confer resistance to particular diseases would reduce the cost of battling diseases in the vineyard. Researchers at the University of Florida have patented a method for producing grape vines that carry a silkworm gene to provide protection from Pierce's disease, a fatal bacterial disease that affects grapes and several other plants.

Tobacco

Nicotine-free tobacco is now being grown for a projected introduction of nicotine-free cigarettes. Previous attempts to make low-nicotine products removed some of the flavor along with the nicotine. Genetically engineered nicotine-free tobacco does not synthesize nicotine in the leaf.

Trees

Forest trees such as poplar, aspen, and spruce have been transformed with various genes to provide resistance to insects, tolerance to herbicides, and higher levels of the commercial product. For example, reducing the lignin content of a tree can make it easier to recover wood pulp.

While the preceding discussion focused on plant foods, work is also proceeding on animal foods such as transgenic fish; however, transgenic animals are more controversial at present.

III. Risks and Concerns

While transgenic research has strong potential to increase plant yields, disease resistance and nutrition in humans and animals, there are also many concerns that have been expressed that have resulted in considerable controversy. Some of the concerns are summarized below.

Damage to human health	allergenicity horizontal transfer and antibiotic resistance eating foreign DNA cauliflower mosaic virus promoter changed nutrient levels
Damage to the natural environment	Monarch butterfly crop-to-weed gene flow antibiotic resistance leakage of GM proteins into soil reductions in pesticide spraying: are they real?
Disruption of current practices of farming and food production in developed countries	crop-to-crop gene flow
Disruption of traditional practices and economies in less developed countries	

The preceding issues are extremely complex and beyond the scope of this project. A more detailed discussion of the issues and the science that may support or nullify the concerns, may be found at the Colorado State University web site on transgenic foods ⁵

⁵ www.coloradostate.edu/programs/lifesciences/transgeniccrops//risks and concerns.html

IV. Regulatory Issues

A. United States

In the United States, transgenic crops are regulated at every stage in their development, from research planning through field-testing, food and environmental safety evaluations, and international marketing. The major United States regulators of transgenic crops, along with hyper links for additional information are listed below:

- ❑ [Institutional Biosafety Committee](#)
- ❑ [Animal and Plant Health Inspection Service \(APHIS\) of USDA](#)
- ❑ [Food and Drug Administration \(FDA\)](#)
- ❑ [Environmental Protection Agency \(EPA\)](#)
- ❑ [State regulations](#)
- ❑ [International agreements](#)

B. Canada

In Canada, the Canadian Food Inspection Agency and Health Canada are responsible for regulating transgenic or genetically modified food. Further details of Canadian regulations and their development may be found at the Canadian Food Inspection Agency web site ⁶.

The framework for the regulation of transgenic plants in Canada and the U.S. is comparable, but there are some subtle differences. In Canada, the CFIA is responsible for the regulation of importation, environmental release and feed use of plants with novel traits, which includes, but is not limited to, transgenic plants. Health Canada has jurisdiction over novel foods, including food products derived from transgenic plants. In the U.S., APHIS is responsible for the regulation of importation, interstate movement, and environmental release of transgenic plants that contain plant pest components. Regulatory authority for food and feed use in the United States lies with the Food and Drug Administration (FDA). The U.S. Environmental Protection Agency (EPA) registers certain pesticides produced in transgenic plants prior to their distribution and sale and establishes tolerances for the pesticides in the plants.

Specific regulations are not as well advanced in Canada as in the United States and Canadian regulators have been criticized for being too lax.

⁶ <http://www.inspection.gc.ca/english/plaveg/pbo/usda/usda02e.shtml>

V. Industry Experts

The existing “clash of views” regarding genetically modified organisms and the reality that “expertise” is more related to the particular crop (for example, tomatoes, canola etc.) make it difficult to “isolate” any particular “experts” for the purposes of this report.

VI. Employment Opportunities and Training Needs

For the foreseeable future (until a critical mass of acceptance, use, alleviation of concerns and risks, cost benefit, and expertise starts to emerge) the opportunities for employment in this area, outside of “self-employment”, can be expected to be somewhat limited, particularly in northern Alberta, as most research and development will be done in other places.

A catalyst to dealing with some of the existing barriers might be short courses to help to facilitate a better understanding of the risks and/or opportunities, and science that may be underlying factors. In addition, it is likely that there will be demand for specialized training with regard to the unique management requirements of genetically modified crops. In the future employment opportunities and training needs related to “inspection”, quality control, as well as gene manipulation may emerge, although some of these issues may be beyond the capability of students without existing university training.

In summary, this is a rapidly evolving and controversial field that should be monitored closely for implications for northern colleges in the five to 10 year time horizon.

Chapter 8 - Agri-Tourism

I. Introduction

The Agri-Tourism industry (which “marries” two of Alberta’s top industries; Agriculture and Tourism, has been defined as a “a commercial enterprise at a working farm, ranch, or agricultural plant conducted for the enjoyment of visitors that generates supplemental income for the owner.” It presents the consumer or tourist with an opportunity to engage in a direct exchange of values between themselves and the farm community.

Agri-Tourism in Alberta is an emerging industry. It is responding to a growing demand for access to farm and ranch lifestyles and products as well as cultural, heritage and culinary tourism adventures, from what is largely an urban audience.

Agri-Tourism is a subset of a larger industry called rural tourism that includes resorts, off-site farmers’ markets, non-profit agricultural tours, and other leisure and hospitality businesses that attract visitors to the countryside. Rural Tourism differs from Agri-Tourism in two ways. First, rural tourism enterprises do not necessarily occur on a farm or ranch, or at an agricultural plant, they do not generate supplemental income for the agricultural enterprise.

Agri-Tourism enterprises might include any of the following types of operations presented in the following table.

TYPES OF AGRITOURISM OPERATIONS

Outdoor Recreation	Horseback riding Wildlife viewing & photography Fee fishing Camping/picnicking (combined) Fee hunting Wagon/sleigh rides Cross-country skiing Game preserve Clay bird shooting Off-road vehicles	Direct Agricultural Sales	On-farm sales Roadside stand Agriculture-related crafts/gifts U-pick operations
Educational Experiences	School tours Garden/cannery/nursery tours Winery tours Agricultural technical tours Historical agriculture exhibits Crop sign I.D. program Micro-brewery tours Exotic animal farm	Entertainment	Concerts or special events
Accommodations	Bed & breakfast inn Farm/ranch vacations Guest ranch Youth exchange Elder hostel	Festivals	Other festivals or fairs Petting zoo Hunting/working dog trials/training
Miscellaneous	Guide/outfitter operation Farmers’ market Horse pack team		

Within the tourism industry, Agri-Tourism is viewed as a niche marketing opportunity for rural communities. It is particularly attractive because of its potential to attract visitors during the Spring and Fall “shoulder” seasons. Other benefits of Agri-Tourism include:

- Attraction of outside income to Agri-Tourism operators and communities
- Potential diversification of the farm operation
- Opportunities to increase agricultural awareness and education among the general public
- Opportunities to promote agricultural products and services
- Low impact on the environment

II. Market Size and Characteristics

A. General Tourism

According to Alberta Economic Development, the general Tourism industry in Alberta employs over 100,000 people, and is one of the largest industries in Alberta. From 1990 to 1999, the value of the industry increased by 62%, or from \$2.6 billion to \$4.2 billion. A subsequent change in methodology for the collection and classification of data in the year 2000 has resulted in better data and an increase in the estimate to approximately \$4.9 billion.

At this time there are no generally accepted estimates of the size of the Agri-Tourism industry in Alberta. However, via the Agri-Tourism Initiative, currently being undertaken by Alberta Agriculture, Food and Rural Development, it is hoped that a clearer understanding will emerge in the near future. The subject matter is gaining attention and Several Canadian provinces have recognized potential for Agri-Tourism and have prepared strategy-related documents about the industry. These include Newfoundland (1999), Saskatchewan (1998), Manitoba (1997), Ontario (1996) and Nova Scotia (1996).

Notwithstanding the above, some indicators of the size of the general Alberta tourism market, based upon Statistics Canada’s Travel Summary and International Travel Survey for the year 2000, may help to provide some perspective:

1. A total of 21.89 million “person trips” were made for the year. Of these, 16.82 million or 76.8% were by Albertans; 3.2 million or 14.6% were made by “other” Canadians; 1.069 million or 4.9% were made by Americans; and 827,000 or 3.8% were made by others.
2. The following table shows the leading sources of origin for the non-Albertan component referenced above.

Other Canada	USA	International
British Columbia – 41%	Mountain – 29%	United Kingdom – 25%
Saskatchewan – 33%	Pacific – 26%	Japan – 18%
Ontario – 13%	Atlantic Seaboard – 18%	Germany – 10%

3. The breakdown of receipts for the 2000 year totaling approximately \$4.9 billion is as summarized in the following table.

Alberta	Other Canada	USA	International
\$2.449 billion (50.0%)	\$1,017 billion (20.8%)	\$714 million (14.6%)	\$714 million (14.6%)

B. Comments Specific to Agri-Tourism

There are two types of farms and ranches that have accommodations and recreation activities in Alberta. The first type is farm/ranch stay. These operations offer overnight accommodation in a family home, a cabin or a campsite. Breakfast is either provided or self-catered. The second is a farm/ranch vacation. These operations feature longer visits, averaging 3.5 days in length. Visitors stay in the family home, on-site cabins or cottages. Activities, both on and off-site, are included as part of a package. The farm/ranch also serves as a staging area for day excursions.

Based upon 1999 data, as presented in the table below, there is a relatively small number of farms/ranches in Alberta (remember there were approximately 53,000 in the 2001 Agricultural Census) that offer “country vacations”.

DISTRIBUTION OF COUNTRY VACATIONS IN ALBERTA

Alberta Regions	Farms/Ranches with Country Vacations*
South (of Calgary)	21
Central	9
North (of Edmonton)	7

***Note:** Other enterprises exist that are not members of the Alberta Country Vacations Association (ACVA) do not advertise in the Alberta Accommodation Guide and are 'non-working' commercial guest ranches.

Source: Compiled from a review of the 1999 Alberta Accommodation Guide and the 1999 Alberta Country Vacations brochure. The numbers represent country vacations on farms and ranches that are operated to contribute to the overall agricultural-based family income.

The following table summarizes origin characteristics of guests at Alberta operations in comparison to those in other prairie provinces.

ORIGIN OF GUESTS

Prairie Provinces	Per Cent from Own Province	Per Cent from Rest of Canada	Per Cent from International
Manitoba	60	20	20
Saskatchewan	41	76	24
Alberta	27	18*	51 (44% from (Europe))

***Note:** The Alberta figures do not add to 100 per cent because there is an unknown percent of guests from Saskatchewan and Alberta.

Source: Compiled from the Agri-Tourism Industry in Manitoba, A profile of Operations and Issues, 1997; The Alberta Country Vacation Association, personal communication with Margie Moore, President, February, 1999.

Each of the major markets presents challenges and opportunities. According to the Alberta Country Vacations Association, the United States makes up only three per cent of its market. However, visitors from the United States are *very satisfied* with Alberta country vacation offerings. They particularly like the service component. Initially, American visitors appear unaware of the favourable exchange rate. This indicates latent demand potential. Alberta operators should be aware that guests are now seeking a higher standard of accommodation. They are now putting more emphasis on the cleanliness of the homes, sanitary facilities, larger rooms and quality of furnishings. Alberta Country Vacation Association operators use numerous techniques to promote their businesses. Indications are that word of mouth advertising and referrals are still fundamental to a successful operation.

There are many reasons for the emerging popularity of Agri-Tourism experiences. The primary reasons include:

- Nostalgia - a desire to "go home";
- A curiosity with rural lifestyles or reaffirming traditional values;
- Learning vacations - learning to ride a horse or observing modern farm practices;
- Health consciousness - a desire for homegrown food;
- Close-to-home getaways - reasonable prices and good value; and/or
- Favourable exchange rates, hospitality and open space for international guests.

III. Regulatory Issues

The establishment and operation of a country vacation/Agri-Tourism venture in Alberta is not regulated by a specific Government Act. Rather, there are a number of government departments and organizations that provide start up information, referrals and operational guidelines, as referenced in the following table.

REGULATORY ORGANIZATIONS AND THEIR RESPONSIBILITIES

Organization	Role or Responsibility
Alberta Agriculture, Food and Rural Development's (AAFRD)	Rural development specialists provide business information and guidelines for developing market gardens, Farmers' Markets, food processing and related farm and ranch diversification options.
Alberta Economic Development's Tourism Development Branch (TDB)	Provides start up information, tourism statistics and market trends for country vacation operations.
The Prairie Farm Rehabilitation Administration (PFRA)	Has information about wetland management for improving wildlife and waterfowl habitat as a tourism resource, dugout construction, wells and the provision of trees for farms and ranches
The Alberta Craft Council	Provides start up information, business planning and marketing advice for the production of rural craft. This can be a value-added opportunity for on-site country vacation sales.
Alberta Bed and Breakfast Association (ABBA)	Provides rural farm/ranch based bed and breakfasts with inspection criteria for membership (ABBA B&B Standards - 1995)
Alberta Country Vacation Association	Provides guidelines and membership networking opportunities with its membership to ensure quality country vacation experiences
Alberta Health and Wellness - Regional Health Authorities	Provides guidelines for ensuring sanitary conditions (potable water and hot tubs) and the preparation of food (meals, handling, conditions for use of farm raised products such as eggs and meat); Bed and Breakfast Health Standards (1997)
Alberta Hotel Association	Establishes criteria in consideration of meeting acceptable inspection standards to participate in the Alberta Accommodation Guide
Alberta Infrastructure	Provides information about signage for provincial highways
Alberta Labour	Provides information about Bed and Breakfast Accommodation and the Alberta Building Code (1996)
Alberta Treasury	Provides the procedures for remitting the five per cent Alberta Hotel Tax for farm/ranch lodging over three rooms
Insurance companies	Provide property and liability coverage for guests, including waiver conditions for participation in farm/ranch activities like canoeing, riding and cross-country skiing
Local municipal government office	Answers inquires regarding and use bylaws, development permitting and signage for municipal roads
Public Lands - Alberta Tourism Recreational Leasing Process (ATRLP)	Handles applications for the use of public lands for tourism related use
Revenue Canada	Provides information on the tax implications associated with owning and operating a country vacation business. These might include the use of farm/ranch homes, cabins and lodging facilities for guests, the use of vehicles, equipment, utilities and professional services, and meals.

IV. Industry Experts and Other Resources

There are many good resources pertaining to Agri-Tourism, including a number of “how to” guides, with some of them as listed below.

A. Industry Associations

Alberta Country Vacations Association (ACVA)
Carol Ohler - Secretary
Box 396, Sangudo, Alberta TOE 2AO
Phone: (780) 785-3700
E-mail: dohler@telusplanet.net

Alberta Bed and Breakfast Association (ABBA)
Elsa Peterson - President
Box 8, Site 11, RR1, Cochrane, Alberta TOL OWO
Phone: (403) 932-3945
E-mail: dickens@nucleus.com

B. Publications/Websites

Travel Alberta - www.tourismtogether.com. This is a place for industry to go for information on tourism product development, market planning and communications.

[Alberta Agriculture, Food and Rural Development](#)

This site supplies additional information on Agri-Tourism.

An Agri-Tourism Strategy, for Nova Scotia, 1996
Published by: Nova Scotia Department of Agriculture and Marketing
P.O. Box 190, 7th Floor, Joseph Howe Building
Halifax, Nova Scotia B3J 2M4
Phone: (902) 424-6734
E-mail: godlielm@gov.ns.ca

Agri-Tourism: Looking at New Horizons, 1996
Published by: Ontario Agricultural Training Institute (OATI)
405-491 Eglinton Avenue, West
Toronto, Ontario M5N 1A8
Phone: (416) 485-3677
E-mail: infooati@oati.com

A Study of Agri-Tourism in Newfoundland and Labrador
Prepared for: Government of Newfoundland and Labrador
Department of Forest Resources and Agrifoods, March, 1999
PO Box 8700
St. John's, Newfoundland A1B 4J6
Phone: (709) 729-6645
E-mail: cmcdonal@agric.dffa.gov.nf.ca

Agri-Tourism in Austria and its Implications for Japanese Rural Tourism
Published in Rural Tourism Management, Sustainable Options
International Conference, September, 1988
Published by: The Scottish Agricultural College (SAC)

Auchincruive, Ayr, Scotland UK KA6 5HW
Phone: 44 1292 525056
E-mail: leisure@au.sac.ac.uk

Assessing the Potential for Farm & Ranch Recreation; Bulletin No. 699
Published by: University of Idaho, College of Agriculture, Cooperative, Extension System
Moscow, Idaho 83843
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Farmers' Markets in Alberta: A Direct Channel of Distribution, January, 1998
Alberta Agriculture, Food and Rural Development and the University of Alberta, Department of
Human Ecology. AARI Report - Project #95CR16

Guidelines for Alberta Country Vacations Association, adapted from Travel Alberta's *Minimum Standards for Approved Guest Ranches and Country Vacations*, November, 1997
Published by: Alberta Country Vacations Association
Box 396
Sangudo, Alberta TOE 2AO
Phone: (780) 785-3700
E-mail: dohler@telusplanet.net

Small Farm News, Small Farm Center, Cooperative Extension, University of California
Agricultural Tourism: Emerging Opportunity
Published by: Small Farm Center
University of California
One Shields Avenue, Davis, CA.
Phone: (530) 752-8136
E-mail: sfcenter@ucdavis.edu

The Agri-Tourism Industry in Manitoba: A Profile of Operations and Issues, 1997
Published by: Rural Development Institute,
Brandon University
270-18th Street
Brandon, Manitoba R7A 6A9

C. Industry Experts

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D. Up-coming Conferences

The Growing Rural Alberta Tourism Conference
Camrose, AB
February 10 to 12, 2003
Contact: Shirley Damberger 1-800-296-8112

V. Employment Opportunities and Training Needs

While no specific estimates are currently available, due to issues such as coming to terms with a more precise definition of the industry, as noted earlier, the potential for employment opportunities in the Agri-Tourism industry (as part of a \$4.9 billion industry employing 100,000 Albertans) can be expected to be positive. This will be particularly so if operators can develop new “product” that meet vacationers’ standards (for example with respect to quality, “family togetherness”, education, economy and emerging issues such as environmental conservation and a concern for safety) and provide new, exiting/ and/or in some cases “reminiscing” experiences. Northern Alberta is blessed with a wide variety of “assets” that can be exploited in many creative ways.

While there is no specific target audience, and with the caveat that many Agri-Tourism operations are initially part-time affairs to supplement incomes (often involving the whole family), some of the training needs and issues that might be met by programs at the colleges in the Clearinghouse network are address below, based upon a number of existing resources that have been published. The following is fairly comprehensive, and it is possible that aspects of it might be modified for part of the business training components of other programs or areas in this report.

Taking Stock of Potential Types of Operations

Potential Agri-Tourism entrepreneurs need to know how to take stock of their existing resources and match them to potential opportunities. Begin with assessing the potential attractions that already exist on your property, rather than spending money on creating something new. Some of the issues in this regard are discussed briefly below.

Physical Resources

Land Resources: list what you have (deeded, leased private property, state & federal allotments, rangeland, woodland, hay meadows, cropland, riparian/wetlands, acreage, location proximity, elevation, topography, location of feed-grounds, etc.)

Climate: consider how weather patterns, temperature, etc. will affect what types of activities you might provide:

- Temperature (monthly variations; length of growing season)
- Precipitation (monthly distribution)
- Snow (ground cover periods and accumulation depth)

Developments and Improvements (buildings, fences, corrals and working facilities, equipment, road and trails, etc.)

Other attractions: list those things that might enhance your operation to a visitor, such as wildlife, streams, ponds, fishing, livestock, proximity to natural or man-made points of interest, etc.

Operations and Management

Owner/Manager strengths and goals: list those intangible assets that can assist you in a farm/ranch recreation operation (e.g., "people person," marketing ability, knowledge or special skills such as horse riding, livestock management, cooking, knowledge about historical sites in the area, etc.).

Family Strengths and Resources: list those skills and strengths that family members add.

Activities

List activities you do on your operation that might appeal to the public. Remember, what seems routine to you may be considered unusual and interesting to the non-farm public. Be free with your ideas in this section: you'll evaluate them later. Some activity examples might include: cattle drives, calving or lambing, trail rides, roadside produce stands, machinery operations (harvesting, planting, cultivating), or on site food processing.

Wild Life Inventory

As you complete this inventory, you will want to add as much detail as possible, including total count, ratios of male/female, trends, locations, size, age, condition, behavior, habitat, etc. This may take considerable time but will be necessary if you intend to build an enterprise around wildlife. You will want this information if you are considering an enterprise to attract wildlife viewers, photographers, or hunters.

People Resources

Consider and perhaps rate the following as they might impact the success of ideas: family members; paid staff; law enforcement; neighbours; game wardens, biologists, and/or crop specialists; and government officials etc.

The Psychology of Agri-Tourism

Understanding the needs of potential clients can help assess the opportunities. The major reasons people go on vacation, ranked by survey results, include those summarized below.

To build and strengthen relationships. The number one reason for going on vacation is to be together as a family. Families find they have little time to be alone together. They want to get away from the stress of home and work. They look to travel as an opportunity to rekindle relationships. Many also seek social interactions on trips, and view vacations as a time for making new friends.

To improve health and well-being. The vast majority of adults say that a vacation is vital to their family's physical and mental well-being. Most travelers who visit California want to refresh and renew themselves by actively participating in outdoor activities.

To rest and relax. Getting away from work, worry, and effort enables vacationers to refresh and renew. This is the third most common reason why Americans vacation.

To have an adventure. Many travelers look to vacations for exciting experiences that stir emotions. Adventure, whether dangerous or romantic, provides the heightened sensation that these consumers seek.

To escape. Many people travel to gain respite from routines, worry, and stress. They are looking for something different: a better climate, prettier scenery, slower pace of life, cleaner air, quieter surroundings or anything else that is missing or deficient in their lives back home.

For knowledge. Learning and discovery are strong motivators for today's better-educated travelers. People travel to learn or practice a language, study a culture, explore gourmet foods or wines, investigate spirituality, discover something about themselves, or a host of other learning pursuits. They want to see, touch, or feel something unfamiliar.

To mark a special occasion. Some travelers take vacations to celebrate milestones in their lives: new relationships, marriages, birthdays, or professional achievements. Vacations that mark special occasions are usually taken with loved ones and provide memories that last a lifetime.

To save money or time. Although going on vacation almost always costs money and time, where one goes on vacation can influence costs. Money and time constrain virtually every vacation decision. By traveling close to home, or taking a short vacation, travelers can save time and money. California residents can be key targets of agri-Tourism ventures.

To reminisce. Many people travel to relive fond memories. In the case of agri-Tourism, some vacationers, especially older travelers, will choose a farm visit to rekindle memories of the simple, rural lifestyle they remember from childhood. Vacationers pay money for food, lodging, transportation, and souvenirs, but they are really buying a sentimental journey.

Assessing Entrepreneur's Preferences, Options and Goals

A key point before venturing into Agri-Tourism is to identify or revisit the real goals of the farm or ranch and to discuss these goals with all parties who may influence the decision-making. If any of the "partners" do not have the same goals, success will be limited and interpersonal stress may be the major result. ALL partners (this may be family members or outside interests) must meet together and seriously express their personal and business goals. Consider in particular:

- What kind of visitors do you want to attract?
- What kind of guests can you attract to your farm/ranch with the operation you have today?
- What kind of visitors will you be able to attract in the future?

Regulatory/Operational Basics

Please reference section "III" above.

Marketing Basics

Some of the key marketing issues that need to be considered by Agri-Tourism hosts are as summarized in the following table.

Issue	Comments
Promotion technique	Can encompass "word of mouth", Internet, Guides, Information Centres, Newspapers, etc. Operators need to be mindful of target audiences and objectives.
Development of marketing strategy	To develop a marketing strategy you need to consider the following basic marketing techniques: learn from your competition; define your product; target your customer; match capacity to demand; advertise and promote; and walk in your customer's shoes. (Compiled with adjustments from Assessing the Potential for Farm and Ranch Recreation, Neil R. Rimy and Richard L. Gardner, 1992. University of Idaho, College of Agriculture, Cooperative Extension System, Bulletin No. 699.)

The critical marketing issues that country vacation operators must address include:

- Developing a business that is suitable for the location and reflects anticipated demand
- Having a targeted marketing strategy; and
- Being able to refine the business within the first few years to entice competitors and remain cost competitive.

Economic/Finance Basics

A country vacation enterprise is a highly variable business. Accordingly, new entrants must be prepared to carefully assess both the profitability and cash flow implications of their proposed operation before investing. Cost information for operating a country vacation enterprise is difficult to obtain. In most cases operators have adapted existing farm and ranch facilities to specific client needs. They have modified facilities over a period of time or built new rooms as finances permitted. A number of sources are now available that provide benchmarks and checklists of prospective costs.

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

- have a solid business plan;
- have high levels of equity capital to put into the venture;
- have access to capital from private sources such as family and friends; and
- have a sound marketing program in place.

The critical economic issue for country vacation operators is being careful to evaluate the economic performance of a proposed operation before investing in facilities and development. Individual operators need to achieve all of the following factors for their enterprise to be viable. Operators will need to:

- Have the accommodations and recreation activity to meet market demands;
- Effectively market the accommodations and recreation activities; and
- Achieve a good market price for their service/product.

Chapter 9 – Non-Traditional Livestock

This chapter addresses a number of issues related to Non-Traditional livestock, namely Elk, and Deer, Bison, and Llamas and Alpacas.

I. Introduction

A. Elk and Deer

Elk belong to the Cervidae family of mammals, which include deer, moose and reindeer. The most common species of elk on game farms is Wapiti. In Alberta, commercial elk production involves the breeding and raising of elk for the production and sale of breeding stock, velvet, antler and venison.

White-tailed and Mule deer are native to North America. They belonging to the Cervidae (Deer) family of mammals, as do wapiti (elk), moose and reindeer. Deer are ruminants, distinguished by bony antlers rather than horns.

B. Bison

Bison belong to the Bovidae family of mammals, as do cattle. The Plains Bison is the primary subspecies used in commercial operations in Alberta, however the Wood Bison is being used in breeding programs. Bison are native to the prairie and parkland regions of Western Canada. There are two bison associations in Alberta: the Peace Country Bison Association and the Alberta Bison Association.

C. Llamas and Alpacas

Llamas and alpacas are members of the Camelid family, which includes the Dromedary and Bactrian camels of Asia, and the guanacos and vicunas of South America. Llamas and alpacas are native to the Andes Mountains of South America, and are primarily found in Peru, Bolivia and Chile. They are extremely hardy animals, easily adapting to North American climates in areas as diverse as Alaska and Florida. Alpacas, the smaller of the two animals, have been bred for fibre production for thousands of years, while llamas were bred for their fibre, and to be pack animals.

II. Market Size and Characteristics

A. Elk and Deer Overview

According to the Alberta Elk Commission ¹, Elk farming in North America is strongly based on the market for velvet antler as a food supplement and nutraceutical. Good markets also exist for meat

¹ <http://www.albertaelk.com/library/history.htm>

and for hunting opportunities. More recently, these strong markets, plus the limited availability of breeding stock, have pushed the prices of livestock to unprecedented levels (as much as \$US4,000 per calf). These prices are now beginning to demonstrate the increasing sophistication of the industry, as prices paid for lower quality stock are decreasing, and conversely, higher quality stock is selling for higher prices. As knowledge of productive capacities and efficiencies increases, the spread of prices paid will continue to increase, with more valuable genetics maintaining their price advantage.

Elk and deer farming industries have established in many countries around the world. Several species are raised, varying with the climate and target markets. Population numbers are shown in the following table:

WORLD POPULATIONS OF FARMED ELK AND DEER, 1997

Country	Number	Predominant Breeds	Uses	1998 Velvet Antler (tonnes, green)
New Zealand	1,400,000	Red deer, elk, fallow deer	venison, antler	350
China	1,000,000	Red deer, elk, sika	antler	200
Russia	400,000	Elk, red deer, sika	venison, antler	180
United States	250,000	Elk, red deer, fallow & others	venison, antler	45
Australia	180,000	Elk, red deer, rusa, fallow	venison, antler	10
Germany	150,000	Red and fallow deer	venison	-
Korea	112,000	Elk, red deer, sika	antler	40
Canada	98,000	Elk, reds, fallow and whitetails	venison, antler	45
Mauritius	60,000	Rusa deer	venison	-
England	30,000	Red and fallow deer	venison	-
Eire(Ireland)	28,000	Red deer	venison	-
Scotland	20,000	Red deer	venison	-
Taiwan	36,000	Sika, sambar, red deer	antler	15
Sweden	35,000	Red and fallow	venison	-
Denmark	30,000	Red and fallow	venison	-
France	30,000	Red and fallow	venison	-
New Caledonia	20,000	Rusa	venison, antler	1
Vietnam	15,000	Sika deer	antler	5
Malaysia	15,000	Red, fallow and Rusa	venison, antler	5
Thailand	5,000	Sambar and red deer	venison, antler	2
Norway	1,000	Red deer	venison	2
Totals	3,915,000			898

The preceding population numbers include only the elk and deer intensively managed on farms enclosed by high fences. They do not include extensively managed deer such as the reindeer of Canada, Alaska, Siberia and Lapland nor the hundreds of thousands of deer and antelope maintained for hunting and meat production in Texas and south African countries.

In Canada and Alberta, the number of Elk and Deer (and other non-traditional livestock) has increased dramatically since 1990. The following table shows the growth of the Alberta industry over the period 1990 to 1997.

	Licensed Game Farms	Elk	White-tailed Deer	Mule Deer	Moose
1990	117	3,110	287	202	21
1991	136	4,054	362	198	23
1992	154	4,377	629	302	17
1993	170	5,916	960	371	15
1994	196	7,231	1452	421	14
1995	250	9,477	2,045	430	10
1996	310	11,939	2,896	336	0
1997	400	14,950	3,544	300	0

Source: Animal Industry Division; Alberta Agriculture, Food and Rural Development

A comparison of growth between 1996 and 2001 is as detailed in the following table.

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Elk	19,024	74,478	291.5	7,875	31,304	297.5	a	19,825	a
Deer	50,859	53,285	4.7	2,812	8,331	196.3	a	3,500	a

a Due to reasons of confidentiality and a split of Deer and Elk in 1996 for northern Alberta was not possible. The aggregate Deer and Elk numbers in 1996 were 4,061 resulting in a combined Deer and Elk percentage increase of 474.4%.

Deer

Commercial white-tailed deer production in Alberta involves breeding and raising deer in game farm operations to produce and sell breeding stock, hunting stock and venison. Commercial deer production is a relatively new business that has grown rapidly due to the following factors:

- White-tailed deer have a high rate of reproduction. It's common for well-managed, mature does to bear twins annually. Good farm managers generally breed does for the first time at 14 to 18 months of age.
- The demand for trophy quality antlers is high in the United States. The white-tailed deer is the most sought after hunting target of all North American mammals.

- The demand for venison in markets around the world is growing, and is discussed later in this chapter. Venison is a lean, finely grained, and low cholesterol meat that is highly desired by health conscious consumers.
- White-tailed deer operations may be economically viable on a smaller land base than is required for most other agricultural enterprises.
- Rapid expansion in commercial deer production is expected to continue and contribute to a high demand for breeding stock.
- The high demand for breeding stock has limited venison production to cull breeding stock. Once expansion of white-tailed deer herds in Alberta takes place, venison is expected to become the primary market for Alberta deer producers. The critical element in achieving an industry based on venison production is developing domestic markets for venison and accessing the worldwide venison market.

The following table shows the growth of the White-tailed Deer herd estimate in Canada over the period 1993 to 1997.

	1993	1996	1997
Alberta	960	2,896	3,544
Saskatchewan	300	700	900
Ontario	500	1,000	750
Quebec	2,700	4,650	5,100
Atlantic Canada	200	50	100
Manitoba	-	-	60
Total Canada	4,600	9,296	10,454

Source: Animal Industry Division; Alberta Agriculture, Food and Rural Development

Comments Pertaining to Specific Markets

Notwithstanding the above, the 2001 figures may provide a misleading image of the current state of the industry. Chronic wasting disease problems and the current drought situation can be expected to curtail the growth of the industry for the foreseeable future. As such, some caution must be exercised with the following discussion as it is based on historical information that does not take account of more recent developments.

1. Velvet Antler Production

As noted above, one of the principal markets for Elk is their antlers. Mature elk stags can produce at least 15 kilograms annually. While more recent figures could not be obtained, in Alberta in

1997², 5,267 head had a production potential of 23.6 tonnes of velvet, or about 2.6% of the total global market. As noted in the table above, the global production of Elk antler velvet in 1998 was estimated to be 898 tonnes. While prices have varied significantly (from \$US 20 to \$US 110 per pound), the wholesale velvet antler market is worth in the order of \$US 39.5 million to \$US 217 million based upon 1996 production.

2. Leather From Alternative Livestock

A study for Alberta Agriculture by Brett Oliver-Lyons³ posted on the Internet in April of 2002, examined the potential markets for leather from alternative livestock. The key findings and conclusions are:

a. The largest market demand for deer hides is in the United States and China.

Current production of deer hides in western Canada is about 30,000. This number is insufficient to supply a value-added manufacturing facility. For example, the State of Michigan produces 300,000 deer hides alone per year.

b. The largest manufacturer of leather goods in the province using alternative livestock is Alberta Boot Company in Calgary.

The company has said that there is a potential for deer boots. This company is also looking for somebody to make good quality western style leather belts to include in their stores in Edmonton and Calgary.

c. The global leather market is extremely competitive and very price sensitive.

However, there are a number of countries that are interested in green, tanned and finished hides of various species. The country that seems to be most interested in green hides is Mexico, although France and Hong Kong are also potential markets.

d. The largest percentage of global leather goods manufacturing takes place in countries such as Mexico and China.

For example, Mexico produces more than 210 million pairs of shoes each year that are exported to over 20 countries. Mr. Oliver-Lyons feels that there is a huge potential for developing markets for Canadian green, tanned and finished hides.

² Game Farm Licensing Database, Animal Industry Division, Alberta Agriculture, Food and Rural Development; Estimated as of August 31, 1997.

³ <http://www.albertadeer.com/markets/venison/leather.htm>

3. Venison Market

Domestic Market

The domestic market for venison consists of health conscious consumers seeking a red meat alternative to beef or pork that is lower in fat, cholesterol and calories. Industry estimates for Canadian consumption of venison in 1995 were about 175,000 kg. In 1996 about 6,500 deer were slaughtered in Canada. In the same year some 35,817 kilograms (35 tonnes) of venison were exported from Canada, while 27,465 kilograms (27 tonnes) of venison were imported, mainly from New Zealand.

In Alberta provincial abattoirs, 15 white-tailed deer were processed in 1995, 42 deer in 1996 and 8 deer in 1997 (January 1 to October 31). These numbers do not include the 100 deer provided by Marvin Ference to the Agriculture Canada Research Centre at Lacombe.

The market for Elk meat venison is starting to develop in Alberta marketed under the brand “vencana”, however, to a large extent, Elk are still more valuable for other purposes (antler velvet). According to the Alberta Elk Commission, the Alberta Elk Slaughter Statistics for 2002 (as of Dec. 18, 2002) were as follows:

Provincial November for 2002 -- 429
Provincial year-to-date -- 2023
Federal year-to-date -- 398
Total year to date: 2,421

International Markets

A more recent study by Brett Oliver-Lyons (Simba Enterprises Ltd.) for Alberta Agriculture found the following opportunities for venison in international markets:

1. Germany is the largest consumer of venison.

In 1997, Germany imported about 20,000 MT per year at a wholesale price of 10-12 DM/kilo (\$12.20 to \$14.65 Cdn). At present, most comes from New Zealand in the form of frozen, de-boned cuts in portion control packaging. Korea imported 4,941 MT of venison from New Zealand and Australia last year. Most of the product was imported as frozen de-boned cuts by surface transport. Japan imports about 144 MT of venison mainly chilled or frozen loin and boneless leg. The wholesale price is 2,400 yen/kg. Kuwait imports about 1 metric tonne of venison per year. Most of it comes from New Zealand at an average price of 12 Kuwaiti dinars per kg. All the venison is consumed by the hotel and restaurant industry.

2. Venison is the meat with the most market potential in the Pacific rim.

However, great care must be taken in providing consistent and quality product for this market.

3. The United States market is the largest undeveloped market for venison.

In 1992, 1.2 million pounds (545 tonnes) of farm-raised venison were consumed in the United States, of which 80% was imported.

Challenges in the Venison Market

Although there are opportunities for deer producers in the venison market, there are also challenges. These include:

- Competition for domestic and foreign venison markets by such established producers as New Zealand and Australia.
- Consumers will need to receive a consistent supply of quality product. Factors such as type of animal (conformation), feeding program, handling practices, packaging and marketing will all influence their success.
- Consumers need to be encouraged to change their habits and purchase venison on a regular basis.
- Developing mainstream domestic markets for venison may be limited by a lack of consumer awareness, special cooking requirements and price. Developing broader consumer markets for venison means it will have to become more price-competitive with traditional red meats such as beef and pork.
- In gaining access to the developing U.S. market, Canadian producers will have to distinguish their product from New Zealand venison.
- Canadian regulations require that deer meat for human consumption be slaughtered in provincial or federally inspected facilities. Meat shipped inter-provincially or for export must be slaughtered in a federally inspected plant. For deer meat to be shipped to European countries requires that the slaughter and processing facilities be European Union approved. Currently in Alberta or Saskatchewan, there is no federally inspected facility or ECC approved facility willing to accept deer for slaughter.
- Germany, the potential largest market, has a 40% tariff on imported finished meat products. Therefore, Alberta deer producers will have to export whole carcasses or work with a German company to provide packaged venison and venison specialty items.

B. Bison

The Canadian Bison industry is estimated to be worth between \$60 and \$400 million per annum. The smaller figure is based upon estimates made by the government of Manitoba (possessing approximately 10% of the Canadian herd and takes account of dramatic declines in the value of meat due to over supply and drought conditions, which are expected to be particularly harmful due to a lack of grazing land. The higher figure is based upon estimates of the Canadian Bison Association.

The number of Bison in North America is estimated by the Canadian Bison Association to be in the order of 500,000. The Canadian total, now comprising approximately 30% of the continent-wide total, has increased dramatically between 1996 and 2001, as detailed in the following table.

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Bison	45,437	145,094	219.3	22,782	79,731	250.0	13,094	35,770	173.2

Alberta numbers account for over 54% of the nationwide population. The following table provides an overview of the Canadian bison population in 2001.

CENSUS 2001 BISON NUMBERS ⁴

	Number of Farms Reporting Bison	Number of Bison	Percentage of Total Bison Herd	Average Number of Bison Per Farm
Canada	1,887	145,094	100	77
British Columbia	98	8,964	6	92
Alberta	950	79,731	55	84
Saskatchewan	562	34,781	24	62
Manitoba	157	13,437	9	86
Ontario	58	3,755	3	65
Quebec	58	4,192	3	72
Maritimes	4	X	X	X

X Data kept confidential

In comparison, according to the 1996 Statistics Canada Census, pp 67, there were 745 farms reporting 45,437 bison in Canada. Alberta reported 334 farms with 22,782 bison.

Notwithstanding the above, the 2001 data gives a misleading image of the current industry. According to Dean Andres of the Alberta Bison Commission, the current drought conditions and depressed markets for meat can expect the number of calves dropped in the upcoming year to be reduced by in the order of 50% ⁵

⁴ Prepared by Dr. Gerald Hauer of the Alberta Bison Centre.

⁵ Personal discussion

Prices

The following table, based upon a November 2002 auction in Saskatchewan, provides an indication of current Bison prices in Canada.

Canadian Bison Association National Sale Canadian Currency (Regina, SK)					
November 25,2002					
Group	Sold	High	Low	Average	Weight Range
Pen of 3 Heifers	9	\$1,000	\$500	\$733	472#
2 Yr. Old Bulls	8	\$6,250	\$600	\$2,919	1451#
Bull Calves	9	\$2,900	\$550	\$1,317	520#
Heifer Calves	11	\$3,100	\$450	\$1,220	480#
Yearling Bulls	9	\$4,000	\$1,000	\$2,272	1107#
2001 Heifers	9	\$1,450	\$600	\$867	801#
Pen of 2 Yearlings	6	\$1,400	\$800	\$1,000	802#
Bred 2 Year Olds	7	\$4,750	\$750	\$2,057	1005#

According to Dean Andres of the Alberta Bison Association ⁶ approximately 14,000 Bison were slaughtered in Alberta in 2002. Based upon an average value of \$1,100 per carcass, the wholesale value of the Alberta industry is approximately \$1.5 million. Approximately 30% of animals were sold at the “farm gate”.

C. Llamas and Alpacas

While absolute numbers are relatively small, on a percentage basis, the number of Llamas and Alpacas has increased dramatically between 1996 and 2001, as detailed in the following table.

	Canada			Alberta			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Llamas/ Alpacas	8,669	25,782	197.4	3,692	12,894	249.2	443	5,897	1,231.2

Alberta numbers account for almost 50% of the nationwide population and the growth in northern Alberta at over 1,200% has been dramatic.

The numbers in this report do not include all animals, as many may be raised as pets or may not be registered due to animal bloodlines. Alpacas and llamas are not slaughtered; therefore no slaughter numbers are available for these animals.

Principal Markets

⁶ Personal discussion

The principal North American markets for llamas and alpacas are for fibre; however, lesser markets include: pets and show animals and guard animals (primarily for sheep). In South America, llamas are used as a source of meat. Some of the characteristics of the llama and alpaca fibre markets are discussed below ⁷.

Llamas

Llamas are producers of beautiful natural fibre. The fleece of the llama is lightweight, multi-coloured, durable and warm. It is a renewable usable resource that has revenue-generating potential. Llamas produce wool-type and hair-type fibre structures that can be processed into fine wool for spinners, knitters and weavers.

As the breeding of llamas has become more diverse in recent years, there are now a range of fleece types starting at the Ccara type – with great differences between guard hair and under-fibre diameters, through to the Lanuda type – with very little difference in guard hair and under-fibre diameters. This development makes for a fleece that is easier to process because the guard hair does not necessarily have to be removed. Also with the advancing of technology and the development of dehairing machinery, the separation of guard hair from the finer under-fibre will soon be problem of the past, with llama fibre becoming more versatile and more widely used.

A unique attribute of llama fibre is the microscopic air pockets (the medulla) found within the core of the fibre. This structure creates a very good insulation value. Llama fibre is unusually strong and resilient and the strength does not diminish as it becomes finer.

To date there is no commercial market for llama fiber, but there is a strong and growing cottage industry.

Alpacas

Alpaca is considered to be a relatively rare specialty fibre. Recent global production of Alpaca fibre in comparison to other fibres is summarized in the following table ⁸.

Fiber	Major Producers	Production
Alpaca	Peru	4,000 tons
Cashmere	China-Iran	5,000 tons

⁷ http://home.earthlink.net/~johnwmerrell/Alpaca_Fiber.htm

⁸ http://home.earthlink.net/~johnwmerrell/Alpaca_Fiber.htm

Angora	China-France-Chile	8,500 tons
Llama	Bolivia	600 tons
Vicuna	Peru	3 tons
Mohair	South Africa-USA-Turkey	22,000 tons
Wool	New Zealand-Australia-South Africa	1,851,000 tons

Alpacas have been selectively bred for their fine fibre for more than 5,000 years. Over the centuries alpaca coat colour was diversified and fibre production was refined. Guard hair, which is present on the wild guanaco and vicuna and the domestic llama, has for the most part been bred out of the alpaca. Alpacas have two different types of fleece:

- Suri alpacas are distinguished by their long and silky fibre. It grows parallel to the body and hangs in long, separate, distinctive pencil locks. It has a slick hand and softness with an exquisite luster.
- Huacaya alpacas may be distinguished by their thick, dense fleece growing vertically from the body. Huacaya fibre has a brightness or sheen.

Alpaca fibre combines a number of extremely desirable attributes into one fibre:

1. Alpaca fibre is silky, soft, supple and smooth to the touch. It is prized for its unique silky feel and luxurious handle.
2. Alpaca is found in 22 distinct colours, which can be blended into an infinite array of natural shades.
3. Alpaca is unusually strong and resilient. The strength does not diminish as it becomes finer.
4. Alpaca is as soft as cashmere and warmer and stronger than lambs' wool.
5. Alpaca is easily dyed any colour and always retains its natural lustre.
6. Alpaca contains microscopic air pockets, which creates lightweight clothing with good insulating values.
7. Most people can comfortably wear pure alpaca next to their skin.

Of the 4000 tons of alpaca produced annually, less than 1% of that is produced each year in North America. North America is at the very early stages of the alpaca fibre industry, and there would appear to be scope to expand and develop the industry.

III. Regulatory Basics

In general, the game farming industry has attracted considerable public scrutiny. As a result, a game farm license is required to farm white-tailed deer, elk, mule deer and moose in Alberta. Detailed regulations and procedures have been established to ensure that game farming can develop as an industry without harming Alberta's wildlife resources.

In Canada, the distribution of game farm elk is determined by the provincial laws and regulations established to control this industry. In Alberta, The Livestock Industry Diversification Act (LIDA) is administered by the department of Alberta Agriculture, Food and Rural Development. This act limits game farming in the Province of Alberta to white-tailed deer, mule deer, elk and moose. LIDA specifies that a game farm license issued by Alberta Agriculture, Food and Rural Development's Animal Industry Division, is required in order to farm elk.

There are a wide variety of regulations and requirements under the LIDA Act regarding among other things, hygiene, fencing, land requirements, tagging and registration and slaughter that should be considered very carefully by those contemplating entering the industry.

IV. Experts and Additional Resources

Elk and Deer

Experts

Ms. Debra Smith
Alberta Elk Association
4301 - 50 Street
Leduc, Alberta. T9E 7H3
Phone: (780) 980-7577
Fax: (780) 980-7591
altaelk@telusplanet.net

Additional Information

The Alberta Elk Association, University of Alberta and Agriculture, Food and Rural Development (AAFRD) have created a partnership to form the Alberta Elk Centre, located in Leduc. A key component of the partnership is the U of A's Ministik Research facility that currently maintains a herd of approximately 200 elk. In addition to innovation, marketing and quality assurance, the Centre will also focus on animal care standards, product quality control and safety, and environmental sustainability.

Canadian Venison Council
35 D Rayborn Crescent
St. Albert, Alberta T8N 5B6
Phone (780) 460-9424
Fax (780) 460-7494

Alberta White-Tail and Mule Deer Association
4301 F 50th Street
Leduc, Alberta Canada T9E 7H3

Phone: 1 (780) 980 5428 Fax: 1 (780) 980 5429
E-mail: info@albertadeer.com
Web: albertadeer.com

Publications

1997 Game Farming Information Package
Published by the Canadian Venison Council

White-tail and Mule Deer Farming in Alberta
Published by Alberta White-tail and Mule Deer Association

The Canadian Elk & Deer Farmer
South Airways Building
Suite #205, 3016 - 19th Street NE
Calgary, Alberta T2E 6Y9
Phone (403) 291-1422

Web Sites

Cybercervus at <http://www.cybercervus.com>

Deernet at <http://cervid.forsci.ualberta.ca/menubar/html>

Bison

Experts

Mr. Dean Andres,
Executive Director,
Alberta Bison Association,
4301 – 50th Street,
Leduc, AB T9E 7H3
Phone: (780) 986-4100
E-mail: dean.andres@telusplanet.net

Other Resources

Alberta Agriculture's publication on 'Commercial Bison Industry' is an excellent resource and reference for individuals interested in bison as a potential business opportunity.

www.bisoncentral.com

Llamas and Alpacas

The Suri Network
7779 Hickory Lane
Findlay, Ohio 05840
<http://www.surinetwork.org/>

The Alpaca Registry, Inc.
PO Box 87

Kalispell, Montana 59903
webmaster@alpacaregistry.net
<http://www.alpacaregistry.net/>

Canadian Llama and Alpaca Association

2320 41st Avenue NE
Calgary, Alberta, Canada T2E 6W8
403-250-2165
403-291-9324 fax
1-800-717-5262
cdnllama@cadvision.com
<http://www.claacanada.com/>

Canadian Alpaca Breeders Association

3490 Fenton Road
Westbank, British Columbia
Canada V4T1V8
250-768-2493 (Sec)
250-768-2345 (Sec fax)
403-932-6775 (Pres)
rosemary@ecotourism.com

V. Employment Opportunities and Training Needs

The development of educational programming in this sector, other than minor efforts as noted below, is not warranted at this time due to the pending distressed states of the industries and limited prospects for employment growth.

Elk and Deer

According to Debra Smith of the Alberta Elk Commission, the Elk industry is at a critical juncture due to chronic wasting disease and the drought that has been experienced for the past two years. Accordingly, there may be retrenchment within the industry, which may make it difficult to comment on training needs and employment opportunities at this time. Current short-term training courses primarily pertain to antler removal and farm gate marketing.

One might say that the industry still does not have a high degree of sophistication, and this may impede training needs. The principal driver is the market for antler velvet. To this end, there is some interest in training to develop new markets. With respect to the market for meat, the current relative shortage of animals and superior markets for antler velvet are impediments to growth. The venison market for Deer, along with some of the market development training that is likely required, can be expected to be “slow” until the chronic wasting disease problem is resolved.

Bison

According to Dean Andres of the Alberta Bison Commission, the most pressing training needs at present might be summed up as “marketing for survival”. There are approximately 2,000 Bison

operations in Alberta, Saskatchewan and northeastern British Columbia that might benefit from such short-term courses.

At a higher level, much greater emphasis is needed on developing new markets, encouraging cooperation among producers, and making use of new technologies. To this point, producers have not had the resources for such efforts and have been dependent upon programs of the Alberta government.

Llamas and Alpacas

While the overall numbers of animals are still relatively low in Canada, Alberta's relatively high proportion of the nation-wide llama and alpaca population (over 50%) may be of some strategic importance, especially if the market for alpaca fibre can be accessed and developed further. Assistance with developing these markets may be of interest for short courses. Other training needs on a limited basis may relate to the introduction and use of new technology for the industry. Finally, as there is a large portion of the llama and alpaca industry that relates to shows and competitions, there may be scope to tie Agri-Tourism opportunities to the industry.

Chapter 10 - Other Miscellaneous Crops and Sectors

This chapter contains comments pertaining to a number of other, miscellaneous crops or sectors where changes have occurred or interest has been expressed but were not considered to warrant a stand-alone chapter.

I. Potatoes

As noted in the 2001 Census of Agriculture, potato production in Alberta has increased over 80%. The following comments are based upon a discussion with Vern Warkentin, Executive Director of the Alberta Potato Growers Association.

Indicator	Comments
Number of Grower Members	165 including 25 Hutterite
Type of Governance	Recently changed back to a commission from a marketing board
Area Planted (ha)	22,300 total including 13,000 south of Calgary under irrigation serving the table or processed food markets; and 6,000 north of Olds pertaining to seed potatoes primarily.
Market Value	\$130 million at farm gate including \$90 million for the processing sector and \$30 million for the seed portion
Growth Rate	Approximately 10% per year driven by “french fry” and “chip” plants in southern Alberta
Major Customers	McCain, Old Dutch, Hostess
Market Challenges	Fast food market is at close to saturation point. Need to develop new international markets
Other Changes	Market demand starting to be impacted by changing ethnic dynamics and family structures with shift to more value-added product

Resources and Contacts for Additional Information

Mr. Vern Warkentin,
Executive Director,
Potato Growers of Alberta,
6008 – 46 Avenue,
Taber, AB T1G 2B1
Phone: (403) 223-2262
E-mail: vern@albertapotatoes.ca

Training Issues and Implications

The biggest training needs for the industry include:

1. Qualified field scouts for processors.

2. Business training for growers with emphasis on financial aspects (managing large sums of capital)
3. English as a Second Language training for migrant workers.
4. Short courses pertaining to potato production, possibly tied in with “Green Certificate” program.
5. International marketing for growers.

II. Pulse Crops

According to “Pulse Crops in Alberta”, edited by Bob Park and Ken Lopetinsky, pulses are edible seeds of annual legumes and are produced throughout the world on plants such as field peas, dry beans, lentils, chickpeas, lathyrus, soybeans, fenugreek and fababean. They are considered to be an important source of protein, with two to three times the protein of cereal grains and provide approximately 10% of the world’s dietary protein.

The following table provides an overview of the production of the most common types of pulses.

PULSE PRODUCTION (000MT)

Type of Pulse	Field Peas	Dry Beans	Chickpeas	Fababeans	Lentils
Europe	7,304	560	82	286	45
Asia	2,126	8,308	8,010	1,843	2,225
Canada	1,762	161	0	12	379
USA	305	1,490	0	0	85
Oceania/Australia	395	38	240	137	120
Africa	354	2,067	296	1,012	84
Latin America	80	4786	199	146	32
Total	12,326	17,410	8,827	3,436	2,970

Source: FAO 1997

Since the 1970s, pulse production in western Canada, lead by peas and lentils and chickpeas, has increases dramatically (by over 3,500 per cent between 1980 and 2001, peaking at 4.4 million tones in 2000) assisted by newer short-season, high yielding varieties and the introduction of herbicides. The forecast is that this expansion will continue at the same rate during the next five years. Most of the growth is driven by international demand, as more than 70 per cent of the output is exported. Reasons ¹ for the increased demand include:

- Some country populations are growing faster than their own agricultural sectors;

¹ <http://ats.agr.ca>

- ❑ Globalization is allowing local producers to stop cultivation of pulses for local markets if they can produce more profitable crops for export;
- ❑ Weather patterns are changing and disturbing the expected agricultural output in some regions;
- ❑ Health conscious consumers in affluent markets are increasing their consumption of vegetal protein; and
- ❑ Feed peas are used extensively as feed ingredients in Canada and the EU, as they are considered to be a “safer” source of feed for animals.

Several other factors have encouraged increased acreage of pulse crops on the Canadian prairies including:

- ❑ Reduced summer fallow acreage;
- ❑ Longer crop rotations;
- ❑ Continuous cropping;
- ❑ Direct seeding;
- ❑ The nitrogen-fixing ability of pulses; and
- ❑ As noted above, improved control of diseases and weeds through better rotations.

Pulses have vastly differing adaptation characteristics depending upon type of soil, frost, moisture, temperature, acidity, and salinity. These characteristics need to be considered by potential producers and there may be merit in covering this material in courses pertaining to the different types of pulses.

Markets

The current most common value-added opportunities ² for pulse crops include:

- ❑ Primary processing: use for animal feeds or as a replacement to soy meal in rations;
- ❑ Secondary processing: conversion into starch, protein and fibre for higher value products;
- ❑ Food processing: such as ingredients for soups, salsa, chips and baked goods, as a meat or milk extender, as fibre to enrich foods (particularly for institutional settings; and
- ❑ Industrial applications: paper products, charcoal briquettes and pet food products.

In Alberta most value-added processing occurs in the primary and food processing levels. Currently, Alberta value-added pulse products represent several different types of processing:

- ❑ Dry soup mixes;
- ❑ Pre-cooked and (often) canned;
- ❑ Precooked and frozen;
- ❑ Precooked and dehydrated for “instant” mixes; and

² “Pulse Crops in Alberta”, edited by Bob Park and Ken Lopetinsky

- ❑ Milled, extruded, coated and precooked in oil to create snacks.

Additional Information and Resources

The Leduc Food Processing Development Centre is a product development resource for processors. The Centre may be contacted at:

6309 – 45 Street,

Leduc, Alberta T9E 7C5

Phone: (780) 986-4793

Fax: (780) 986-5138

Other information about pulses may be obtained at:

www.pulsecanada.com

www.specialcrops.mb.ca

www.agr.gc.ca/misb/spcrops

Training Issues and Implications

To be effective pulse growers, Alberta farmers need to be particularly knowledgeable regarding the following factors:

- ❑ Costs and returns per acre, particularly in comparison with other competing crops;
- ❑ Types of inoculations and their respective benefits;
- ❑ Application of inoculants;
- ❑ Plant diseases and their causes and controls;
- ❑ Harvesting and conditioning;
- ❑ Loss calculation;
- ❑ Storage and a variety of drying systems;
- ❑ Handling
- ❑ Product grading;
- ❑ Marketing and types of contracts

III. Value-added Agriculture

The Alberta government has set a target of increasing the value of Alberta's value-added agriculture industry from \$7 billion to \$20 billion by 2005. One of the future objectives of the northern colleges system must be to align its programming to enhance the value-added sector.

While there is no generally accepted definition of “value-added agriculture”, and **it transcends all aspects of agriculture**, the Iowa State University Department of Extension defines it as including any or all of the following:

- “Converting agricultural outputs into products of greater value”.
- “Increasing the economic value of an agricultural commodity through changes in genetics, processing or diversification”.
- “The process of increasing the consumer appeal of an agricultural commodity.”

In order to add value to agriculture, producers may need assistance with any or all of the following:

- Preparation of marketing and business plans;
- Preparation of marketing research and competitive intelligence;
- Obtaining Information pertaining to new, trends, developments and opportunities;
- Fostering innovation and entrepreneurship;
- Risk management;
- Technology transfer;
- Developing contacts and resources;
- Access to financial opportunities available for companies; and/or
- Identifying “cross-over” applications and technologies from other industries or sectors.

One of the steps taken to achieve this objective was the creation of the Alberta Value Added Corporation (AVAC). AVAC will focus its efforts on the following areas:

- **Increasing the level of technology commercialization**

AVAC’s programs are designed to assist researchers and entrepreneurs take promising science to market. It also assist established companies whose R&D programs are creating new technologies for commercialization.

- **New & Enhanced Food Products**

New foods and enhanced foods arrive on grocery shelves daily. Consumers are demanding more choice, more convenience and more knowledge about their foods. An example of an enhanced food is pre-packaged, ready-to-eat salad. The consumer is willing to pay more for the product, because of its convenience.

- **Wellness Products**

Nutritional health is creating opportunity for value-added growth since the average consumer is more health-conscious. For example, anti-oxidants and omega-3 fatty acids are becoming known for their nutritional benefits. Consumers are seeking products like these that will provide additional health benefits.

- **Industrial Applications**

Non-food uses, or industrial uses of agriculture commodities include biodegradable marine oils, grain derivatives for cosmetics, construction materials or natural fertilizers from plant and animal waste. These products address a consumer need and create additional value for agricultural commodities.

- **Enabling Technologies**

To keep pace with new consumer demands for health and safety requires new technology. New technology can increase consumer confidence and demonstrate benefits to facilitate the consumer's willingness to pay more for products. Examples of enabling technologies are methods to measure effective bio-ingredients in functional foods or methods to enhance food safety.

It is suggested that new programming being considered at northern colleges consider an attempt to align with some of the above-noted initiatives to encourage synergies.

IV. Game Bird Industry

As noted in Chapter 2, "Other Poultry" including geese, ducks, roosters, ostriches, emus, pheasants, quail, wild turkeys etc. has increased by over 270% in northern Alberta between 1996 and 2001 (from approximately 31,000 birds to 115,000 birds). While the overall industry is small across Canada, the growth in northern Alberta warrants a brief commentary regarding the industry.

A 1991 Agriculture Canada study ³, with some updates for 2001 provides a somewhat dated but relatively good overview of the industry.

Market Size and Characteristics

In 1989, nine million head of game birds with an eviscerated weight of 2.8 metric tonnes were slaughtered for meat purposes. It is estimated that the Producer return is \$18 million, and the retail value \$24 million. Given that federal records show a slaughter of 10.5 million birds in 2000, one might conclude that the overall industry value has not increased dramatically nationwide. With approximately 115,000 birds, northern Alberta's share of the Canadian industry is very small.

There are no marketing boards for game bird producers; thus, the majority of meat is marketed by the individual producers. The distribution channels include exports (21%), retail stores (2%), hotels and

³ The Canadian Game Bird Industry (www.agr.gc.ca/poultry/gamebird.htm)

restaurants (48%) and on farm sales and others (29%). Some producers package a brace or pair of pheasant or partridge in gift boxes, which are popular for executive gifts at Christmas time.

Approximately 91 % of birds are used for the purposes of meat.

This industry is spread across the country, but with concentration in Québec, Ontario and British Columbia. In British Columbia there are well-established markets among the Oriental population. In other areas across Canada, there is a perception that the meat is healthier than other meats.

Related industries which profit from the game bird industry include hatchery, feed, building and equipment, packaging, transportation, retail stores, and the hotel, restaurant and institution trade.

North American Game Bird Associations

Association des éleveurs d'oiseaux fermiers
Ferme avicole d'Oka Inc.
1525 Chemin Oka
Comté Deux Montagnes, Oka (Québec)
JON 1E0
Claude Dicaire, secrétaire (514) 479-6610

Ontario Game Bird Association
Gold Creek Farms Ltd.
R.R. 2, Mt Brydges (Ont.) NOL 1W0 (519) 245-1329
Ken Hook, President (613) 336-8552

Commercial Pheasant Producers Cooperative Ltd.
P.O. Box 288
Kerrobert (Saskatchewan) SOL 1R0
Jim Wilson (306) 834-5156

North American Gamebird Association
Wildlife Harvest
P.O. Box 96
Goose Lake (Iowa) 52750

John Mullin, editor (319) 242-3046
Peggy Mullin Boehmer, Assistant editor (319) 242-3046

Appendix 1 Details of Northern Alberta Agricultural Changes

The following tables provide the details of the figures for Northern Alberta, as presented in Chapter 2. The data have been collected and summarized for 1996 and 2001 according to the two Agricultural Regions that make up Northern Alberta: Census Agricultural Region 6 comprises Census Districts 12, 13 and 14; and Census Agricultural Region 7 comprises Census Districts 17, 18 and 19.

I. Crops

A. Field Crops

TOP FIVE FIELD CROPS BY AREA (HECTARES 000 ¹⁾)

	CAR 6			CAR 7			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Spring Wheat	90,347	112,489	24.5%	424,707	388,626	-8.5%	537,196	501,115	-6.7%
Barley	271,391	188,189	-30.7%	200,523	155,887	-22.3%	388,712	344,076	-11.5%
Alfalfa	284,028	369,999	30.3%	184,658	270,718	46.6%	554,657	640,717	15.5%
Canola	80,819	90,250	11.7%	359,489	276,061	-23.2%	449,739	366,311	-18.6%
Other Tame Hay /Fodder	162,642	185,993	14.4%	149,486	215,920	44.4%	335,479	401,913	19.8%
Total	889,227	946,920	6.5%	1,318,863	1,307,212	-0.9%	2,208,090	2,254,132	2.1%

1. 1 hectare is equivalent to 2.471 acres

B. Fruits and Vegetables

TOP FRUITS AND VEGETABLES (HECTARES)

	CAR 6			CAR 7			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Strawberries	79	17	-78.4%	48	18	-62.5%	127	35	-72.4%
Other Fruits	37	5	-86.5%	84	7	-91.6%	121	12	-90.0%
Other Vegetables	45	25	-44.4%	5	X	NA	50	25	-50.0%
Sweet Corn	6	4	-33.3%	20	14	-30.0%	26	18	-30.7%
Green Peas	8	17	112.5%	0	X	NA	8	17	112.5%
Cucumber	7	7	0.0%	11	5	-54.5%	18	12	-50.0%
Turnips	27	X	NA	0	X	NA	27	X	NA
Total	209	75	-64.1%	168	44	-73.8%	377	119	-68.4%

C. Greenhouse, Mushrooms, Nursery, Sod and Christmas Trees

GREENHOUSE, MUSHROOM, NURSERY, SOD AND CHRISTMAS TREES

	CAR 6			CAR 7			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Greenhouse Area Under Cover^a	61,422	102,567	67.0%	36,275	50,721	39.8%	97,697	102,628	5.0%
Mushrooms^a	-	-		-	-		-	-	-
Sub-total	61,422	102,567	67.0%	36,275	50,721	39.8%	97,697	102,567	5.0%
Nursery Products^b	281	243	-13.5%	61	49	-19.7%	342	243	-28.9%
Sod^b	128	216	68.8%	-	101	#DIV/0!	128	216	68.8%
Christmas Trees^b	134	113	-15.7%	191	61	-68.1%	325	113	-65.2%

a) Square metres

b) hectares

II. Livestock

A. Other Livestock

OTHER LIVESTOCK (NUMBER OF ANIMALS)

	CAR 6			CAR 7			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Horses / Ponies	18,682	24,637	31.9%	12,709	16,901	33.0%	31,391	41,538	32.3%
Goats	5,514	6,076	10.2%	2,427	7,606	213.4%	7,941	13,682	72.3%
Wild Boar	-	698	NA	-	3,287	NA	-	3,985	NA
Fox	-	-	NA	-	-	NA	-	-	NA
Mink	-	-	NA	-	-	NA	-	-	NA
Bison	4,296	12,766	197.2%	8,798	23,004	161.5%	13,094	35,770	173.2%
Llamas and Alpacas	317	4,233	1235.3%	126	1,664	1220.6%	443	5,897	1231.2%
Deer and Elk	3,119	16,387	425.4%	942	6,938	636.5%	4,061	23,325	474.4%
Rabbits	6,655	1,031	-84.5%	972	769	-20.9%	7,627	1,800	-76.4%
Total	38,583	65,828	70.6%	25,974	60,169	131.7%	64,557	125,997	95.2%

NA Not Applicable

B. Sheep and Lambs

SHEEP AND LAMBS (NUMBER OF ANIMALS)

	CAR 6			CAR 7			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Farms									
All Farms	9,332	8,665	-7.1%	7,775	7,110	-8.6%	17,107	15,775	-7.8%
Farms With Sheep and Lambs	440	483	9.8%	242	280	15.7%	682	763	11.9%
Animals									
Rams	649	874	34.7%	492	589	19.7%	1,141	1,463	28.2%
Ewes	14,284	18,771	31.4%	11,335	13,380	18.0%	25,619	32,151	25.5%
Lambs	26,295	26,571	1.0%	12,784	13,334	4.3%	39,079	39,905	2.1%
Total	41,228	46,216	12.1%	24,611	27,303	10.9%	65,839	73,519	11.7%

C. Cattle and Calves

**CATTLE AND CALVES
(NUMBER OF FARMS AND NUMBER OF ANIMALS)**

	CAR 6			CAR 7			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Farms									
All Farms	9,332	8,655	-7.3%	7,775	7,110	-8.6%	17,107	15,765	-7.8%
Farms Reporting Cattle and Calves	6,300	5,598	-11.1%	3,383	2,997	-11.4%	9,683	8,595	-11.2%
Animals									
Calves Under 1 Year	283,105	325,910	15.1%	132,636	148,964	12.3%	415,741	474,874	14.2%
Steers 1 Year and Older	78,475	65,928	-16.0%	29,230	19,060	-34.8%	107,705	84,988	-21.1%
Heifers 1 Year and Older	97,370	120,112	23.4%	47,339	46,298	-2.2%	144,709	166,410	15.0%
Dairy Cows	11,063	7,727	-30.2%	3,411	1,498	-56.1%	14,474	9,225	-36.3%
Beef Cows	315,606	335,744	6.4%	160,077	168,263	5.1%	475,683	504,007	6.0%
Bulls 1 Year and Over	16,778	16,413	-2.2%	9,245	8,221	-11.1%	26,023	24,634	-5.3%
Total	802,397	871,834	8.7%	381,938	392,304	2.7%	1,184,335	1,264,138	6.7%

D. Pigs

PIGS (NUMBER OF FARMS AND ANIMALS)

	CAR 6			CAR 7			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Farms									
All Farms	9,332	8,655	-7.3%	7,775	7,110	-8.6%	17,107	15,765	-7.8%
Farms Reporting Pigs	945	520	-45.0%	440	329	-25.2%	1,385	849	-38.7%
Animals									
Boars	1,567	1,164	-25.7%	673	377	-44.0%	2,240	1,541	-31.2%
Sows and Gilts for Breeding	21,075	20,247	-3.9%	5,654	4,300	-23.9%	26,729	24,547	-8.2%
Other Pigs	170,034	157,268	-7.5%	47,674	39,449	-17.3%	217,708	196,717	-9.6%
Total Animals	192,676	178,679	-7.3%	54,001	44,126	-18.3%	246,677	222,805	-9.7%

"Other pigs" includes nursing and weaner pigs, and growing and finishing pigs.

E. Poultry Inventory

POULTRY INVENTORY (NUMBER OF BIRDS 000s)

	CAR 6			CAR 7			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Farms	9,332	8,655	-7.3%	7,775	7,110	-8.6%	16,442	15,765	-4.1%
Farms With Poultry	1,065	938	-11.9%	704	671	-4.9%	1,769	1,609	-9.0%
Animals									
Hens and Chickens	666,610	1,016,501	52.5%	439,999	334,790	-23.9%	1,001,400	1,351,291	34.9%
Broilers, Roasters and Cornish Hens	318,488	580,904	82.4%	281,701	167,199	-40.6%	485,687	748,103	54.0%
Pullets for Laying Under 19 Weeks	85,735	91,181	6.4%	54,736	84,960	55.2%	170,695	176,141	3.2%
Laying Hens 19 Weeks and Over	262,387	344,408	31.3%	103,562	82,631	-20.2%	345,018	427,039	23.8%
Turkeys	132,134	85,171	-35.5%	8,556	13,600	59.0%	145,734	98,771	-32.2%
Other Poultry ¹	17,317	101,244	484.7%	9,088	13,612	49.8%	30,929	114,856	271.4%
Total	1,482,671	2,219,409	49.7%	897,642	696,792	-22.4%	2,179,463	2,916,201	33.8%

1. Includes geese, ducks, roosters, ostriches, emus, pheasants, quail, wild turkeys etc.

F. Chicken and Turkey Production

CHICKEN AND TURKEY PRODUCTION

	CAR 6			CAR 7			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Number of Farms	9,332	8,665	-7.1%	7,775	7,110	-8.6%	17,107	15,775	-7.8%
Broilers, Roasters and Cornish Hens	460	145	-68.5%	264	88	-66.7%	724	233	-67.8%
Turkeys	180	57	-68.3%	113	30	-73.5%	293	87	-70.3%
Sub-total	640	202	-68.4%	377	118	-68.7%	1,017	320	-68.5%
Kilograms of Production									
Broilers, Roasters and Cornish Hens	2,685,081	6,873,860	156.0%	2,840,633	2,081,941	-36.2%	5,525,714	8,958,801	62.1%
Turkeys	2,220,802	2,375,259	7.0%	1,376,677	2,634,377	91.4%	2,358,469	2,638,696	11.9%
Total Production	4,905,883	9,249,119	88.5%	2,978,300	263,437	-91.2%	7,884,183	11,597,497	47.1%

III. Farm Management

A. Certified Organic Farms

CERTIFIED ORGANIC PRODUCTION IN 2001

	CAR 6		CAR 7		Northern Alberta	
	Number	As a % of All Farms	Number	As a % of All Farms	Number	As a % of All Farms
Total Farms	8,665		7,110		15,775	
Farms Reporting Certified Organic Products	43		50		93	
Type of Products		Type as a % of All COFs		Type as a % of all COFs		
Fruits, Vegetables or Greenhouse Crops	2	4.2	3	1.5	5	5.4
Field Crops	36	83.7	39	78	75	80.6
Animal or Animal Products	18	41.9	9	18	27	29
Other (Maple Syrup, Herbs etc.)	5	11.6	7	14	12	12.9

B. Land and Tenure

OVERVIEW OF LAND TENURE (HECTARES)

	CAR 6			CAR 7			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Area Owned	1,523,881	1,509,440	-0.9%	1,919,979	1,879,688	-2.1%	3,443,860	3,389,128	-1.6%
Area Rented, Leased or Crop-shared from all Sources Except Government	464,555	526,677	13.4%	487,892	559,963	14.8%	952,447	1,086,640	14.1%
Area Leased From Government	448,797	490,990	9.4%	439,459	438,516	-0.2%	888,256	929,506	4.6%
Total	2,437,233	2,527,107	3.7%	2,847,330	2,878,167	1.1%	5,284,563	5,405,274	2.3%

C. Applications to Land

APPLICATIONS TO THE LAND (HECTARES)

	CAR 6			CAR 7			Northern Alberta		
	1995	2000	% Change	1995	2000	% Change	1995	2000	% Change
Land in Crops	1,038,390	1,102,068	6.1%	1,527,606	1,598,165	4.6%	2,565,996	2,700,233	5.2%
Application of:									
Herbicides	390,322	406,100	4.0%	904,377	980,858	8.4%	1,294,699	1,386,958	7.1%
Insecticides	16,426	11,698	-28.7%	35,924	85,402	237.7%	52,350	97,100	85.5%
Fungicides	22,206	28,462	28.2%	74,349	59,944	-19.4%	96,555	88,406	-8.4%
Irrigation	988	1,152	16.6%	2,254	290	-87.1%	3,242	1,442	-55.5%
Commercial Fertilizer	564,745	531,003	-6.0%	1,129,118	1,002,009	-1.2%	1,693,863	1,533,012	-9.5%
Method of Manure Application									
Solid Spreader	56,523	64,603	14.3%	17,625	23,334	32.3%	74,148	87,937	18.6%
Irrigation System	0	0	0	342	0	0	342	0	NA
Surface Liquid Spreader	11,447	12,130	6.0%	2,173	2,406	10.7%	13,620	14,536	6.7%
Injected Liquid Spreader	834	1,806	116.5%	340	540	58.8%	1,174	2,346	99.8%
Total	68,804	78,539	14.1	20,480	26,280	28.3%	89,284	104,819	17.4%

D. Paid Agricultural Work

PAID AGRICULTURAL WORK

	CAR 6			CAR 7			Northern Alberta		
	1995	2000	% Change	1995	2000	% Change	1995	2000	% Change
Farms Reporting Year Round Paid Work	1,276	1,237	-3.1%	1,038	1,060	2.1%	2,314	2,297	-0.07%
Weeks of Paid Work									
Year Round	68,840	67,876	-1.4%	56,771	57,352	1.0%	125,611	57,352	-54.3%
Seasonal or Temporary	28,696	29,833	4.0%	30,644	34,936	14.0%	59,340	64,769	9.1%
Total	97,536	97,709	0.2%	87,415	92,288	5.6%	184,951	122,121	-34.0%

D. Gross Receipts

GROSS RECEIPTS

	CAR 6			CAR 7			Northern Alberta		
	1995	2000	% Change	1995	2000	% Change	1995	2000	% Change
Less than \$10,000	2,624	2,084	-20.6%	1,759	1,561	-11.3%	4,383	3,645	-16.8%
\$10,000 to \$49,999	3,710	3,382	-8.8%	2,205	2,581	17.1%	5,915	5,963	0.8%
\$50,000 to \$99,999	1,443	1,384	-4.1%	1,349	1,215	-9.9%	2,792	2,599	-6.9%
\$100,000 to \$249,999	1,105	1,230	11.3%	1,406	1,209	-14.0%	2,511	2,439	-2.9%
\$250,000 to \$499,999	307	392	27.7%	343	393	14.6%	650	785	20.8%
\$500,000 and Over	143	237	65.7%	109	151	38.5%	252	388	54.0%
Total	9,332	8,709	-6.7%	7,171	7,110	-0.9%	16,503	15,819	-4.1%

F. Gross Farm Receipts and Expenses

GROSS FARM RECEIPTS AND EXPENSES (\$MILLIONS)

	CAR 6			CAR 7			Northern Alberta		
	1995	2000	% Change	1995	2000	% Change	1995	2000	% Change
Operating Expenses	665	841	26.5%	495	566	14.3%	1,160	1,407	21.37%
Gross Farm Receipts	743	918	23.6%	607	627	3.4%	1,350	1,545	14.5%
Sales of Forest Products	6	2	-62.1%	7	3	-63.4%	13	5	-62.8%

G. Computer Use

COMPUTER USE

	CAR 6			CAR 7			Northern Alberta		
	1996	2001	% Change	1996	2001	% Change	1996	2001	% Change
Farms									
Farms Using Computers	1,555	2,807	80.5%	1,559	2,607	67.2%	4,366	5,414	24.0%
Use									
Bookkeeping		2,051			2,075			4,126	
Livestock Record Keeping		1,297			1,005			2,302	
Word Processing		1,960			1,701			3,661	
Internet		1,965			1,803			3,768	
E-mail		1,773			1,640			3,413	
Other		14			14			28	

Appendix 2 – Profile of Organic Consumers

Introduction

Certain perceptions, and potential misconceptions, exist about the organic consumer and the organic food market. The purpose of this report is to obtain a clearer picture of who is buying organic food and to identify some of the attitudes, values and trends of this consumer. By using data obtained from Environics International Food Issues Monitor survey (conducted in October 2000) and the Canadian Healthfood Association survey (July 2000), an image of the Canadian organic consumer emerges. By examining these survey results and various other studies (i.e the US Hartman group study) and trade magazines, we have been able to supplement this picture and construct a profile of the Canadian organic consumer. This information may be used for planning and decision making by current and potential growers, marketers and others in the agri-food industry.

What is Organic Food?

Organic food, also referred to as organics, is food grown under a production system that, in addition to the avoidance of synthetic chemicals, also promotes soil health, biodiversity, low stress treatment of animals and sound environmental practices. In 1999, the retail market for organic food in Canada was estimated at between \$200 and \$500 million US. Although this only represents about one percent of the overall retail share, the annual market growth rate of organics is approximately 15 percent.¹ The demand is growing, but what is contributing to this growth and who is purchasing organic food?

How Many Canadians are Eating Organic Food?

The results from an October 2000 Environics International survey were as follows²:

- 18 percent of Canadians purchased organic food regularly (regular or heavy buyers)
- 22 percent purchased organic food several times (several times or light buyers)
- 31 percent purchased organic food once or twice
- 26 percent never purchased organic food
- 3 percent did not know (DK) or provided no answer (NA)

How Frequently do Canadians Purchase Organic Foods?

The survey results show that a total of 71 percent (approximately 21.8 million) of Canadians have at least tried organic foods, whereas only 26 percent (approximately 8 million) have never purchased any organic food. Of special interest to us is the 40 percent (12 million) who purchase organic foods fairly often (i.e. more than one to two times per year).

Heavy or Regular Buyers of Organic Foods

Heavy (regular) buyers, the 18 percent who identified themselves as regular organic food purchasers, are fairly representative of the Canadian population with a few interesting demographic differences:

- Sixty percent are female
- They are under-represented in the \$60 to 80K income range
- They are more likely to be from BC (30 percent)
- They are less likely to be from either Saskatchewan (7 percent) or Alberta (12 percent)
- They are slightly more likely to be in the 25-34 age group than in the over 55 age group

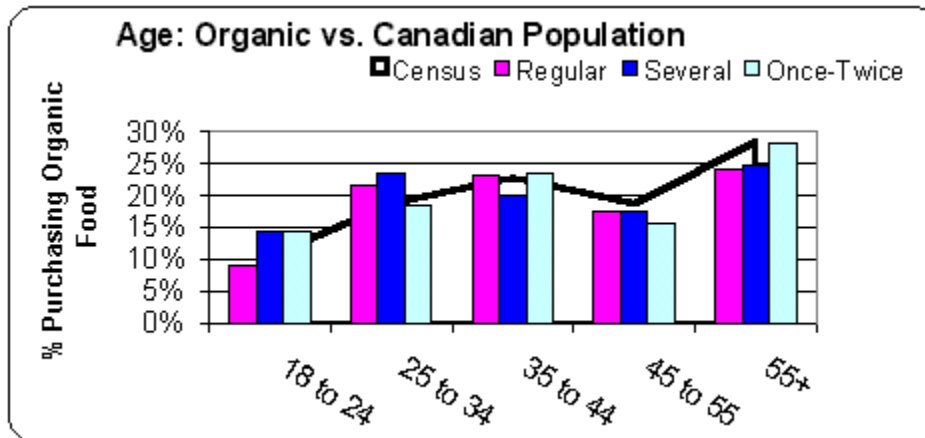
Light or Occasional Buyers of Organic Foods

Light buyers, the 22 percent who purchase organic foods several times a year, more closely resemble the average Canadian consumer profile with the following differences:

- They are under-represented at the \$60 to 80K income range, and:
- They are slightly more likely to be in the 18-34 year age group and slightly less likely in the over 55

Age

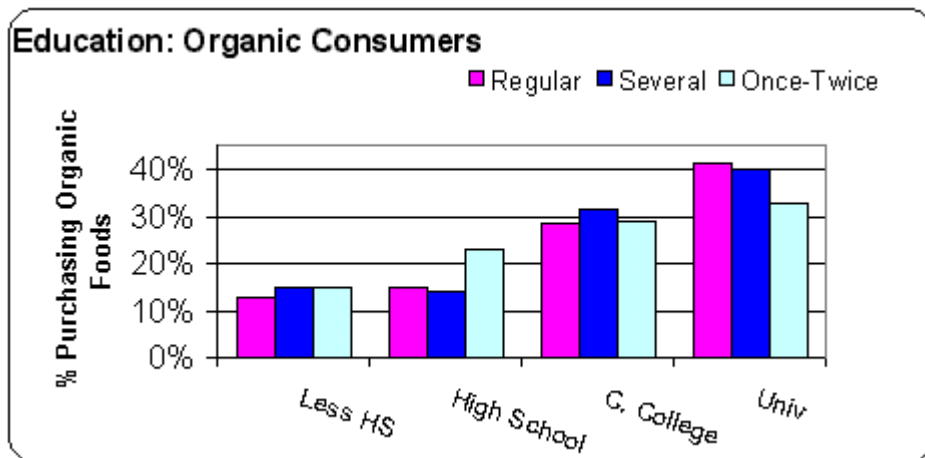
Not only are the affluent and numerous baby boomers (consumers in the 35-55 age group) driving this market, but so are the health-conscious younger generations.



Note: Census = total Canadian population as indicated in the white area behind the bar graphs.

Education

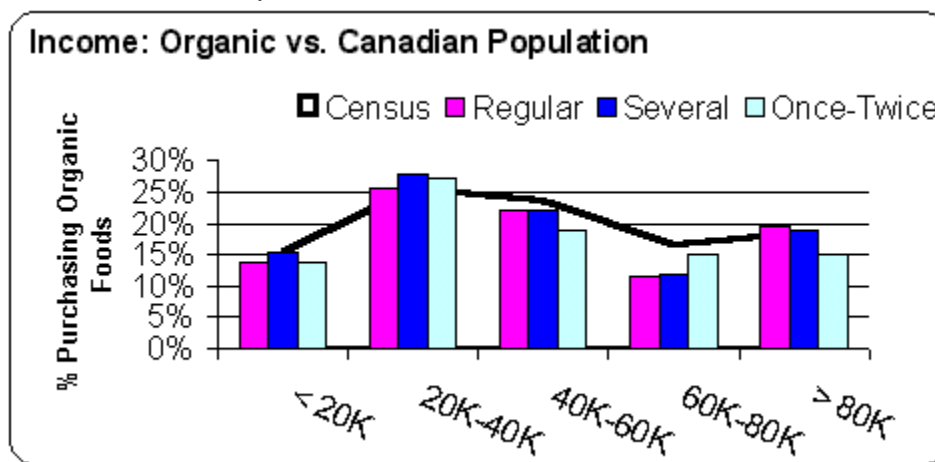
A close correlation appears to exist between the education level of consumers and the amount of organic foods they purchase. Even though most of the survey respondents were more educated than the general population, we can determine that a trend is emerging. As seen in Figure 3, the more educated the respondent, the more likely they are to make organic purchases.



Income

The following figure compares the income levels of organic consumers compared to the overall Canadian population. The under-representation of organic consumers at the \$60-80K income range is worth noting. It segments the buyers into both the high and low-income ranges. US studies, conducted by the Hartman Group (1999), have also determined a bipolar nature to the income distribution, showing that consumers in these two income levels are not purchasing organics. This points to a difference in the motivation, values and principles of those within these organic consumer groups.

In his book, *Marketing to the New Natural Consumer*, Harvey Hartman defined one of the characteristics of a classic organic consumer as having "commitment to environmentally sound products as part of lifestyle"³, as opposed to the new organic consumer whose has "commitment to products that relate to personal health" (p. 97).³ Given that environmentalism is a lifestyle choice with a philosophy that puts a low priority on money and materialism, they are more likely to have lower incomes by choice.



Note: Census = total Canadian population as indicated in the white area behind the bar graphs.

Local Markets

Taking the proportions for only the heavy and light buyers into consideration, the potential local market in Alberta and BC, represents about 3.3 million consumers. This figure is calculated using the actual regional percentages for heavy and light buyers (i.e. for Alberta, 12 percent and 27 percent respectively; for BC, 30 percent and 22 percent). Over half of these consumers (1.77 million) come from three cities - Edmonton, Calgary and Vancouver.

Other Studies

The results of the Environics International survey are in keeping with other surveys, both Canadian and American. In a July 2000 Canadian Healthfood Association (CHFA) study, 21 percent (close to the 18 percent found in the Environics survey) identified themselves as current organic purchasers. An analysis of these demographics also supports the view that organics are becoming mainstream. The CHFA survey looked at additional factors including family structure and marital status. While not that different from the general population, one third of the organic households have children - an interesting point to keep in mind for later.

After Alberta and BC, the next attainable market is the US. The 1999 Hartman Group survey profiled the US organic consumer and showed that 31 percent of US citizens purchased organic foods. Of interest in this study was the segmenting of the market -- heavy buyers and light buyers. The American heavy buyers were predominately female and under 30 years of age; half of them were earning under \$30K (about \$45K Cdn). The American light buyers were demographically closer to the American population and half of them earned over \$50K (about \$76K Cdn). This is similar to the Canadian organic buyers. A subsequent study by this same group proclaims "organic products are becoming more mainstream with 48 percent of consumers reporting use of organics at least occasionally".⁴

Where Do Consumers Buy Their Organic Food?

The purchasing of organic food is becoming more mainstream as evidenced by where people buy their organic food. Table 1 shows that almost half of organic purchases in the US are made at some mass-market outlet (49 percent). Supermarkets, the most mainstream of all purchasing channels, capture 44 percent of organic food sales. The very presence of natural food supermarkets within the health and natural product stores shows growing acceptance of organic and natural foods. [The definition of natural foods varies from product to product as it is not a registered term nor does it have a certification process. In general, it covers a range of food eco-labels that can indicate organic, no-pesticide, no-antibiotics, etc.]. Natural foods, once sold only by small independent businesses, are now sold in mainstream retail stores which capture 31 percent of organic food sales.

Table 1. Share of US organic food sales by retail outlet type (2000).⁵

Type of Outlet	Share (%)	
Mass Market Outlets		49
Supermarkets	44	
Other mass market (drug stores, mass merchandisers)	5	
Health & Natural Product Stores		48
Natural food supermarkets	31	
Natural food stores	12	
Natural food cooperatives	3	
Supplement chains/supplement stores	2	
Farmers Markets / Community- Supported Agriculture programs		3

This could be a future snapshot of the Canadian industry, given that the US is already targeting Canada as a destination market. For 2001, the US State Department ranked organic food as the fourth best agricultural prospect in Canada for US exports and investors.⁶

Food and Environmental Views

Relevant for the organic industry is the population's views and values regarding food and the environment. In 1996, 1997 and 1999, the Hartman Group looked into these perceptions.³ They segmented the population into six groups of which the following four can be defined as organically interested:

- True Naturals
- New Green Mainstream
- Affluent Healers

❑ Young Recyclers

True Naturals

The True Naturals (roughly 7-11percent) hold the strongest views on environment. Consumers in this segment tend to act on their beliefs. They regularly purchase organic food and earth-friendly products and are willing to pay premium prices.

New Green Mainstream

The New Green Mainstream consumers are concerned about the environment, in particular the impact of chemical fertilizers and pesticides. While they may have purchased organic foods in the past, this group has found barriers for further purchasing to be availability, price and other criteria. However, given the maturing of the industry (i.e. increased availability, selection, etc.), the new green mainstream consumer has likely grown since the survey was conducted.

Affluent Healers

The last two segments are well named. Affluent healers are wealthy, older people interested mainly in their health - the nutritional aspect of organic food is more important to them than the environmental aspects.

Young Recyclers

Young recyclers are young, single individuals who, although they claim to be environmentally sensitive, do not follow through unless it is very easy to do (e.g. recycling).

With the exception of the True Naturals, these other segments of the population must meet their own core purchasing criteria before they purchase organic. These criteria include taste, convenience, price, nutrition, health and ease of preparation. The importance of some of these factors will be seen a little later. However, all things being equal, the environmental aspect of a product may be the tie-breaker in terms of purchasing.

Traits and Values of the Canadian Consumer

Much of what organic food offers speaks directly to the emerging values and traits of the Canadian consumer, not just those identified as organic consumers. Organics fit well with elements being sought by our society as a whole - environmentalism, wellness, back to basics and even the search for new experiences.

Most Common Traits of the Average Canadian Consumer

The nine top traits of the Canadian consumer, identified in the Speaking of Food and Eating Report, are as follows:⁷

- ❑ Less homogenous, culturally bound
- ❑ Independent thinkers who seek control over their lives
- ❑ More educated and sophisticated (51 percent of women and 42 percent of men have post- secondary education)
- ❑ Pursuers of higher quality of life
- ❑ Extremely demanding
- ❑ Optimistic, but well grounded in reality
- ❑ Seeking new experiences and innovation
- ❑ Pursuers of wellness and environmentalism
- ❑ Aging, but more active

Consumers' interest in new food experiences is an area within organics that will, in all likelihood, require additional marketing efforts by the producers themselves. People want more from their

shopping experience such as meeting the farmer and connecting with producers of their food. This is already being done not only in farmers markets, but also in innovative and successful supermarkets in the US.

Five Emerging Consumer Values

Another study identified five emerging core consumer values:⁸

- Essences - returning to basics
- Hearth - growing importance of family and home
- Earth - environmental issues
- Whole being - health means not only looking good, but also balance of body, mind and soul
- Ethics - purchasing from socially responsible company

Factors Affecting Canadian Eating and Food Choices

Additionally there are a number of factors (potential purchasing barriers) that the organic industry needs to keep in mind. Table 2 lists some of the important factors related to food choices. These are based on a 1996 Canadian report on eating habits.⁷ According to this report, the most important factor related to why Canadians choose certain foods was taste; this was followed closely by nutrition and health. Also of importance were the ease of food preparation, the amount of time to prepare the food and the cost.

Table 2. Important factors for why Canadian consumers choose certain foods

Food choice factors	Percent of Canadians considering this a key factor
Taste	93%
Nutrition and health	89%
Ease of preparation	68%
Preparation time	66%
Price	62%

The importance of taste to consumers is in keeping with other more recent surveys. A 1998 HealthFocus study found that 48 percent of US natural food consumers were unwilling to give up taste for health. This was up from 30 percent in 1990.⁹

Food Safety Issues Relate to Food Choices

Other factors play into the consciousness of the consumer. Since 1996, the publicity surrounding food safety issues has raised the profile of these concerns for consumers. Canadians' top four food concerns (each with 89 to 91 percent of the population ranking these as very or somewhat concerned) are:²

- bacterial contamination
- pollution in the air, water and soil
- food safety
- use of chemical pesticides

The reduction of pollution and use of chemical pesticides are central to the appeal of organic farming. Taking into account the perceptions of organic food, we can see that food safety is also a very significant factor in food choices.

Big Role of Perception

Perception plays an important role. Canadians perceive organic foods as safer and healthier - 64 percent strongly or somewhat agree that organically grown foods are much safer and healthier than regular foods (slightly lower in Alberta at 49 percent). Canadians not only view organic foods as healthy, but also are willing to pay somewhat of a premium for it. Sixty-eight percent strongly or somewhat agree that they would be willing to pay 10 percent more for organic foods (again, a little less in Alberta at 59 percent).²

Three Main Triggers for Choosing Organic Foods

Further research has found that there are three main triggers that convince people to choose organic foods:⁴

- ❑ children
- ❑ specific food allergies
- ❑ healthy lifestyles

Children are an important part of the equation in organics. They have a great deal of influence directly on the food purchases as time-pressed parents enlist their children in food shopping and preparation. Even if children do not shop solo, they apply their environmental and health awareness by changing items in the cart. Teenagers are already purchasing items with their own money. These future consumers are savvy about food, nutrition and health issues.

Another factor related to choosing organics is that people worry more about what their children eat than what they themselves eat. Findings that "...children have heightened vulnerability to a variety of exposures as a consequence of their developmental, behavioural and physiological characteristics"¹⁰ have influenced parents' concerns about their children's diet. Seventeen percent of households have a member on a special diet. "Sixty percent of shoppers base their purchases on disease management or risk reduction".¹¹ Today, it is estimated that between one to two percent of adults and four to six percent of children have food allergies.¹²

Other Influences on Choosing Organic Foods

Other influences include taste, texture, health, nutrition, genetically modified organisms (GMOs), food-borne illness and chemical exposure.⁴ Seventy-five percent of Canadians are strongly or somewhat concerned about GMOs in their food.²

Conclusions

Organic foods seem to fit with and appeal to many of the current key traits, concerns and values of the Canadian population - those who purchase organics range from the health-conscious teenagers, to concerned mothers, to aging baby boomers. Organic consumers are educated, found in any age group and likely at both the high and the low-income range. They are no longer merely the stereotyped sixty's flower child. Not only are organic consumers becoming mainstream, but so also are the channels for purchasing organic products, clearly seen in trends

within the US and Canada. And, with the US sizing up Canada as a viable destination market, it is clear that organics offer growth opportunities and are here to stay.

Footnotes

¹ Lohr, L. (2001, Feb.). Factors affecting international demand and trade in organic food products. (unpublished). University of Georgia, Athens, Georgia. (p. 33). Retrieved on March 23, 2001 from the World Wide Web: <http://agecon.lib.umn.edu/>

² Environics, International Ltd. (2001) Food issues monitor survey 2001. Subscribe for reports to the World Wide Web at: <http://www.environics.net/eil/>

³ Hartman, H. & Wright, D. (1999). Marketing to the new natural consumer: understanding trends in wellness. (1st ed.). The Hartman Group: Bellevue, Washington.

⁴ Hartman group study reports organics going mainstream. (2000, October 27). The Hartman Group Press Releases. Retrieved on Jan. 10, 2001 from the World Wide Web: <http://www.hartman-group.com/pressreleases8.html>.

⁵ Myers, S., and Rorie, S. (2000, Dec.). Facts and stats: the year in review. Organics and Natural Business News. Retrieved on Dec 4, 2000 from the World Wide Web: <http://www.organicandnaturalnews.com/articles/0c1feat1.html/>

⁶ US Department of State. FY 2001 Country commercial guide: Canada. Retrieved Jan. 2001 from the World Wide Web: http://www.state.gov/www/about_state/business/com_guides/2001/wha/canada_ccg2001.pdf/

⁷ The Canadian Foundation for Dietetic Research, Dietitians of Canada and Kraft Canada. (1997). Speaking of food and eating: A consumer perspective.

⁸ The future of foods - industry trends. Retrieved on Jan. 10, 2001 from the World Wide Web: <http://www.opta-food.com/trends/2trends.html/>

⁹ Dinar, J. (2000, Dec.). Food for thought why they buy. Natural Food Merchandiser. Retrieved on Dec 1, 2000 from the World Wide Web: http://www.healthwellexchange.com/nfm-online/nfm_backs/Dec_00/research.cfm

¹⁰ Kidder, K. et al. (2000). The health of Canada's children. (3rd ed). Canadian Institute of Child Health. Ottawa, ON.

¹¹ Canadian Grocer. (2000, June). The road ahead: consumer trends in food. MacLean- Hunter. Toronto, Ontario. Retrieved Dec. 19, 2000 from the University of Alberta Library Databases (Canadian Business and Current Affairs [CBCA] Fulltext Education) on the World Wide Web: <http://ej.library.ualberta.ca/database/index.cfm?ID=135/>

¹² Canadian Restaurant and Foodservice Association. Food allergies and the foodservice industry. Retrieved on Jan 31, 2001 from the World Wide Web: <http://www.crfa.ca/foodallergy/main.htm>

Appendix 3 – Individuals Contacted

In completing this study, successful discussions were held with the following individuals.

<p>Mr. Vern Warkentin, Executive Director, Potato Growers of Alberta, 6008 – 46 Avenue, Taber, AB T1G 2B1 Phone: (403) 223-2262 E-mail: vern@albertapotatoes.ca</p>	<p>Mr. Toso Bozic, Woodlot Specialist/Agroforester, Alberta Agriculture Food and Rural Development, Crop Diversification Centre North, RR6, 17507 Fort Road, Edmonton, AB T5B 4K3 Tel: (780) 415-2681 Fax: (780) 422-6096 E-mail: toso.bozic@gov.ab.ca</p>
<p>Mr. Robert Rogers, Vice President, Alberta New Crops Network Society, Upper, 5303 – 91 Street, Edmonton, AB T6E 6E2</p>	<p>Dr. Mohyuddin Mirza, P.Ag. Greenhouse Crops Specialist, Crop Diversification Centre North, Edmonton, AB, T5B 4K3 Phone: 780-415-2303 Fax: 780-422-6096 Email: mohyuddin.mirza@gov.ab.ca</p>
<p>Dr. Dalin Bullock, Dean of Agriculture, Fairview College, Tel: (780) 835-6639/ 1-888-999-7882 E-mail: dbullock@fairviewcollege.com</p>	<p>Mr. Eric Hutchings, Aqua-ponics Specialist, Crop Diversification Centre South, Brooks, AB Tel: (403) 381-5574</p>
<p>Dr. Bruce Rutley, Director, Innovation Centre, Fairview College Tel: (780) 835-3959</p>	<p>Mr. Dean Andres, Executive Director, Alberta Bison Association, 4301 – 50th Street, Leduc, AB T9E 7H3 Phone: (780) 986-4100 E-mail: dean.andres@telusplanet.net</p>
<p>Ms. Debra Smith, Alberta Elk Commission, 4301 - 50 Street Leduc, Alberta. T9E 7H3 Phone: (780) 980-7577 Fax: (780) 980-7591 altaelk@telusplanet.net</p>	

Appendix 4 – Major Literature Used

The major sources of literature used for each section of the report are summarized below.

Chapter 2 – An Analysis of Changes Between 1996 and 2001

Statistics Canada – 2001 Census of Agriculture - <http://www.statcan.ca/English/agcensus2001>

95-180-XPB Agricultural Profile of Alberta (data and analytical products: 1996 Census of Agriculture, August 1997).

Chapter 3 – The Greenhouse Industry

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