

A TEACHER'S GUIDE TO  
NOVA SCOTIA AGRICULTURE

f on Nova Scotia  
farms



# Acknowledgments

The Nova Scotia Agricultural Awareness Committee is pleased to present *On Nova Scotia Farms: A Teacher's Guide to Nova Scotia Agriculture* (2nd edition).

The Agricultural Awareness Committee is a partnership of government, industry and rural organizations. The committee works to enhance the knowledge, understanding and appreciation of agriculture and the agri-food industry of Nova Scotia.

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# Introduction

*'On Nova Scotia Farms'* was created to provide a basic overview of Nova Scotia agriculture for teachers of all grade levels. We encourage educators to help students understand and appreciate the role that agriculture plays in our lives and in our province. Look for the *'On Nova Scotia Farms'* activity books for ways to bring agriculture into the classroom.

Nova Scotia agriculture is a dynamic industry offering many opportunities and challenges. The agriculture and agri-food industry is an integral part of the Nova Scotia economy and touches many parts of our lives, from the field to the fork. Farmers across the province provide valuable employment opportunities and invest money and time in local communities. Farmers continue to work to ensure their communities are healthy and economically viable places.

Nova Scotia farmers are leaders in progressive farming and are continually working to produce food using environmentally sustainable practices. On the farm, in your grocery store, and everywhere in between, the agriculture and agri-food industry in Nova Scotia is taking advantage of the latest developments in research and technology to improve food quality, safety, and freshness and to provide good environmental stewardship.

For further information on agriculture in Nova Scotia, refer to the Contacts and Resources section of this document and visit the Nova Scotia Department of Agriculture website.

[www.novascotia.ca/agri](http://www.novascotia.ca/agri)

Other sources of information include:

[www.thinkfarm.ca](http://www.thinkfarm.ca)

[www.selectnovascotia.ca](http://www.selectnovascotia.ca)

## FOR AGRICULTURAL EDUCATION PROGRAMS CONTACT:

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To visit Atlantic Canadian farms, consider Open Farm Day, held annually on the third Sunday in September. For information see

[www.meetyourfarmer.ca](http://www.meetyourfarmer.ca)



Open Farm Day visit

# Agriculture in Nova Scotia

## The beginnings

The earliest European agricultural endeavours in Nova Scotia took place on Sable Island when the French tried to settle there in 1518 and again in 1598. Unfortunately, both attempts ended in failure. During the next 150 years both the French and English made settlements, prepared land for cultivation, suffered the setbacks of fire, harsh winters, and attacks from rivals. These first settlers brought with them chickens, sheep, goats, pigs, cattle, wheat, oats, barley, peas, beans, turnips, and cabbages to grow in their new land. They produced a surplus of crops and livestock, some of which were shipped back to Europe.

The Acadians were drawn to farm marshlands because they were familiar with them at home in France, and they had the technology to drain and build dykes around the marshes. The heritage of their work can still be seen today, and the Nova Scotia Department of Agriculture currently maintains 241 km of dykes protecting 17 400 hectares of land.



Acadian marshlands

The British gained possession of Nova Scotia in the early 1700s and by 1749 Halifax was founded. 1752 marked a turning point in Nova Scotia agriculture. Governor Cornwallis offered a subsidy to farmers for cleared land planted to English grass, hemp, or flax seed. Subsidies were also offered for hay, wheat,

barley, oats, hemp, and flax harvested. Farming began in earnest, on the marshlands and on the uplands. German and Swiss settlers arrived and helped the British colonists develop agriculture.

Through the late 1700s and 1800s agriculture in the province increased in importance. The government passed legislation to support its development. Societies were formed for the improvement of agricultural practises, and fairs were started to exhibit agricultural products. The Hants County Exhibition in Windsor was first held in 1765 and is the oldest agricultural fair in North America. About 35 000 people visit the fair annually.



Traditional oxen team



Agriculture in Nova Scotia reached a peak in the late 1800s and early 1900s with over 1.9 million hectares of cultivated land and a farm population of 300 000. As agriculture in North America grew, Nova Scotia felt competitive pressure from agriculture in western North America. Western farms had the benefit of highly productive land with lower production costs. This economic pressure brought about the abandonment of some marginal farmland in Nova Scotia, with most of this land being returned to woodland.

This means that there is significant potential for increased production in Nova Scotia, especially if market demands for local food create a suitable economic environment.

Another significant historical period with impact on Nova Scotia agriculture was the Netherlands Farm Families Movement between 1947 and 1960. At the end of World War II, the Canadian and Dutch governments signed a formal agreement that brought a wave of Dutch farmers to Canada looking for farming opportunities and for escape from the weak Dutch economy. While some settled in other parts of Canada, a significant number settled on Nova Scotia farms. Their strong agricultural background and hard work helped rejuvenate the agricultural sector in Nova Scotia at that time.

## Changes in Nova Scotia agriculture

Since agriculture started in Nova Scotia over 400 years ago, farmers have been improving agricultural practices by testing crops and livestock to find the best suited to the climate, soils, and management practices of the province. Agricultural models that work well in western Canada or other places may not work well at all in Nova Scotia.

Because farming is so competitive, farmers are also quick to adopt changes in technology that will make their operations more efficient and effective. Farm product traceability systems, automation in milking parlours, environmentally controlled storage facilities, and the latest harvesting equipment for

field crops are examples of the means that farmers employ to improve their operations and products. New uses for traditional farm products, such as hay for bio-fuel pellet burners, can provide economic opportunities for innovative farmers.

Nova Scotia farms are still largely family owned and operated, with extra labour provided by full or part-time staff as the seasonal work load requires. Following a world-wide trend, many small farms that raised a variety of crops and livestock have given way to larger, more specialized farms. Many Nova Scotia farms today produce only one or two commodities, like dairy products, beef, cereal crops, fruit crops, vegetables, blueberries, cranberries, mink, goat's milk and cheese, chickens, wine grapes, or Christmas trees.

While the growing interest in local food provides opportunities for all Nova Scotia farms, smaller, more diverse operations can stand to gain from new, direct marketing strategies. Some farms have developed successful agri-tourism businesses alongside their main farm operation. This can be an attractive project in which various members of a family farm, especially young people, can join in partnership with the main family-farm operation.



Farm market in Mahone Bay

## Agricultural Marketing Opportunities in Nova Scotia

One of the fastest growing trends in agriculture is direct marketing. Farm entrepreneurs are developing innovative ways to reach customers, and one of the most common is the farmers' market. Markets can be found in solitary buildings or in public squares with rented tables for vendors to sell directly to customers. Farmers' markets are growing in number and in sophistication. There were about 15 markets in Nova Scotia in 2005, and about 55 in 2010. The Seaport Farmers' Market in Halifax is in a magnificent building on the waterfront. It is twice the size of the old Brewery Market, offering more space for farmers and customers. The building is open multiple days of the week and has many 'green' features, like wind turbines, a 'living' roof, and natural lighting.

Another marketing method that is growing in popularity across North America is Community Shared Agriculture (CSA). Community Shared Agriculture links producers directly with consumers, to sell products and build relationships. Customers buy annual shares or subscriptions from individual farmers, usually at the start of the season before the crops are even in the ground. In return, the farmer provides fresh produce on a regular basis. The relationship goes beyond the purchase of food, with consumers potentially joining in the planning, production, and harvesting of crops. The customers share both the rewards and the risks of farming, from bumper crops to crop failures. Most CSA farms are certified organic or emphasize sustainable production practices. Consumers enjoy knowing where and how their food is produced, giving them a greater sense of food safety and security. There are over 20 CSA organizations in Nova Scotia, with some feeding more than 400 members.

There are other examples of creative food entrepreneurship. The Self-Serve Freezer presents a way to sell frozen farm products (meats or vegetables) in high-traffic locations with minimal labour. It is a method of selling that is similar to the vending machine or an unattended farm stand. The freezers

can be managed by the farmer or at a facility operated by a third party. The ideal location is an existing hub, offering the right traffic volume, the right potential customers, and the right timing. An example of a good location is a day-care facility. Busy parents picking up their children after work are often thinking about supper, saving time, and possibly stopping at a grocery store. Other good locations could be family resource centres and churches.

Another growing trend is the practice of urban agriculture. This is the practice of cultivating, processing, distributing, and marketing food in metropolitan areas. It often brings new and innovative ways of growing to urban and peri-urban spaces, and examples of urban agriculture can be found around the world. Two of the factors that differentiate urban from rural agriculture are its proximity to a concentrated human population and the scale or amount of land that is cultivated. The practice is also set apart by its intimate connection with urban social and economic systems. Urban agriculture includes small-scale urban farms, community gardens, rooftop and backyard gardens, and school gardens. A guide for help in starting a school garden may be found on the Department of Agriculture website ([www.novascotia.ca/agri](http://www.novascotia.ca/agri)).



Harvest in the school garden

# Industry Overview

Information for this section was drawn largely from three sources produced by the Nova Scotia Department of Agriculture in 2010: *An Overview of the Nova Scotia Agriculture and Agri-Food Industry*, *Profile of Agricultural Land Resources in Nova Scotia* and *Homegrown Success – a 10-year plan for agriculture*.

All are available for downloading at [www.novascotia.ca/agri](http://www.novascotia.ca/agri).

## DID YOU KNOW:

- About 4000 farms in Nova Scotia produce food and fibre on about 400 000 hectares of improved agricultural land. The average farm size is just over 100 hectares, far smaller than the Canadian average of 315 hectares.
- Nova Scotia agriculture had a product value at the farm gate of \$540 million in 2011.
- Agriculture employs about 5,200 Nova Scotians directly. An additional 4,700 are employed in the food and beverage manufacturing sector (excluding fisheries and seafood manufacturing).
- The top four sectors in terms of farm sales are dairy, fur, poultry and eggs.
- Fur is the most valuable export product and blueberries are the leading export crop.
- Nova Scotia is a world leader in agricultural research and production for products such as carrots, wild blueberries, strawberry plants, and fur.
- The agriculture and food industry provides career opportunities in everything from primary production to food safety, quality control, and scientific research.



Annapolis Valley lookoff

## How much farm land is there in Nova Scotia?

The Canada Land Inventory (CLI) is a system that designates land capability for agriculture based on climate, soils, and landscape. There are seven levels, ranging from Class 1, which has no significant limitations for crops, to class 7, which is not suitable for crop production. Generally, Class 4 or above is required for farming. Class 4 land has limitations for many crops. Blueberries, however, grow well on Class 4 land and are a significant crop in Nova Scotia. Class 5 land is suitable only for unimproved pasture land.

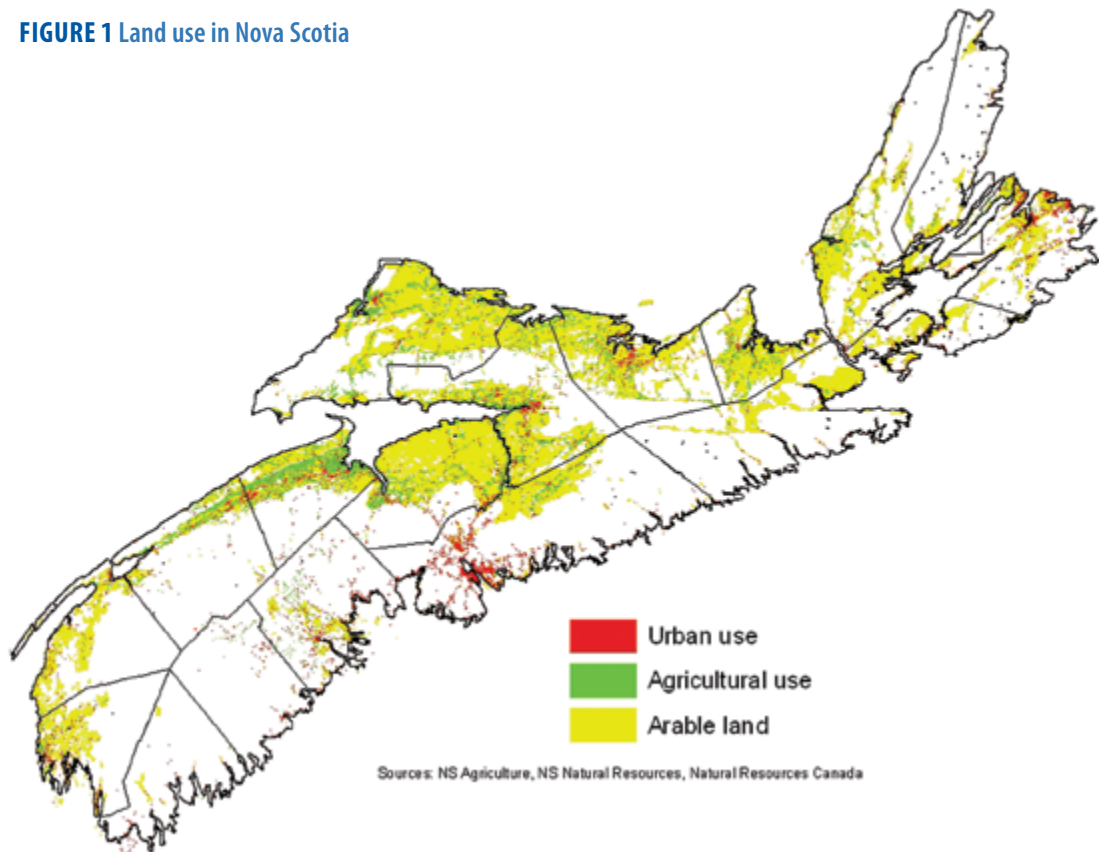
Nova Scotia has no Class 1 land. It has about 165 000 hectares (or 3% of the province) of Class 2 land. If we consider Classes 2, 3, and 4 together, the land accounts for slightly less than 30% of the provincial land area. This represents the total arable land base of the province. Of this land base, only about 15% is being active farmed.

**TABLE 1** Agricultural Land Resources in Nova Scotia

Land	Hectares	Percentage of provincial land area
Class 2	164,933	3.1
Class 3	990,062	18.1
Class 4	418,166	7.6
Classes 2, 3 and 4 total	1,573,160	28.7
Land in active agriculture	235,965	4.3

The following map shows the location of urban development, land currently used for agriculture and arable land not being used for farming in Nova Scotia.

**FIGURE 1** Land use in Nova Scotia



**TABLE 2 Farm numbers and acreage, Nova Scotia 2011**

County	Number of farms	Total farm area (acres)	Land in crops (acres)	Summer fallow land (acres)	Tame or seeded pasture (acres)	Natural land for pasture (acres)	All other land (acres) <sup>1</sup>
Cumberland	562	224,986	52,690	132	9,065	10,178	152,921
Colchester	455	143,333	39,879	137	7,391	7,262	88,664
Kings	614	122,640	54,974	600	6,101	8,719	52,246
Hants	342	93,218	34,043	38	5,024	4,986	49,127
Lunenburg	342	68,297	9,649	X	1,820	2,702	54,126
Pictou	277	61,157	20,413	0	429	4,974	35,341
Antigonish	235	60,233	19,214	X	4,540	3,954	32,525
Annapolis	234	51,133	16,706	59	3,854	6,272	24,242
Halifax	164	37,360	10,966	18	1,150	1,859	23,367
Inverness	138	33,843	9,017	X	3,552	4,309	16,965
Guysborough	99	29,297	2,123	0	429	809	25,936
Cape Breton	90	12,142	3,690	X	837	1,141	6,474
Yarmouth	91	11,775	2,628	X	970	1,775	6,402
Queens	37	10,954	1,644	0	535	438	8,337
Digby	150	9,149	X	X	X	1,433	7,716
Victoria	40	7,700	1,324	X	387	494	5,495
Shelburne	17	6,321	X	X	X	246	6,075
Richmond	18	2,949	364	0	41	591	1,953
<b>Total</b>	<b>3,905</b>	<b>986,487</b>	<b>279,324</b>	<b>984</b>	<b>46,125</b>	<b>62,142</b>	<b>597,912</b>
Hectares		399,217	113,038	398	18,666	25,148	241,966

Notes: X= suppressed to meet confidentiality requirements of the Statistics Act

<sup>1</sup>includes Christmas tree area, woodlands, and wetlands

Source: Statistics Canada, Census of Agriculture 2011

## Where is the farmland in Nova Scotia?

Agriculture in Nova Scotia is concentrated in the “agricultural triangle,” mainly Cumberland, Colchester, Kings, and Hants counties. These four counties account for over 60 percent of agricultural revenues in the province. Within the “agricultural triangle” the soil characteristics and microclimate are among the best in the province. Cumberland County has close to a third of the best class available in Nova Scotia, with over 50 000 hectares of Class 2 land, while the “agricultural triangle” as a whole has over 75% of the Class 2 land in the province.

Outside of the triangle, Pictou, Inverness, and Antigonish counties have considerable arable land, with about 17% of the Class 2 land in the province.

In contrast, Yarmouth, Lunenburg, Shelburne, and Queens counties have no Class 2 land. While Yarmouth and Lunenburg counties have considerable Class 3 land on which conventional agriculture is feasible, Shelburne and Queens counties have very little Class 3 or Class 4 land. Less than 10 % of the land in those counties is considered suitable for agriculture.

## How are we using our farmland in Nova Scotia?

Of the arable land in Nova Scotia (Classes 2, 3, and 4), only about 15% is currently being actively farmed. Urban development occupies about 5%, and the remaining 80% is in natural or cultivated forest.

In Nova Scotia, the use of arable land for urban development is an important topic. Currently 7% of urban development in the province is on Class

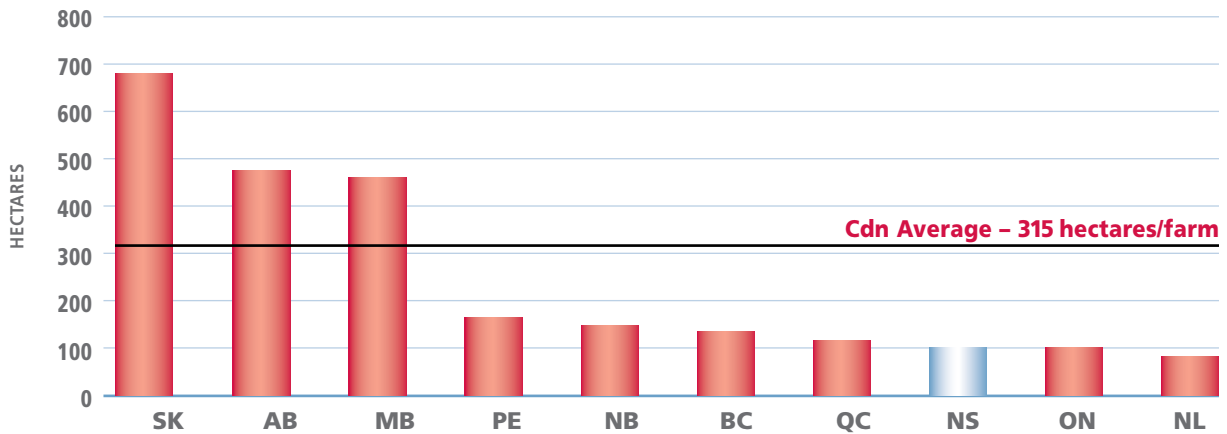
2 land, 35% is on Class 3, 13% is on Class 4, and 45% is on Class 5 or lower. The location of Halifax, the province's largest urban area, on poor quality land contributes significantly to this breakdown. In other parts of the province, how land is put to use provokes considerable debate.

Since only about 15% of the arable land in Nova Scotia is actively farmed, many parts of the province, including Hants and Colchester counties, have good farming land that is currently not used for agriculture.

## How big are Nova Scotian farms?

Historically, Nova Scotia had as many as 47,000 small farms occupying over 1,900,000 hectares of the province. Today, about 4000 farms occupy about 400,000 hectares (this includes farm woodlots). By North American standards, Nova Scotia farms are small and highly diversified.

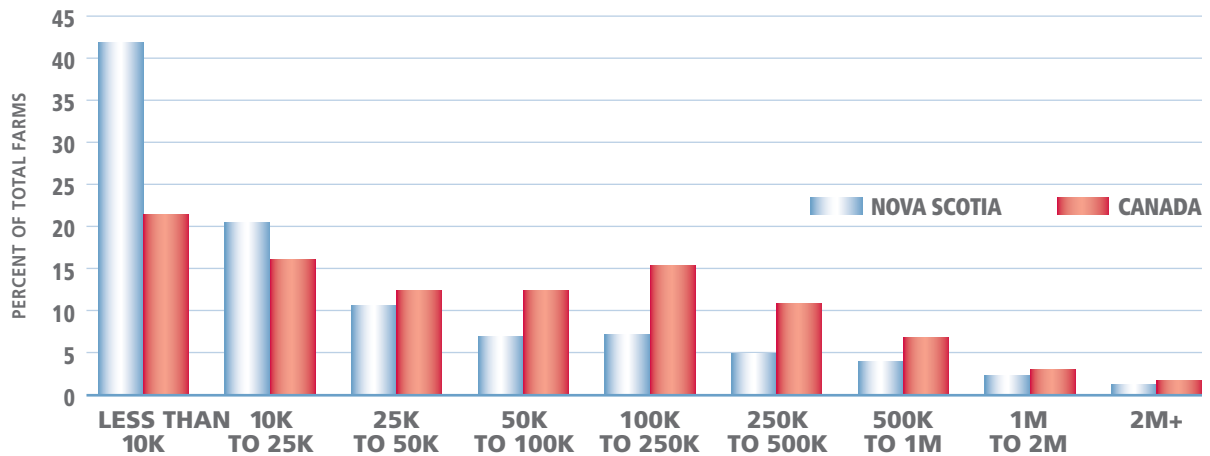
**FIGURE 2 Average Farm Size, 2011**



SOURCE: Statistics Canada. 2011 Census of Agriculture

The size of farms in Nova Scotia is also considered small in terms of revenue generated. Compared to the Canadian average, Nova Scotia has more small farms and fewer medium-sized farms.

**FIGURE 3 Farm size by gross farm receipts 2011 (K=thousand\$)**



SOURCE: Statistics Canada. 2011 Census of Agriculture

## What types of farms do we have?

The largest agricultural sector in Nova Scotia in terms of number of farms is fruit farming, consisting mostly of blueberry and apple operations. Nova Scotia fruit farms represent a healthy 12% of the total number of fruit farms in Canada. The relatively small number of fur farms in Nova Scotia represents 33% of all fur farms in Canada.

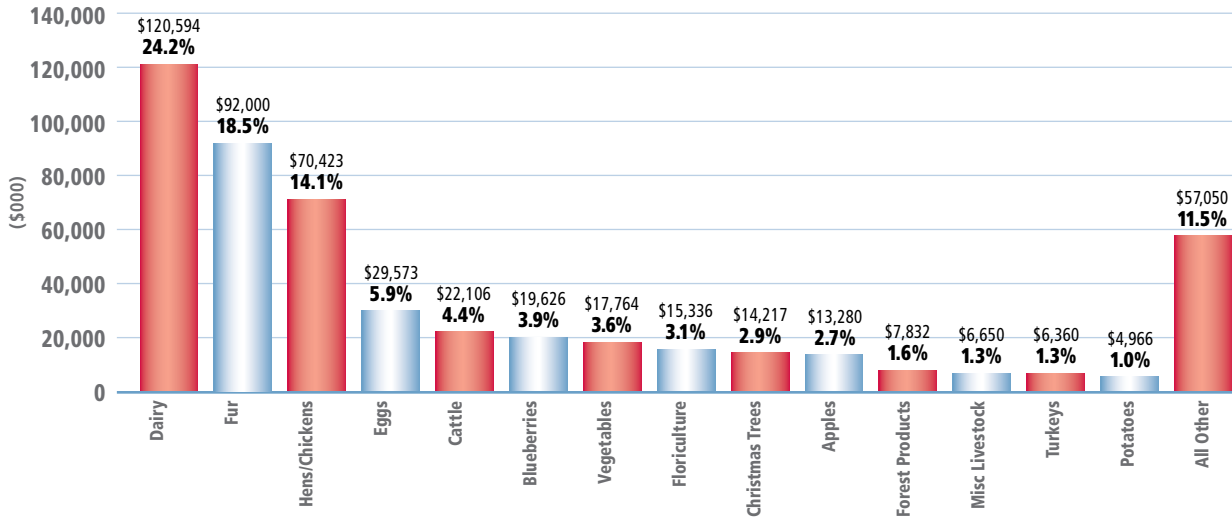
**TABLE 2** Number of farms by main crop/animal

Item	Quantity of NS Farms	Percentage of Canada
Total Farms	3,905	2%
Fruit and tree nut farming	971	12%
Hay farming	485	2%
Beef cattle ranching and farming, including feedlots	441	1%
Nursery and tree production	428	9%
Dairy cattle and milk production	257	2%
Horse and other equine production	199	1%
Animal combination farming	172	2%
Fur bearing animal and rabbit production	128	33%
Other vegetable (except potato) and melon farming	127	4%
All other miscellaneous crop farming	110	2%
Sheep farming	80	3%
Broiler and other meat-type chicken production	77	4%
Floriculture production	75	3%
Chicken egg production	57	3%
Other food crops grown under cover	43	5%
Maple syrup and products production	36	1%
Apiculture	35	2%
Fruit and vegetable combination farming	34	5%
Goat farming	24	2%
Hog and pig farming	21	1%
Other grain farming	21	0%
All other miscellaneous animal production	16	1%
Corn farming	13	0%
Potato farming	13	1%
Soybean farming	12	0%
Turkey production	9	3%
Combination poultry and egg production	8	5%
Wheat farming	4	0%
Mushroom production	4	3%
All Other poultry production	3	2%
Poultry hatcheries	2	4%
Oilseed (except soybean) farming	0	0%
Dry pea and bean farming	0	0%
Tobacco farming	0	0%

Source: Statistics Canada. Census of Agriculture 2011

In terms of farm revenue generated, livestock farming is a major component of Nova Scotia agriculture. This includes dairy, beef, mink, and other livestock. Supply managed sectors (in which supply is controlled in accordance with demand) dominate the farm gate revenues in Nova Scotia. Three of the top four sectors in terms of farm gate sales are supply managed—dairy, poultry, and eggs. Dairy leads Nova Scotia sectors in farm gate sales with over \$120 million in annual farm revenues. The fur sector in Nova Scotia ranks second in farm gate sales at \$92 million and makes a major contribution to national production with 25% of the total number of Canadian fur farms located in Nova Scotia. Fur is also the most important export sector in provincial agriculture. Blueberries are the leading fruit crop produced in the province (over \$19 million) and are also the leading export crop.

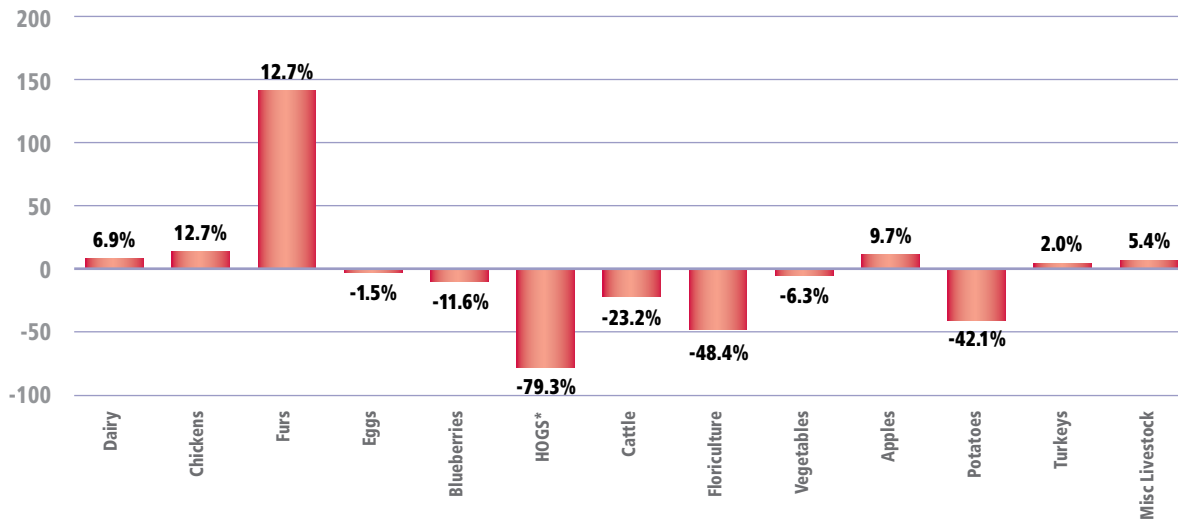
**FIGURE 4 Nova Scotia farm revenues, 2010**



SOURCE: Statistics Canada Cat No. 21-011-XIE and NSDA adjustment for Fur

Some traditionally important sectors in agriculture have been in serious decline recently, as measured by changes in farm revenues. Hog production has seen the largest decline, followed by potatoes and floriculture. The fur industry has increased substantially, leading to an overall increase in total livestock revenues.

**FIGURE 5 Change in farm revenues over the past decade**



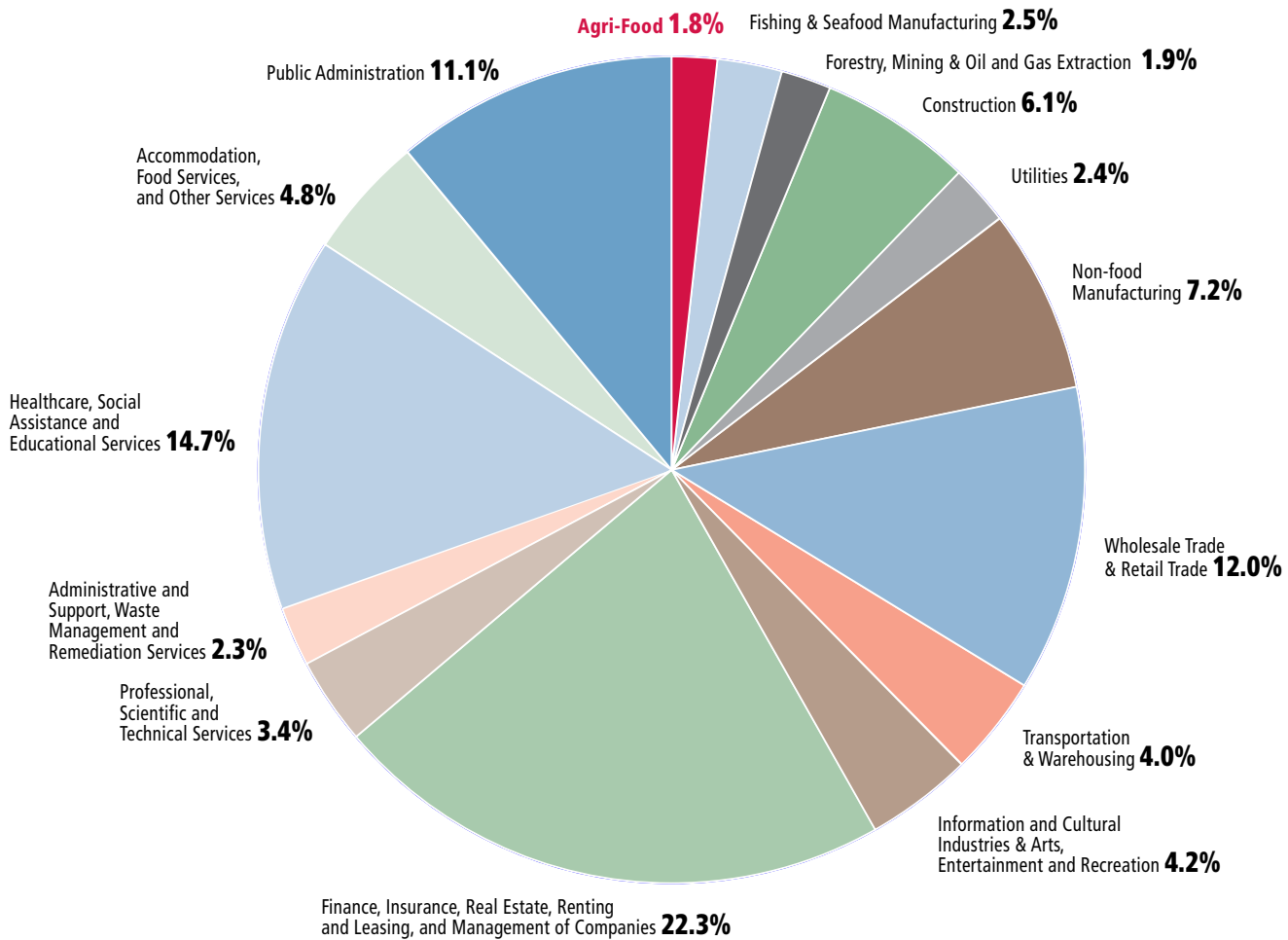
SOURCE: Statistics Canada Cat No. 21-011-XIE and NSDA adjustment for mink



## How does Nova Scotia agriculture fit into the economy of the province?

In 2011, the contribution to the Nova Scotia economy from the agriculture and food industries, as measured by gross domestic product (GDP), was 1.8% of the provincial total GDP. Primary agriculture GDP was 0.8% of the total economic output of Nova Scotia.

**FIGURE 6** Nova Scotia GDP by Industry 2011

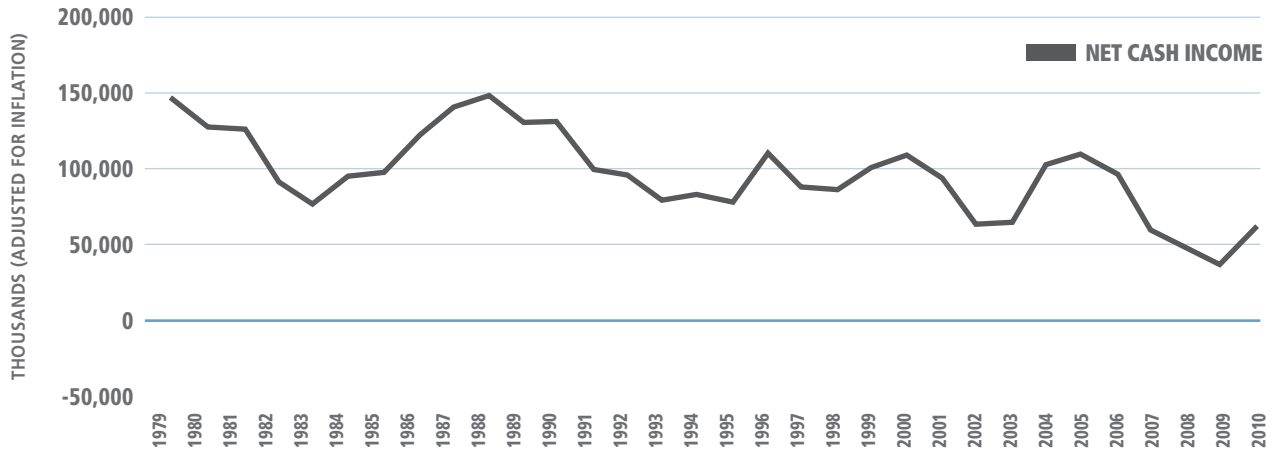


## How are Nova Scotia farmers doing?

Accounting for inflation, farm revenues have been relatively flat for many years. The livestock sector, led by dairy, mink, and poultry is generally a more important component of agriculture in Nova Scotia than are crops.

Adjusted for inflation, net cash income (market revenues less expenses) has fallen by almost half compared with the average in the 1980s, reaching a record low of \$35.6 million (unadjusted) in 2009. In 2010 however, for the first time in five years, net cash income increased (by 73 percent) and totaled \$61.5 million. This gives a positive total net income for the industry for the first time in three years at \$3.6 million in 2010.

**FIGURE 7 Nova Scotia farm cash income**

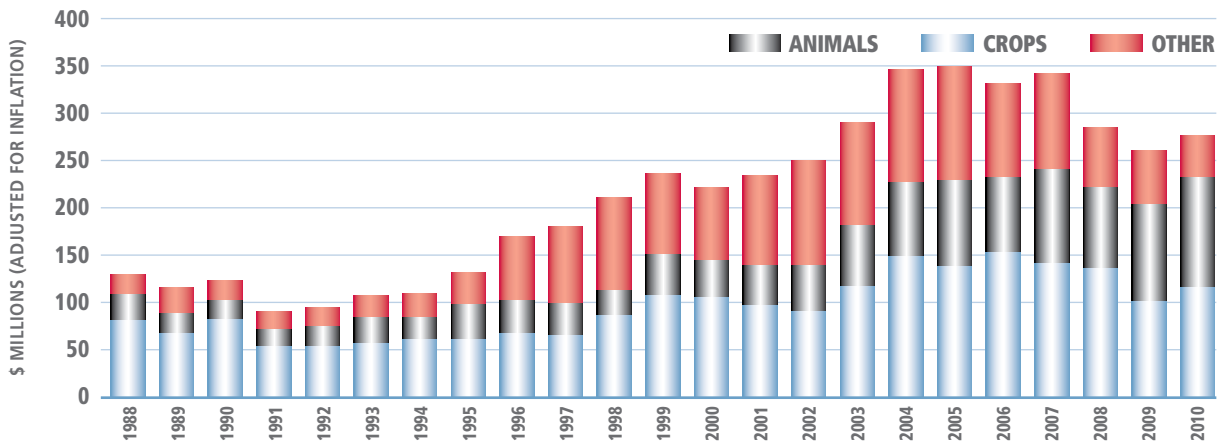


SOURCE: Statistics Canada – CANSIM Table 002-0009

## Where do Nova Scotia farmers sell their products?

In addition to local markets, international exports are a major driver of Nova Scotia’s agri-food sector. Total exports have been rising steadily since 1991, reaching a high of \$351 million in 2005. Adjusting for inflation, exports rose in 2010 for the first time in three years. While exports have decreased from 2005, there has been an overall tripling of exports since 1991, reaching \$277 million in 2010.

**FIGURE 8 Total Nova Scotia agri-food exports**



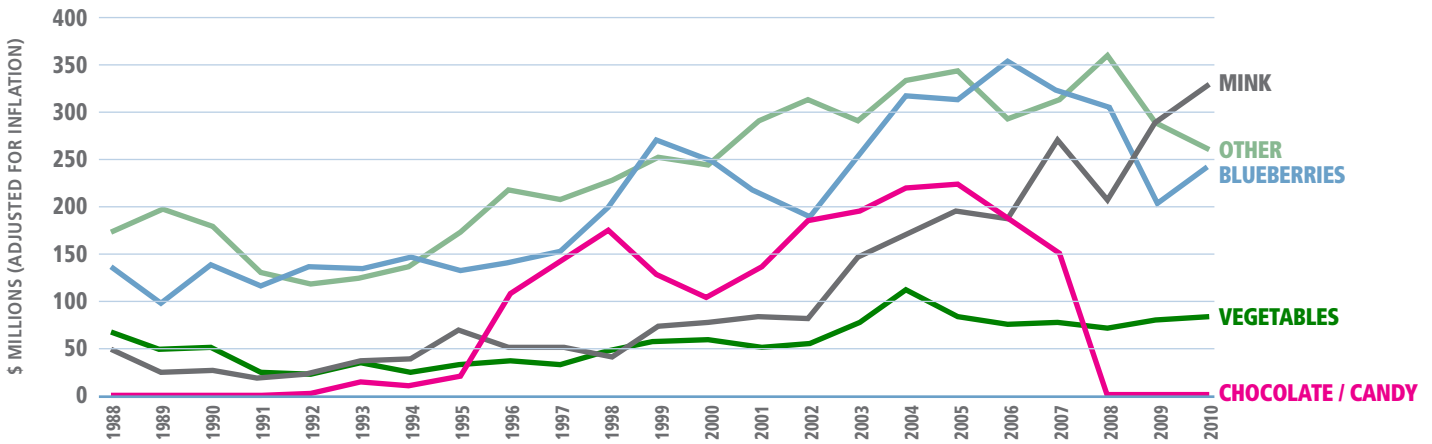
SOURCE: Statistics Canada and AFFC CATS-NET trade data and NSDA adjustments for mink

## What do we export?

At \$99 million in 2010, mink is now Nova Scotia’s largest agricultural export. Blueberries are second at \$73 million, and no other single commodity comes close to these export values. Of the \$73 million in blueberry exports, \$68 million are wild blueberries and \$5 million are cultivated. The large majority of blueberry exports are processed rather than fresh.

Mink is the fastest growing export commodity, increasing in relative importance from 7 percent of the total value of agri-food exports in 1991 to 36 percent in 2010. Over this same period, blueberries (almost entirely processed wild blueberries) declined in relative importance (from 40 percent to 26 percent) but grew in absolute terms from \$25 million to \$73 million (current dollars). Combined, various vegetable crops remained fairly stable over this period. Chocolate and candy reached a high of \$62 million in 2005, followed by a collapse in export values in 2008 that coincided with the closure of the Moirs chocolate factory at the end of 2007.

**FIGURE 9** Export trends by product



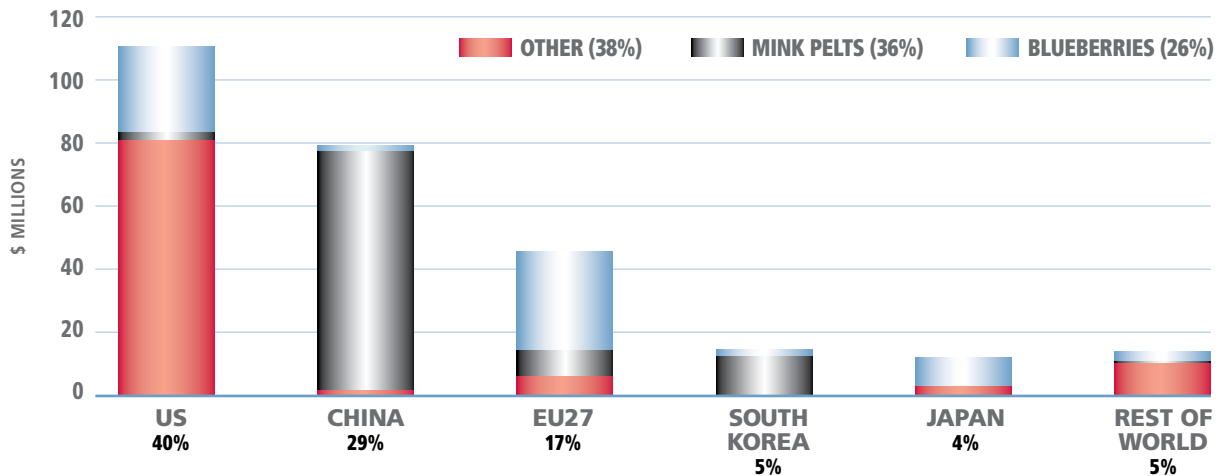
**SOURCE:** Statistics Canada and AFFC CATS-NET trade data and NSDA adjustments for mink

## Where do we export products?

The United States remains Nova Scotia's most important export destination, having consumed \$110 million of Nova Scotia's agri-food exports in 2010. However, as a result of Nova Scotia's high-growth mink industry, China, which purchases the majority of the province's mink exports, has been catching up and is now well above all 27 European countries combined. Similarly, South Korea, a major purchaser of Nova Scotia mink exports, has surpassed Japan, importing \$15 million worth of Nova Scotia agricultural exports, almost all of which were mink pelts.

Nova Scotia agri-food exports to the United States are more diverse in comparison with the trade-relationship with China. While the US consumes a wide variety of export products, China consumes almost exclusively a single commodity, mink. Similarly, European expenditures go to a single commodity: 67 percent of Europe-bound Nova Scotia agri-food exports are blueberries.

**FIGURE 10** Export partners



**SOURCE:** Statistics Canada and AAFC CAT-NET trade data and NSDA adjustments for mink

## Who is farming?

**TABLE 3** Farm Operators

Operator Characteristics	Quantity
Total number of operators	5,225
Total male operators	3,865
Total female operators	1,355
Average age of farm operators	55.4

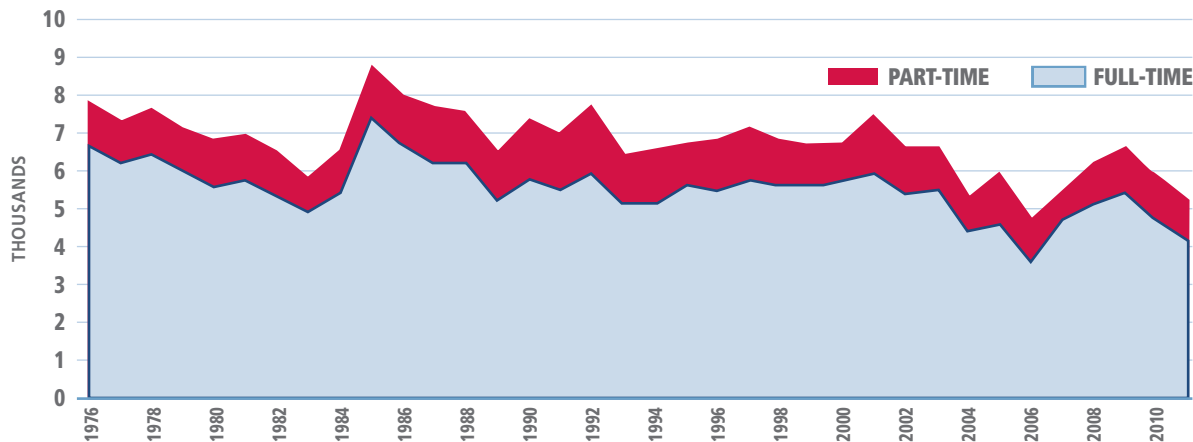
Source: Statistics Canada, 2011 Census of Agriculture

Nova Scotia saw an increase of 2.4 percent in the number of farm operators between 2005 and 2011. Nova Scotia has less than 2 percent of the total number of Canadian farm operators.

About 26 percent of Nova Scotia farm operators in 2011 were female, slightly lower than the national average of 27 percent. The number of female operators in Nova Scotia increased by 7 percent in 2011, while the number of male operators increased by only 0.7 percent. The average age of all farm operators in Nova Scotia is 55.4.

Farm employment decreased by approximately 600 between 2010 and 2011 to 5,200, with the majority of this drop resulting from full-time employment. Farm employment in 2011 was below the 10 year average of 5,800. Full-time jobs make up approximately 79 percent of farm-level employment. The agri-food industry, which includes manufacturing, adds to this total and makes agriculture a significant employer, particularly in rural Nova Scotia.

**FIGURE 11** Employment on farms in Nova Scotia



SOURCE: Statistics Canada CANSIM Table 282-0008

## The Future of Nova Scotia Agriculture

Competition in a global marketplace brings new challenges to the Nova Scotian industry which was traditionally based on a small, diversified farm model. Nova Scotian farmers need to focus on new emerging markets to stay competitive.

The Nova Scotia Department of Agriculture has published a 10-year strategy for supporting Nova Scotia farms. *Homegrown Success* is a means of focusing departmental activities in support of government's overall vision for making life better for Nova Scotia families. The emphasis is on growing the agricultural economy, attracting and retaining young farmers, and ensuring equitable public services and infrastructure in rural regions.

*Homegrown Success* is available online at [www.novascotia.ca/agri](http://www.novascotia.ca/agri).

Nova Scotia needs more farmers. Visit [www.thinkfarm.ca](http://www.thinkfarm.ca) for information, resources, and sources of support for starting a farm business in Nova Scotia.



# Careers in Agriculture

Farming is one of the most challenging jobs you can have. To be successful, farmers have to master one of the widest ranging skill sets of any profession. There is not much room for boredom on the farm, at least not for the farm manager. However, with great challenges come great rewards, not always in a financial sense, but certainly from the satisfaction of dealing with a diversity of tasks, surmounting obstacles, working outdoors, being your own boss, and having a job that really matters to other people and makes a difference in their lives.

The average age of farmers in Nova Scotia in 2011 was 55.4. The province must attract new people into farming to maintain and increase our current levels of production, as well as to contribute to economic growth and increase the number of good jobs. We need self-motivated entrepreneurs who are interested in working hard at a rewarding job.



Market gardener

Agriculture is one of the Nova Scotia economy's important wealth generators. Growth in the local-food movement has created demand for locally produced food that is currently not being met. In addition, there are more opportunities than ever before in the global marketplace for high quality, high-value agricultural exports.

Nova Scotia needs new farmers. But farmers are only one component of our agriculture industry. Primary production is not for everyone, but with the range of jobs and skills needed to support production, almost anyone can find a rewarding career in the agri-food industry.

Literally hundreds of different careers are represented daily in the food we eat—those of researchers, farm management consultants, journalists, human resource specialists, marketing advisors, mechanics, new product testers, crop and livestock consultants, and teachers at agricultural colleges.



Plant scientist

Agricultural research is carried out in the public and private sectors to improve production by increasing yields, improving product quality, and

decreasing costs. Researchers include plant and animal breeders and nutritionists, pathologists, entomologists, biologists, and chemists.



Organic researcher

Knowledgeable salespeople promote the products of this research to farmers once they've been commercialized. Efficient marketing and supply chains ensure that farmers get their seeds and other necessities in a timely manner. For example, there are locally-based seed production companies such as Hope Seeds in Granville Ferry and Annapolis Seeds in Middleton.

Because farming is so different from other occupations, farmers need a wide range of specialized services and equipment. Farmers have unique financial requirements from banks, accountants, insurance companies, and record-keeping software. Farm loans, insurance, and specialty software are provided by both the private and public sectors.

Although most farm equipment used by Atlantic Canadian farmers is manufactured elsewhere, local businesses sell and service the equipment. At the same time, homegrown inventors and manufacturers do exist. For example, Allan Equipment on Prince

Edward Island manufactures potato harvesters that the company has specifically designed for PEI conditions. The majority of potato harvesters used on PEI are from Allan Equipment. The development of new and innovative ideas is often driven by need at the farm level and supported by a partnership of research in the public and private sectors. For example, at the Atlantic Food and Horticulture Research Centre in Kentville, Agriculture and Agri-Food Canada has researchers working to improve primary production, crop protection, soil and water evaluation, post-harvest storage, food-quality assessment, pilot-plant processing of food, and consumer safety in the region.



Research greenhouse

More and more farms are adding value-added components to their operations. Some innovative Nova Scotian companies include Seafoam Lavender, which makes lavender food and body-care products; Terra Beata Farm, which makes dried berries and berry juice; and Meadowbrook Meat Market, which makes sausages and other pork products that are notable for their high Omega-3 fatty acid content. Once a farm expands into food processing, a whole new range of skills and additional support people are required, in such areas as product development, recipe testing, food and factory safety, inventory management, and product packaging and labeling. The Atlantic Centre for Agricultural Innovation is a product development facility near Truro that brings inventors and innovators together with business development professionals to create new business opportunities in the agriculture and the agri-food sector.

People find careers in the agriculture industry in many ways. Some grew up on or near a farm and have always wanted to be farmers. Others move away from the farm and are surprised later in life to find themselves coming back to agriculture and loving the direction their life has taken. Increasingly, young people who had little exposure to agriculture in childhood are being drawn to farming careers as they seek out ethical, “green” jobs that produce something of concrete value to society. Entrepreneurs are also seeing lucrative business opportunities in farming and are filling gaps in the market with non-traditional crops. A prime example of this phenomenon may be seen in the explosion of growth in Nova Scotian vineyards and wineries in the past ten years.

The Dalhousie Agricultural Campus (Dal-AC) in Truro is one of the provincial agriculture industry’s greatest assets. Dal-AC faculty and staff prepare students for the full range of careers required to support the agri-food industry, as well as engage in vanguard research in agricultural production and food technology.

Visit [www.dal.ca/about/agricultural-campus.html](http://www.dal.ca/about/agricultural-campus.html) for more information. For more information on programs contact the Admissions & Enrolment Office at [registry.dalac@dal.ca](mailto:registry.dalac@dal.ca)

While Dal-AC is a logical place of study for anyone seeking a career related to agriculture, there are other options. There are people currently working as farmers or in farming-support careers who are graduates of a variety of educational disciplines from high schools, colleges, and universities across Canada. All that’s required to get involved in the agriculture industry is an interest in food and farming, the ability to be flexible, and a willingness to keep learning and adapting to the changes in this ever-transforming industry.

For a national database of agricultural career opportunities, visit [www.agripathways.ca](http://www.agripathways.ca) provided by the Canadian Agricultural Human Resource Council.

So you might want to become a farmer? Here’s how . . .

If you’ve grown up on a farm and spent a lot of time helping your parents, you’re well on your way. If you’re interested in working with your parents and eventually buying their farm, talk to them about your specific interests and about the farm’s strengths and weaknesses. You might consider taking a course on business, mechanization, marketing, or production and should think about how you’ll save enough money to finance the purchase of the farm.

It’s also a good idea to work on someone else’s farm and gain different experiences before going back home to work with your parents. There are plenty of programs to help you find a job or internship on a farm in another province or even another country.

If you didn’t grow up on a farm, there are still plenty of ways to gain the skills you need to be a successful farmer. If you’re not already a 4-H member, consider joining a club near you or forming one. 4-H clubs not only teach practical skills, but help you become a better public speaker, critical thinker, and community leader.



4-H members

You can also find a job on a local farm. Many farmers hire high school students for short-term work like haying and harvesting fruit and vegetables. You may also consider getting a full-time farm job for the summer or a part-time job on a dairy farm milking cows on evenings and weekends.



After high school, consider enrolling in an agriculture or business program. There are two and four-year programs at the Dalhousie Agricultural Campus, as well as horticulture and business programs at the Nova Scotia Community College. There is also a wide variety of programs in other provinces and even out of the country—do some research to find what best suits your interest.

Also, contact staff at the Nova Scotia Department of Agriculture in one of the regional offices located in Sydney, Antigonish, Truro, Kentville, and Cornwallis. Contact information for each is found in the Contacts and Resources section of this document.

In addition, connect with THINKFARM to get more information on starting a farm.

THINKFARM is a government program that provides support to beginning farmers. Check out everything THINKFARM has to offer at

[www.novascotia.ca/thinkfarm](http://www.novascotia.ca/thinkfarm) and find us on Facebook [www.facebook.com/thinkfarmns](https://www.facebook.com/thinkfarmns)



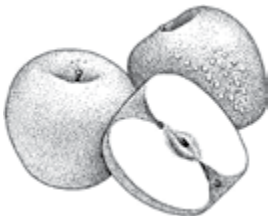


Nova Scotia

# Agricultural Sectors

# Apples and Other Tree Fruit

Nova Scotia tree fruit crops include apples, pears, cherries, peaches, and plums. While a few growers depend entirely on apples for their income, the majority grow apples in combination with some other farming enterprise, or work off the farm.



Apples and pears are pomes, fruit that has multiple seeds protected by a core with an edible fleshy outer layer. Cherries, peaches, and plums are known as stone fruits because they have a single seed in a hard shell, surrounded by the fleshy part which used as food.

Tree fruit production in Nova Scotia dates back to 1633, when the early Acadian settlers planted apple trees for their personal use. The apples were eaten fresh but were also dried and used in cooking and cider production. A tree census conducted in 1698 of the Annapolis Royal district recorded 1,584 apple trees.

The largest recorded apple crop for Nova Scotia was in 1933 with a yield of 8.3 million bushels. Since that time, production has drastically declined because of shifts in areas of production, changing markets, varieties of apples grown, and a reduced provincial production base.

## DID YOU KNOW?

- Popular apple cultivars grown in Nova Scotia include Gravenstein, McIntosh, Cortland, Red Delicious, Ambrosia, Jonagold, Gala, and Honeycrisp. The apple cultivars Idared and Northern Spy are grown almost exclusively for the processing market.
- The pear varieties, Bartlett and Clapp's Favorite, have been grown in Nova Scotia for many years and make up most of the pear production. Bosc and Flemish Beauty have been planted more recently.

- Sweet and tart cherry cultivars are both grown in Nova Scotia, but in recent years growers have tended to plant sweet cherry cultivars as there is no processing facility for tart cherries.



Cherries

- European prune plums and Japanese plums are also grown in Nova Scotia. Shiro, Early Golden, and Burbank are the most common Japanese cultivars grown, while Damson, Italian, and Stanley are common prune plums.
- Redhaven is the most commonly grown peach cultivar. Growers have also used some new hardy peach cultivars, such as Newhaven and Harson.

## Where are apples and other tree fruit produced in Nova Scotia?

Fruit trees have been planted throughout the province, but the tree fruit industry is centred in Kings, Annapolis, and Hants counties because of

favorable climatic conditions, suitable soils, and the presence of a stable infrastructure for harvesting, storing, and processing tree fruit.



Honeycrisp apples

### How many apples and other tree fruit do we produce?

Apples are the major tree fruit grown in Nova Scotia. Pears, plums, cherries, and peaches are grown on a limited commercial basis, and usually on farms that grow apples as their main crop. There has been an increase in new-orchard planting of peaches and sweet cherries, owing to the introduction of new cultivars and production techniques. However, in terms of production, pears are the second major tree fruit grown, followed by plums, cherries, and peaches.

The growing and processing of apples contributes significantly to the economy of Nova Scotia. The five-year average for production is 2.3 million bushels for apples and 35,000 bushels for pears. The farm gate value of apples is around \$12 million per year, making apples the second-highest-value fruit crop in Nova Scotia, exceeded only by blueberries.

There are fewer than 100 commercial apple tree growers in Nova Scotia today, a far cry from the 2,500 producers in 1939. Although the number of growers has declined, the size of individual orchard holdings has increased.

### How are apples and other tree fruit produced?

During the past ten years, growers have been gradually replacing old orchards with new planting systems that utilize dwarfing rootstock and tree support systems, and allow for higher numbers of trees per hectare. Some growers are using new production systems to improve fruit quality, yields, and returns. These systems make use of specialized techniques and resources, such as trickle irrigation, growth control products, and new selective pesticides used in conjunction with insect monitoring, tree-row volume spraying, and modern machinery. A limited number of growers make use of irrigation during times of periodic drought. The climate is such that frost is not a concern for most growers, although one producer has installed an over-the-row irrigation system to protect against it.



Apple Orchard

Growers who follow an IPM (Integrated Pest Management) program make use of orchard monitoring, natural predators and parasites of insects, and pheromones and selective pesticides to control insects, mites, and disease in their orchards. This approach allows producers to reduce the number of pesticides used during the growing season, and to use products that are more environmentally safe. Most Nova Scotia growers follow IFP (Integrated Fruit Production) protocol for apple production. IFP is a holistic system of

food production that embraces environmental stewardship and economic viability from the farm through to the wholesale, storage, and retail stages, while consistently delivering a premium, quality-assured product to the consumer. In the past couple of years, apple growers have implemented an on-farm food safety program to assure that consumers receive a safe product.

In the summer and fall, tree fruit is picked by hand and collected in baskets. The baskets are emptied carefully into large bins, so as not to bruise the fruit. Apple bins will hold about 340 kg of apples, while softer fruit, such as peaches and cherries, are harvested into smaller containers. The fruit is cooled to remove field heat, and sold quickly in the case of the stone fruits.



Apple harvest

### How are apples and other tree fruit used?

Apples and other tree fruit are eaten fresh or used in salads, baking, or cooking. Some fruit is processed into frozen pies or made into juice here in Nova Scotia.

### What happens after apples and other tree fruit leave the farm?

Pears and stone fruits are put into cold storage and are packed by hand. They are sold fresh from the farm and farm markets.

Apples are stored in cold storage and also in Controlled Atmosphere Storage (CAS). The CAS facility could be on the farm, but apples are often transported to a CAS packing facility. At the facility, the apples are taken from storage to a packing line, where they are graded according to colour, size, and defects. They are packed in consumer-ready plastic bags or cardboard boxes and returned to storage until needed. The grading and packing is done as close to the time of shipping as is practical. Developments in production and storage technology have resulted in high-quality apples being available to the consumer year round.



Apple packing plant

Processed apple products utilize between 55-60 % of the annual apple production. There are two frozen food plants located in Kentville that process apples into pies, crisps, and cake. One juice plant accounts for the major portion of the apples processed, utilizing approximately one million bushels of apples annually. Some packers also have cider production facilities.

## What challenges do apple and other tree fruit producers face?

Tree fruit growing involves an intense agricultural production system that becomes more sophisticated with each passing year. This means that many hours and dollars are spent on each hectare of fruit trees. In the case of apples, the cost to establish a new orchard can range from \$14,000 to \$21,000 per hectare, depending upon the production system used. Annual production costs range from \$5,500 to \$7,500 per hectare, depending upon annual yields. The average yield for mature apple orchards ranges from 1000 to 2500 bushels per hectare (19 to 47 metric tonnes per hectare). In addition to the challenges of using and maintaining a modern production system, producers endeavor to educate consumers about the importance of buying locally grown fruit.

## Who is involved in producing apples and other tree fruit?

- Orchard owners and managers
- Apiarists
- Farm/harvest workers
- Packing and processing workers
- Packaging designers and manufacturers
- Agricultural supply companies
- Equipment dealers and maintenance workers
- Box, bin, and pallet manufacturers
- Researchers
- Financial institutions
- Fuel companies
- Truckers
- Crop consultants or specialists

## FOR MORE INFORMATION:

### Nova Scotia Fruit Growers' Association

32 Main Street, Agricultural Centre  
Kentville NS B4N 1J5

Tel: 902-678-1093

Email: [derith@nsapples.com](mailto:derith@nsapples.com)

Website: [www.nsapples.com](http://www.nsapples.com)

### Apple Farmers' Association of NS

2380 Harmony Road, RR 1  
Aylesford NS B0P 1C0

Email: [grow@applefarmersofns.ca](mailto:grow@applefarmersofns.ca)

Website: [www.applefarmersofns.ca](http://www.applefarmersofns.ca)

# Beef

Beef farming in Nova Scotia has a long history and is distributed across the province. Most beef farms in Nova Scotia are relatively small, part-time family operations, with the farmer working off the farm or combining another farm enterprise with that of beef. The total size of the industry in Nova Scotia has been on a downward trend, and in 2010 the total number of cattle was the lowest it had been in 40 years.

## DID YOU KNOW?

- Common breeds of beef cattle raised in Nova Scotia originate from Britain (Aberdeen Angus, Hereford, and Shorthorn) and continental Europe (Charolais, Simmental, and Limousin). Generally the British breeds are smaller and mature faster, while the European breeds are larger and leaner and mature more slowly.



Shorthorn beef cattle

- Beef cattle bulls (males) average approximately 900 kilograms when mature. Cows (females) can weigh around 550 kilograms depending on the breed. A newborn calf weighs between 30 and 45 kilograms.
- Heifers are female cattle that have not given birth to offspring. They are bred at fourteen to fifteen months of age to calve at twenty-four months. Steers are neutered males.

- Cows are usually bred in spring or summer to calve 282 days (plus or minus 10) later, in winter and spring. A calf will suckle its mother's milk until six to ten months of age.

## Where is beef produced in Nova Scotia?

Kings, Hants, Colchester, Pictou, Antigonish, and Cumberland counties have the majority of Nova Scotia's beef cattle, although all counties have some beef cattle producers.

## How much beef do we produce?

There were approximately 18,900 beef cows in Nova Scotia in 2010. Farm cash receipts for beef cattle and calves amounted to about \$14 million that year.

The 2011 census determined that there were 441 beef farms in the province.

## How is beef produced?

Cattle are ruminants, which means that their digestive tract allows them to eat roughage, such as grass, hay, and silage that would not be used by people for food. When ruminants swallow grass and other vegetation, the feed goes into the first of four compartments of the stomach, called the rumen. When the rumen is full, the animal will lie down to rest. During this time it will burp up portions of



food. These portions, called the “cud” are brought back up into the mouth, chewed into a pulp, and swallowed again.

In the rumen, billions of living micro-organisms break down the feed and make it available to the animal. The partly digested material from the rumen goes on through the other three chambers of the stomach—the reticulum, omasum, and abomasum—where digestion is completed. This allows ruminants to convert a diet of roughage into high quality food. Other ruminant animals include dairy cattle, sheep, goats, and bison.



Belted Galloway cattle

The cattle are provided with shelter in winter. Grasses and legumes are grown, harvested in summer, and stored as hay (dry) or silage (wet) for winter feeding. Grains, mainly oats, barley, and corn, are also grown or purchased and fed to beef cattle. Each year a cow is expected to produce one calf. The cows are bred usually in late spring or early summer. Newborn calves are nursed by their mothers, and as they grow they graze with their mothers in fenced in fields, called pastures. When the calves are weaned, they may be moved to a backgrounding operation. The heavier calves may go directly to a feedlot until they reach market weight. A feedlot is any area, open or enclosed, where a controlled diet is fed to cattle. Feed and water are made available to the cattle at all times. They can gain from 1 to 2 kilograms of body weight per day. Cattle will “finish,” or gain the desired amount of muscle and fat, faster in a feedlot than on pasture, because they consume a higher-energy feed at a lot.

The traits of economic value in beef cattle are fertility, rate of gain, mothering ability, efficiency of

gain, carcass merit, and longevity. Farmers weigh cattle and keep records indicating which females will make the best mothers.



Simmental cow with calf

Artificial insemination and embryo transfer are two technologies that are now used in the beef industry. They both provide a method for faster progress in improving beef herds.

Farmers may keep a herd of beef cows and sell the calves in the fall (these are called cow-calf operations). These calves are sold as “feeders” and are purchased by other producers who nurture them to a finished market weight of between 450 and 600 kilograms, at an average duration of 18 months. Others will keep a herd of purebred cows and sell breeding stock or replacement animals.

Beef producers are very careful to treat their cattle humanely and to keep them healthy and well fed. Producers educate themselves about new and better feeding methods, safer ways of handling cattle, and up-to-date health practices.

### How is beef used?

Steaks, roasts, and ground beef are the most common edible products of the industry. Other edible products include organ meats and gelatin. Beef products are high in protein and vitamins, as well as iron, zinc, and other minerals.

The hides from the cattle are tanned and used for leather products, including clothing, shoes, belts, and sports equipment. Medicines made from cattle

products include insulin (for diabetics), heparin (an anticoagulant), and epinephrine (for allergies). Other by-products are used in making soap, cosmetics, buttons, photographic film, sandpaper, violin strings, and even explosives.

## What happens after cattle leave the farm?

Cattle may be sold to feedlots to be finished before processing. Diets for finishing beef cattle provide high energy so that animals finish weight-gain as rapidly and efficiently as possible. Beef cattle on finishing rations are typically allowed to eat as much as they want.

When the cattle have reached their optimum weight, they are sent to packing plants. In a federally-inspected packing plant, the animals are examined to ensure that they are healthy, and the carcasses are examined to ensure that the beef is wholesome. After inspection, the carcasses are graded based on the age of the animals, the quality of the meat, and the meat yield. In Canada, there are three A grades, based on the level of marbling (amount of fat in the meat), with AAA beef having the highest level. The carcasses are cut in two, and the sides of beef are sold to grocery stores and butcher shops. In some cases the sides are further processed and cut into portions that fit into a box. This is called “boxed beef,” and many of the large grocery stores and restaurants receive their beef in this form. Industry by-products, such as bones and hides, are sent elsewhere for further processing.

“Dressing percentage” refers to the ratio of carcass weight to live weight. Dressing percentage for finished cattle varies between 54% and 59%.



Meat inspection

Nova Scotia has 20 provincially licensed packing plants and 25 processing plants, located across the province. They serve a vital role for beef producers who don't want to ship cattle out of the region.

## What challenges do beef producers face?

Profit margins from beef fluctuate and sometimes are very low. Nova Scotia is not self-sufficient in beef, so competition from beef produced outside the province provides a marketing challenge. Nova Scotia's climatic conditions, with plenty of rain and snow, mean that not only do cattle need shelter and stored feed, but also that wastes must be carefully managed, to keep run-off from becoming a problem. Finishing beef on grass rather than grain may provide a cost effective production model for Nova Scotia producers.

## Who is involved in producing beef?

- Beef farmers
- Backgrounding operators
- Feedlot operators
- Veterinarians
- Machinery dealers
- Feed and fertilizer salespeople
- Auctioneers
- Truckers
- Packing plant workers
- Meat graders, inspectors, and butchers

### FOR MORE INFORMATION:

#### Nova Scotia Cattle Producers

60 Research Drive

Perennia Park

Bible Hill NS B3L 2R2

Email: [office@nscattle.ca](mailto:office@nscattle.ca)

Website: [www.nscattle.ca](http://www.nscattle.ca)

#### Beef Information Centre

Email: [info@beefinfo.org](mailto:info@beefinfo.org)

Website: [www.beefinfo.org](http://www.beefinfo.org)

# Biomass Crops

Over the past decade there has been increasing concern over the need to reduce greenhouse gas levels. The desire to reduce these levels, combined with the threat of higher oil, natural gas, and electricity prices, has created much interest in developing low-cost renewable fuels. Dedicating agricultural crops such as reed canarygrass and switchgrass, for pelletized fuel can reduce greenhouse gases by increasing carbon storage in the landscape, and by replacing fossil fuels for combustion.

## DID YOU KNOW?

- Biomass crops are plant species grown for the purpose of producing energy.
- According to Stats Canada, of the 73,000 hectares (180,000 acres) of hay land in Nova Scotia, it is estimated that 32,000 hectares (80,000 acres) are available to create a renewable source of energy without affecting forage supplies to the province's ruminant livestock industry (based on an average yield of 5.2 tonnes/ha).



Switchgrass field

## Where is biomass produced in Nova Scotia?

Using crops for biomass purposes is a relatively new idea in Nova Scotia. Biomass crops have been produced in small quantities all across the province. Most counties in Nova Scotia have some potential to grow grass species.

## What are biomass crops?

The suitability of a given plant species for biomass production is determined by several factors, including yield potential, crop adaptation to local soils and climate, moisture content at harvest, chemical composition, ash content, and calorific or energy content. Biomass crops can be grouped into either herbaceous or woody species. Herbaceous species are mostly perennial grasses that are harvested on an annual basis. The woody species, such as willow (*Salix* spp.) and poplar (*Populus* spp.), are grown in short rotation coppices which are harvested on a 3–5 year cycle.

## Which biomass crops are best suited to Nova Scotia?

For Nova Scotia the ideal biomass crop would be high-yielding, grow well on imperfectly drained soils, yield well under cooler growing conditions, have excellent winter hardiness, have excellent burn qualities, and not require additional special farm equipment for planting and harvesting.

Miscanthus grass (*Miscanthus* spp.), switchgrass (*Panicum virgatum*), reed canarygrass (*Phalaris arundacea*), and willow are plant species currently being considered for biomass production in Nova Scotia.

Each of the crops has specific soil and climatic conditions required to ensure sustainable production. Whereas all the above grass species will grow in a wide range of soil conditions, reed canarygrass is the grass most tolerant of imperfectly drained soils that are considered marginal or poor for corn production. The biomass yield of miscanthus and switchgrass is limited on shallow, imperfectly drained soils. These grasses yield best on deep, fertile, moderately to well-drained soils that are well suited for corn production. Miscanthus will out-yield both switchgrass and reed canarygrass when grown on sandy loams with good water-holding capacity and organic-matter content. However, reed canarygrass is of considerable interest to farmers because of its ability to grow on the large number of acres in Nova Scotia that are marginal for crops like corn, wheat, and soybeans.



Reed canarygrass

## How are biomass crops produced?

Whereas reed canarygrass and switchgrass are propagated by seed, miscanthus is propagated from root cuttings. It takes 3–5 years for all these perennial grasses to fully establish and reach maximum yield. Highly specialized equipment is required to plant fields with the miscanthus root stock, whereas the equipment needed to plant reed canarygrass and switchgrass is common on many Nova Scotia farms. Woody biomass species, such as willow, are produced using a method called coppicing. This involves planting the trees in dense stands and harvesting every 3–5 years by cutting the shoots near the base of the plants.



Willow shoots

## What happens after the biomass leaves the fields?

The major industrial use of biomass crops is for heat and power generation. Densifying the harvested crop into bales, briquettes, and pellets increases both the bulk density and energy density of the biomass, reducing transportation costs and increasing combustion efficiency. In Nova Scotia, grass pellets and briquettes are being marketed to heat domestic housing and small commercial buildings. There is, too, much interest in producing biomass for large scale power generation in the province. Using ash on agricultural land from the burning of biomass crops returns nutrients to the soil, contributing to the sustainable use of biomass.



Switchgrass pellets

## What challenges do farmers face with biomass crops?

The technical challenges of harvesting are a major consideration in the growing of biomass crops. Miscanthus, switchgrass, and reed canarygrass should be harvested well after the crop has finished growing for the season, or just before the crop begins to regrow in the spring. Timing of the harvest greatly affects the yield, moisture, and combustion qualities of the crops. High content of minerals such as potassium and chlorine lower the burn quality. Both moisture and mineral content are reduced by allowing the crop to stand in the field for an extended period at maturation.

The problem with delaying harvest until late winter or early spring is that the crop is exposed to weather conditions that break it down physically, reducing the harvestable yield. A gain in combustibility is sometimes traded off for a reduction in yield.



Mature Miscanthus crop

## Who is involved in biomass production?

- Farmers
- Equipment dealers and mechanics
- Fertilizer and chemical sales representatives
- Seed dealers
- Agricultural supply companies
- Agricultural advisors
- Soil testing laboratories

## REFERENCES

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Kludze, H., B. Dean, and A. Dutta (2011). Report on Literature Review of Agronomic Practices for Energy Crop Production under Ontario Conditions. University of Guelph, June, 2011.

## CONTACTS AND OTHER RESOURCES:

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### Perennia

1-866-606-4636

info@perennia.ca

Email: **Managing Grass for Fuel Pellet Production in Nova Scotia**

Website: **www.perennia.ca/Fact%20Sheets/Field%20Crops/Forage/General/REV\_Managing%20Grass%20for%20Fuel%20Pellet%20Prod%20in%20NS.pdf**

# Blueberries

There are two types of blueberries grown in Nova Scotia, wild blueberries and highbush blueberries. Wild Blueberries, the most common, are small, round, and blue in colour. They are sweet and juicy and have very tiny seeds. Highbush blueberries are similar, but are larger in size. The wild blueberry is Nova Scotia's official berry.



Wild (lowbush) blueberries

Blueberries are a nutritious treat that is a good source of Vitamin C and dietary fibre. They contain no fat, sodium, or cholesterol, and there are only 80 calories per cup of berries. Recent studies have shown that antioxidants in blueberries provide many health benefits.

## DID YOU KNOW?

- Wild blueberries are native to Eastern Canada, and Nova Scotia is the second-largest wild blueberry producing province in Canada.
- Since 1996, the wild blueberry has been Nova Scotia's official berry.
- Nova Scotia soil is generally acidic and well suited to the growth of blueberries. They prefer well-drained soil, with a pH between 4.5 and 5.5.
- The wild blueberry crop is worth more to the provincial economy than any other fruit crop. There are more hectares of wild blueberries in Nova Scotia than of any other fruit crop, and the wild blueberry leads in fruit-crop export sales for the province.

## Where are blueberries produced in Nova Scotia?

There are approximately 16 000 hectares of wild blueberries in Nova Scotia, and over 70% of the berries are grown in Cumberland County. Other major wild blueberry production areas are found in the following counties: Colchester, Pictou, Halifax, Hants, Antigonish, Guysborough, Yarmouth, and Cape Breton. Wild blueberry production is expanding in all parts of the province.

There are around 100 hectares of highbush blueberries in Nova Scotia, mostly in Kings County.

## How many blueberries do we produce?

The five-year average production of wild blueberries in Nova Scotia is over 15 million kilograms annually, with a farm value of \$25 million and a value-added contribution to the provincial economy of over \$63 million. The farm gate value of highbush blueberries is around \$3 million.

## How are blueberries produced?

In choosing land to grow wild blueberries, there must be a good natural base of wild blueberry plants, since they are not planted, only managed and encouraged to grow. Land-leveling of wild blueberry fields allows machinery like mechanical harvesters to work on the fields. This is accomplished by using excavators to remove the soil from knolls and rises, with as little disruption

to the plants as possible. This is often done in fields that were previously forested. Those fields that were previously farmland are usually flat and already accessible to machinery. The developed field is generally placed on a continuous two-year cycle of a vegetative year followed by a cropping year. It is a common practice to divide the fields so that only half of the total area is harvested each year. Pruning encourages strong, healthy growth, and consists of mowing or burning the fields in the early spring or fall. This is done every second year.



Wild blueberry field

Wild blueberry fields are sometimes fertilized with nitrogen, phosphorous, potassium, boron, magnesium, lime, and other nutrients. These nutrients help the plants to grow better and to produce more berries.

Blueberries need to be pollinated, and so growers rent hives of managed bees to ensure a high level of pollination.

Harvest begins in early to mid-August when approximately 90% of the berries are ripe. The season lasts about three or four weeks and is probably the busiest time of the year for growers. More than 85% of the crop is mechanically harvested and the remainder is hand harvested.

As the name suggests, highbush blueberry plants are bigger shrubs than the wild blueberry bush. Planted individually, in rowed orchards, highbush blueberries are pruned by hand and require weed control, nutrients, and pollination. There are early, mid-season, and late-maturing varieties that extend the harvest from mid-July to as late as mid-October.



High bush blueberry field

### How are blueberries used?

About 2% of the wild blueberry crop is sold fresh at local markets. Some blueberry products made in Nova Scotia include pies, yoghurt, ice cream, jams, syrups, juice, and wine.

Highbush blueberries are picked by hand and placed in pint, five-pound, and ten-pound boxes and are mostly sold fresh in local markets and stores. They are also “U-picked,” or hand-picked directly by consumers.





Highbush blueberry harvest

## What happens after blueberries leave the farm?

Wild blueberries which are not sold fresh are taken to a processing plant where they are frozen. Most of the crop is individually quick frozen (IQF) in Nova Scotia, either by Oxford Frozen Foods or by Rainbow Farms. The IQF process involves placing berries on conveyor belts with blown air which flash freezes them individually. Most of this processed crop is then exported in the frozen state. The United States is the main export market, followed by Germany, Japan, and the United Kingdom. Wild blueberries are also exported to the Netherlands, Scandinavian countries, France, and elsewhere.



Blueberries in processing plant

Much of the highbush blueberry crop is sold locally, but a significant fraction, particularly of late-season varieties, is exported into the United States.

## What challenges do blueberry producers face?

Sufficient snowfall in the winter is important for covering the wild blueberry plants. This prevents the cold winds from damaging the stems and buds. Also, because Nova Scotia's weather can be too wet, too cold, or too dry, blueberry farmers face the problem of getting high enough levels of pollination during the bloom period in June.

As blueberry production increases, so must consumption, in order to keep the price stable. New ways of using blueberries are being developed, such as in making juice, but product diversity remains an ongoing challenge.

Mechanical blueberry harvesters developed in Collingwood, Nova Scotia, harvest over 85% of the provincial wild blueberry crop. Finding labour to harvest the remaining 15% by hand is difficult. Mechanical harvesters can pick over 1 hectare or up to 4 600 kg of wild blueberries per day, and more wild blueberry fields are being leveled with excavators to accommodate mechanical harvesting and mowing operations. Highbush blueberries are all picked by hand in Nova Scotia.

## Who is involved in producing blueberries?

- Blueberry growers and managers
- Receiving shed operators
- Pickers and harvesters
- Processors
- Office workers
- Secondary food industry workers
- Government employees and associations
- Researchers
- Machinery and equipment suppliers and servicers
- Financial institutions

**FOR MORE INFORMATION:**

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of Nova Scotia**

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# Chicken

Throughout the world, domesticated chickens are widely raised for their meat. In Nova Scotia, chicken farms generate over \$70 million in farm-gate sales annually and are a significant driver of the rural economy. Kings county leads the province in chicken production.



Chicken barn

## DID YOU KNOW?

- A mature male chicken is called a rooster; a mature female, a hen. A cockerel is a male chicken under one year of age, while a pullet is a female chicken of that age. Baby chickens receive the diminutive, chicks.
- A broiler is a young chicken bred for meat, usually weighing between 1.7 and 2.5 kg. It takes 35 to 40 days for the bird to reach this weight. A roaster, also bred for meat, usually weighs about 3 kg and takes about 50 days to reach this weight.
- Chickens do not have teeth to chew their feed. They use an organ, called a gizzard, to grind food into smaller particles for digestion.
- No hormones are used in the production of chicken in Nova Scotia. In fact, the use of hormones in poultry feed has not been allowed in Canada since the 1970s.

## Where is chicken produced in Nova Scotia?

Kings County chicken farmers produce approximately 85% of the provincial output. Chicken farmers in Lunenburg, Antigonish and Annapolis Counties produce the remaining 15% of commercial production.

## How many chickens do we produce?

There are more than 80 registered chicken farmers in Nova Scotia, and they produce more than 45 million kg of chicken each year. Most farms are family owned and operated.

Nova Scotia's chicken industry is under a supply management system. Supply management is a business system with merit. It meets the challenge to provide price stability and ensure supply demands are met with acceptable levels of return for independent farms. This is done through Chicken Farmers of Canada (the national agency) and Chicken Farmers of Nova Scotia (the provincial marketing board).

A license and quota are required for raising both conventional chicken and free-range chicken, and the industry is highly regulated.

### How are chickens produced?

In the chicken business it all begins with the egg. Eggs are collected from broiler breeder operations and taken to hatcheries. At the hatchery, the eggs are sorted into trays and placed in large incubators. The temperature and humidity are electronically controlled in the incubator. The eggs are turned several times daily and are transferred to hatching trays for the final three days. It takes 21 days of incubation for the egg to develop and hatch a chick. Upon hatching, the sex of each chick is determined and the chicks are vaccinated to prevent illness. Within twenty-four hours of hatching, the chicks are transported to chicken farms in heated trucks.

Meanwhile, at the chicken farm the farmer is busy preparing the barn for the arrival of the new chicks. Before new chicks are placed in the barn, it must be thoroughly cleaned and disinfected to prevent disease and keep the new flock healthy. The barns that house chickens are specially designed to ensure that proper temperature, humidity and air quality are maintained, no matter what time of year the chicks arrive. Prior to the arrival of the chicks, clean, chopped straw or wood shavings, often referred to as bedding, is spread on the barn floor. Broiler chickens are not kept in cages but are floor-raised.



Chicken barn interior

All Nova Scotia chickens are grain-fed. Chicken feed is made up of grains such as corn, wheat and

barley. Grains are the primary source of energy in the ration, but protein-containing ingredients, such as soybean meal and canola meal, are added to chicken feed in smaller quantities. In much smaller quantities, fats are added to increase energy levels as well as improve the taste and texture of the feed. Finally, vitamin and mineral supplements are added to ensure that all nutritional requirements are met. A clean, fresh supply of water is also an important element of a chicken's diet.



Broiler chicks



Mature broilers

Today's chicken farmers take pride in caring for their birds and providing a quality product. Chicken farmers in Nova Scotia are involved in a National Food Safety program for chicken known as "Safe, Safer, Safest," which the Canadian Food Inspection Agency (CFIA) has recognized as an On-Farm Food Safety Assurance Program (OFFSAP). Most chicken farms do not allow visitors into their barns and never allow other animals in. When authorized people are permitted in the barns, they must put on plastic boots and other protective clothing. Barn

doors are kept locked, with a sign on the door that reads, “*DO NOT ENTER/BIOSECURITY IN EFFECT.*” Biosecurity is one aspect of OFFSAP that helps keep the chickens healthy and ensures a quality product in the marketplace.

### How is chicken used?

Chicken meat is sold either fresh or frozen, and birds are sold whole or halved or cut into pieces and sold in packages containing breasts, thighs, drumsticks, or wings. These may be sold whole, skinless, or skinless and boneless. Chicken can be prepared in a variety of ways, usually baked, fried, roasted, broiled, or grilled. It is of course also processed further, by manufacturers of such products as precooked chicken pieces, soups, boullion, stews, and pies.

### What happens after chickens leave the farm?

When the chickens reach market weight of 2 to 3 kg (approximately 37 days for broilers and 50 days for roasters) they are transported to a processing plant in trucks specially designed for shipping live poultry. Nova Scotia has one federally inspected processing plant and several smaller, provincially inspected plants. Federal inspection is required for chicken to be sold outside of the province. At the plants, inspectors check the chicken to ensure the birds are healthy and safe for us to eat. Chicken products are then shipped to grocery stores, restaurants, or factories for further processing.

### What challenges do chicken producers face?

Nova Scotia chicken farmers are facing increasing competition from the global market and producers able to produce chicken at lower costs and import it into Canada. As a result of this, those in the poultry industry closely follow the activities of the World Trade Organization (WTO). It is very important to our chicken farmers that the three pillars of supply management are maintained in WTO negotiations.

### Who is involved in producing chickens?

Nova Scotia’s chicken industry employs hundreds of people. Feed mills, grain farms, hatcheries, farm equipment dealers, veterinary clinics, and trucking companies employ many more. Businesses connected to chicken farming include the following:

- Broiler breeder producers
- Hatchers
- Veterinarians
- Equipment suppliers
- Trucking companies
- Processors
- Government inspectors
- Restaurants, hotels, institutions, retailers, fast food outlets
- Pharmaceutical companies
- Nutritionists and field workers

### FOR MORE INFORMATION:

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# Cranberries

Cranberries are a tangy fruit that grows wild in some areas of Nova Scotia. The berries are round and bright or dark red when ripe. Commercial cranberry growers manage cranberry bogs to maximize the productivity of the crop.



Cranberries on the vine

## DID YOU KNOW?

- Besides containing vitamin C and other nutrients, cranberries contain proanthocyanidins, which can limit the adhesion of certain bacteria to the urinary tract wall, thus preventing infections. They also contain antioxidants that may protect against cancer.
- Cranberries grow on low-lying vines and range from 0.8 to 2.5 cm in diameter.
- Fresh cranberries are available in Nova Scotia from September to December; frozen are available year-round.

## Where are cranberries produced in Nova Scotia?

Most cranberries are grown in the Annapolis Valley, but they are also grown in Shelburne, along the South Shore, and in Central Nova Scotia.

## How many cranberries do we produce?

Nova Scotia has around 130 hectares of cranberries, with 15 growers. The annual cranberry crop is about 1000 tonnes, worth around one million dollars.

## How are cranberries produced?

Cranberry growth and survival depends on a rare and fragile combination of soils and geology, the right climate, and a knowledgeable grower. Cranberries are grown in bogs that are natural or man-made, and need sand or peat soil. These bogs must have an ample water supply for irrigation and for harvest and winter flooding.

To start a cranberry bog, growers must first remove wild growth from the bog, then level the land and plant vines. Cranberry vines are started from vine cuttings 10 to 25 cm long, which are placed directly into the ground. It takes 2 to 3 years before a cranberry vine will bear fruit, and with good management it will be full-bearing in 5 to 6 years.

Cranberries need pruning every second year but do produce in the pruning year. Fertilization is done carefully to promote the growth of berry production while minimizing vine growth. For crop pollination, a high level of bee activity is important. Hives are placed in the crop when 10 to 20% of the flower blossoms are open.

Cranberries grow in clusters on the vine. When it is time to harvest berries destined for processing, growers flood the fields. A beater is run over vines to shake berries loose. The berries, which float, have a soft landing in the water and are corralled with floating booms. They are then pumped onto trucks.

Berries destined for the fresh market, however, are harvested dry. A mechanical harvester “combs” berries off the vines.



Cranberry harvest



Cranberry rake

### How are cranberries used?

Cranberries are used fresh or frozen, in cranberry sauce, cranberry juice, and cranberry jelly. They are used in baking, in products such as cranberry muffins and bread. Sweetened dried cranberries are a popular snack, and are also used in baking and candy making.

Cranberries and cranberry products attract sales because they are known for their nutrient content of dietary fibre, vitamin C, vitamin K, minerals, and antioxidants.

### What happens after cranberries leave the farm?

In Nova Scotia, a significant quantity of berries are packaged and sold fresh. Nova Scotia exports fresh cranberries as far as Calgary and Texas. There is, too, a growing cranberry processing industry in Nova Scotia, producing juice, sauces, jams, and dried fruit. Nova Scotia growers also pack and export frozen cranberries for international markets.

### What challenges do cranberry producers face?

Nova Scotia cranberry producers must protect the crops from frost throughout the growing season and from winter injury during the off-season. Beds need to be carefully engineered and constructed so as to quickly and accurately manipulate and retain water during harvest and winter flooding. Cranberry growing sites need access to a good clean water source with a pH below 5.5. Clean, gritty sand, or “sharp sand,” is necessary for production and must be located on the site or nearby. Producers also have to deal with fluctuating prices, driven by the current world supply of cranberries.

### Who is involved in the cranberry industry?

- Owners and producers
- Field workers
- Equipment suppliers and servicers
- Agricultural supply companies
- Apiarists
- Packaging designers and manufacturers
- Researchers
- Truckers

#### FOR MORE INFORMATION:

##### Nova Scotia Cranberry Growers' Association

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# Dairy

The dairy industry in Nova Scotia is the province's leading agricultural sector, with a farm-gate value of over \$125 million annually, or around 26% of the total value of agricultural production. Dairy farms are found in every county of the province.

## DID YOU KNOW?

- 95 % of the dairy cows in Nova Scotia are Holsteins. Other breeds include the Jersey, Ayrshire, Guernsey, and Brown Swiss.
- A dairy cow is usually bred by artificial insemination, and some farms use embryo-transfer technology. These are efficient methods of improving breeding stock in a relatively short period of time.
- A heifer will be old enough to breed when she is 14 to 16 months of age. The best calves are kept as dairy herd replacements for cows that are old or whose milk production is decreasing.
- A dairy cow is a mature female, kept for milk production. A heifer is a female less than two years old that has not had a calf. A male is called a bull; a neutered male, a steer. A young animal is called a calf.

## Where is milk produced in Nova Scotia?

Dairy farms are found all over Nova Scotia, with Colchester and Hants counties producing the most milk. Antigonish and Kings counties also produce significant amounts of milk, followed by Annapolis, Halifax, Pictou, Cumberland, and Inverness counties.

## How much milk do we produce?

Nova Scotia has just fewer than 250 dairy farmers, shipping about 170 million litres of milk a year. The average dairy herd in Nova Scotia has 75 cows.

Milk is a supply-managed commodity in Canada. This means that the supply is limited to the demands of the market. Nova Scotia producers must have a milk quota before they can sell milk to Dairy Farmers of Nova Scotia. This quota is known as the TPQ (Total Production Quota) and is the amount needed to meet consumer demands for fresh milk and all dairy products. The amount of the TPQ is determined on a national basis for each province. This provincial quota is then allocated to individual producers on the basis of kilograms of fat produced per day. Producers who wish to produce more milk must purchase quota from other quota holders through an exchange system. A producer who exceeds a daily quota ships the milk at a lower price. The rate paid to producers is determined by a formula which takes into account the estimated cost of milk production for this region. The amount paid for milk from an individual farm is based on the composition of the milk shipped.



Holsteins in free stall barn



## How is milk produced?

A heifer must calve first, in order to start producing milk. Calving usually happens in a well-bedded pen, where the farmer can keep a good eye on the process. After having a calf, a cow is said to have “freshened” and begins milk production, or lactation. The cow usually nurses the calf for the first 24 hours, enabling the newborn to get colostrum, or the cow’s first milk. The calf is usually then separated from the cow, and the farmer looks after feeding it the right amount of milk by bottle. A cow usually produces milk for about ten months a year, has a two-month rest, gives birth to a calf, and then recommences milk production.

The dairy cow eats approximately 8 kilograms of grain and a minimum of 12 kilograms of forage per day. The cow drinks at least 13 litres of water for every 5 litres of milk she gives. Cows are put on pasture in the summer and fed hay and silage in the winter. Silage is fermented forage that is stored in air free conditions, such as under plastic or in a silo.

Dairy cattle are ruminants, allowing them to consume roughage, such as hay and silage, and concentrates (grain) not used by humans for food. They have four compartments to the stomach. When ruminants swallow grass and other vegetation, the feed goes into the first compartment, called the rumen. When the rumen is full, the animal will lie down to rest. During this time it will burp up into the mouth portions of food, called “cud,” which are chewed into a pulp and swallowed again. In the rumen, food is broken down by billions of micro-organisms. Cud-chewing and the work of micro-organisms allow ruminants to digest tough cellulose and convert it to usable food. The partly digested food goes on through the other three compartments of the stomach, the reticulum, omasum, and abomasum, where digestion is completed.

Many dairy farms today use computerized feeding systems. The computer is programmed to deliver a certain amount and type of food to each individual cow, depending on such things as rate of milk production and stage of lactation.

Cows are usually milked twice a day, early in the morning and late in the afternoon. Dairy cows are kept in a number of different types of housing. Free-stall housing enables cows to roam within the barn to eat, drink, or lie down in any stall they want. In a tie-stall barn, cows are tied individually with a chain or strap, and are usually milked in the stalls with the use of mobile equipment. In the case of free-stall housing, cows move to the milking parlour at milking time. The milking machinery is permanently located there.



Tie stall housing

The milk is transported by a pipeline system to a milk house. It is collected in a refrigerated bulk tank, which quickly cools the milk to just below 4°C. A milk truck comes to pick the milk up every second day and take it to a dairy processing plant.

Regardless of how milking procedures vary, the emphasis on sanitation remains constant. Barns are cleaned daily, and cows are given fresh, clean bedding. The cows’ udders are washed before milking. The milking equipment is made of stainless steel and glass, with removable, washable rubber parts. The equipment is washed and sanitized after every milking, and the bulk tank is washed and sanitized after it is emptied.



Milking parlour

### How is milk used?

Besides the several types of milk graded according to fat content, products made from milk include chocolate milk and various creams. Other important products are cheese, butter, yogurt, skim-milk powder, and ice cream. Most of the milk produced in Nova Scotia (60%) is sold in the fluid form.

### What happens after milk leaves the farm?

Milk is picked up at the farm by a certified tanker truck, which delivers it to a processing plant. There, the fat is separated from the milk so that skim, .5%, 1%, 1.5%, 2% and “homogenized” milk (which contains 3.25% butterfat) can be made. After separation, milk is pasteurized and homogenized. Pasteurization is the process of quickly heating milk to 72°C and rapidly cooling it to 4°C. This kills any harmful bacteria and keeps milk fresh longer. Homogenization is the process of breaking the fat into tiny globules so that it doesn’t separate out from the milk. During all these steps, quality control ensures the milk is safe and clean.

Milk is packaged quickly, usually within 24 hours of arriving at a dairy plant. An extensive provincial program evaluating the shelf life of processed milk products has been in effect for many years.

A number of quality checks are carried out at the processing plant. Before the truckload of milk is unloaded at the dairy it is tested for antibiotics. This ensures that all products meet strict standards against antibiotics in milk. If antibiotics are found, the load is discarded and the farmer who contaminated the load may be held responsible for the entire amount.

In Nova Scotia, milk is processed by four fluid-milk processing companies: Cook’s Dairy Farm Ltd., Saputo Milk Division, Farmers Co-operative Dairy, and Scotsburn Dairy Group. The last two are cooperatives owned by dairy farmers and together handle most of the total fluid milk sold. Nova Scotia has three small specialty plants: Holmstead Cheese Sales in Harmony, Kings County; That Dutchman Cheese in Economy, Colchester County; and Fox Hill Cheese House in Kings County. Farmers Co-operative Dairy operates a cheddar and mozzarella cheese plant in Truro.

### What challenges do dairy producers face?

Nova Scotia producers work hard to ensure consumers receive quality dairy products at reasonable prices. Farmers have to bear the cost of putting food safety, farm safety, animal welfare, and environmental regulations into effect. Global markets sometimes enable competitors to ship in to Nova Scotia food that is produced more cheaply elsewhere.



Holsteins on pasture

### Who's involved in producing milk?

- Dairy farm owners, managers, and staff (milkers, herdsmen, field personnel)
- Breed associations
- Artificial insemination technicians
- Dairy herd improvement advisors
- Veterinarians
- Suppliers of milking equipment, farm equipment, building and facility units
- Feed producers and nutritionists
- Dairy workers
- Government inspectors, advisors
- Researchers
- Milk-tank truck drivers
- Packaging designers and manufacturers
- Milk product deliverers
- Store employees

### FOR MORE INFORMATION:

#### **Dairy Farmers of Nova Scotia**

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#### **Dairy Farmers of Canada**

Website: [www.dairyfarmers.ca](http://www.dairyfarmers.ca)

# Deer and Game Farm Animals

Deer and game farm animals are covered under the Nova Scotia Wildlife Act. The Nova Scotia Department of Agriculture licenses sites for the rearing of deer and game for commercial purposes. Before licensing and before the animals are purchased, sites must be properly equipped to handle the animals and prevent escapes. Most licensed sites do not involve large numbers of animals. Deer farming has a separate set of regulations from those concerning other game farm animals, because the industry was established before the raising of other wildlife on farms was considered. Wildlife covered in Nova Scotia's game farm regulations are bison, wild boar, and ratites (emu, ostrich, and rhea).

## Deer

Nova Scotia has 7 deer farms, with a total of around 250 animals, consisting of red, sika, fallow, and elk. There are many challenges when it comes to housing fencing, and inspection requirements, owing to concern about escapes that could result in compromising the white-tailed deer population native to Nova Scotia.

The most lucrative market would be the selling of breeding stock, except that the market is very small. Nova Scotia has an abundance of deer hunting, and this may be one reason why few restaurants have venison on the menu. Restaurants sell just the best cuts of meat, leaving the producer with the less saleable product. Besides marketing breeding stock and venison, the deer farmer harvests the velvet from the antlers, which is sold for medicinal uses in the Asian market.

## Bison

Bison are large mammals whose bodies are covered in long, coarse guard hairs and a matted, woolly undercoat. They have a dark brown mane covering the head and forelegs. As with cattle, there are cows (mature females), calves (young animals), and bulls

(males) in the herd. Since bison are wild animals in their native state, they are classified as game animals. Bison need very sturdy, high fences, since they can jump higher than any domesticated farm animal. Bison are raised for their meat and hides. Bulls can weigh around 600 kg at 2 ½ years of age, which is generally when they are slaughtered. There are fewer than 5 bison farms in Nova Scotia, with less than 50 breeding animals.

In Western Canada, bison are treated more like cattle than they are in Nova Scotia, and bison sites are not licensed. In Nova Scotia, there are no federally registered slaughter facilities, and so any bison marketed must be processed in provincially registered facilities, restricting the market opportunity to this province. Only one producer markets bison meat commercially in Nova Scotia.

## Emu

There are only a few emu farms in Nova Scotia, with a total of about 20 breeding animals; Emu, rhea, and ostrich are all large, swift running, flightless birds of the Ratite family. They are raised for therapeutic oil (used in skin-care products), leather, and meat. The meat is low in fat and high in iron. Secondary products are feathers and eggs.



Deer Farm

The number of ranched raptites and licensed sites for raptite production in Nova Scotia has been in decline. Although some producers have promoted secondary products, the demand for meat has not grown. There are few locations that will process raptites, and there is minimal demand for breeding stock.

#### **FOR MORE INFORMATION:**

**Nova Scotia Department of Agriculture**

Website: [www.novascotia.ca/agri](http://www.novascotia.ca/agri)

### **Wild Boar**

There are very few farms in Nova Scotia producing wild boar, with fewer than 10 breeding animals. Since wild boar are able to survive in the wild, good fencing is essential to prevent escape. Feral populations after escape in other locations have been known to do considerable damage to the natural habitat.

# Eggs

Nova Scotia is self-sufficient in eggs and provides some eggs to other provinces. Nova Scotia egg producers use a supply management system to provide a stable supply of eggs to consumers at fair prices and a fair return to producers.



White eggs



Leghorn hen

## DID YOU KNOW?

- Eggs are a high quality protein food classed under the Meats and Alternatives group in Canada's Food Guide to Healthy Eating. Eggs contain all 9 essential amino acids, which make up a complete protein, and are considered a nutrient-dense food.
- The most common laying hen in Nova Scotia is the White Leghorn, which lays white eggs. Rhode Island Red hens produce brown eggs, and the province of Nova Scotia has one of the highest percentages of brown egg production in Canada. However, the colour of the shell does not affect the nutritional value of the egg.
- Hens begin laying at about 19 weeks of age and continue for about 12 months. On average, a hen lays about 300 eggs during that period.
- There are many types of eggs available to consumers today. Besides ordinary eggs, there are those that come from hens housed or fed in a special way. Specialty types include Omega-3 enhanced eggs, eggs from free-run and free-range chickens, vitamin enhanced eggs, as well as organic and vegetarian eggs.
- Approximately 30% of Nova Scotia's total egg production is shipped to the processing market.

## Where are eggs produced in Nova Scotia?

Egg producers have operations located throughout the province. Farm sizes range from 500 to over 150,000 laying hens. Over half of the laying hens in Nova Scotia are located in the Annapolis Valley.

## How many eggs do we produce?

Over 20 million dozen eggs are produced in Nova Scotia annually. The provincial farm-gate value of eggs is approximately \$30 million.

## How are eggs produced?

Egg farmers treat their hens with care. Farmers make sure their hens have adequate light, air, a well-balanced nutritious diet, fresh water, and comfortable surroundings. Because Canada's weather is so variable and can be harsh, most laying hens are housed indoors. Cage style housing can provide a safe, healthy environment for egg production since droppings fall outside the cage, away from the hens and the eggs.

Free run eggs are produced by hens that are housed indoors, in pens which allow free roaming. Free range eggs are produced by hens which also have access to the outdoors. Organic certification has specific requirements for both feed and housing.

Laying hens are fed a diet of grains, proteins, vitamins, and minerals. The hens' diet does not contain hormones or antibiotics, the use of each being illegal in Canada. A hen may be given antibiotics if it is ill, but eggs produced during treatment cannot be sold for human consumption.

Regulated egg farms participate in the Start Clean, Stay Clean™ program and are inspected by trained officers from the Canadian Egg Marketing Agency. This on-farm food safety program is based on internationally recognized principles for food safety and incorporates many practices to safeguard the health and welfare of hens.

Eggs are usually collected twice a day and are stored in a temperature and humidity-controlled atmosphere until they are sent to a grading station.

## How are eggs used?

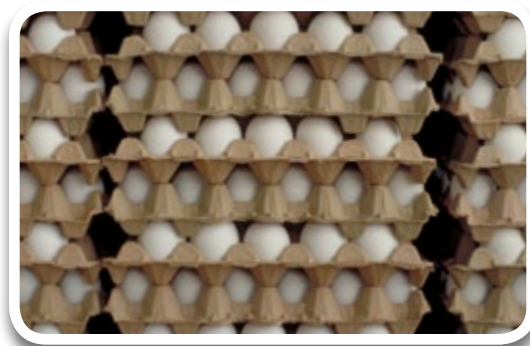
Eggs can be served with any meal, breakfast, lunch, and dinner, and are often a key ingredient in baking. Eggs are an excellent source of protein and contain many vitamins and minerals.

Processed eggs are pasteurized before being further processed and packaged in liquid, frozen, or dried form. Pasteurization is a process in which the liquid egg is heated to a very high temperature to kill possible bacteria. Processed egg products may contain preservatives and flavouring or colour additives and are used in manufacturing many foods, such as mayonnaise, noodles, and baked goods. They are also used to make non-food items, including pharmaceuticals, shampoo, pet foods, and adhesives.

## What happens after eggs leave the farm?

From the farm, eggs are taken to a grading station where they are cleaned, graded, and packed. Egg grading stations are registered by the Canadian Food Inspection Agency (CFIA). The CFIA inspects all registered grading stations for proper sanitation and operating conditions.

The eggs are washed and sanitized in a high-speed washer. They are then passed over a bright light, which reveals the interior of the egg and the shell quality. This process is still called candling, although electric light has long replaced the candle, originally used for the purpose. The eggs are then graded according to quality standards having to do with interior quality, weight, cleanliness and shell quality. Only Canada Grade A eggs are then graded by size.



Eggs at the grading plant

All eggs sold in grocery stores have been graded and packed before distribution. Most eggs reach store shelves in about 4 days. A “best before” date of approximately 35 days is placed on the carton to indicate the length of time properly handled eggs will maintain their Grade A goodness.

Canada Grade A eggs are graded according to size. Many of Nova Scotia’s producers are also graders, so that eggs are often graded and packed on-site.

Proper handling of eggs is a priority in all stages of production, but it is also the consumer’s responsibility. Eggs should be purchased at the end of the shopping trip and kept near frozen items so that they can stay cold on the way home. Eggs should be stored in their original carton in the main body of the refrigerator with the best before date visible. The carton protects the eggs and prevents them from absorbing strong odours and flavours of other foods. Keeping eggs in the main body of the refrigerator, rather than on the door, ensures they are stored at a more consistent and cooler temperature, allowing for the longest retention of their Grade A quality.

### What challenges do egg producers face?

Producers need to be aware of consumer preferences. Demands for specialty eggs are driving change in the industry, and producers now offer greater choice to consumers. At the same time, a more complex market means a more complex business, and producers need to make sound business decisions.

Canadian egg farmers treat their hens with care and humane treatment of hens is a priority. Not only is it the right thing to do, but happy, healthy hens lay more eggs, and so it is in the farmers’ best interest to take good care of their hens.

After many years of reliable scientific studies on cholesterol, egg producers must still work hard to overcome nutrition misinformation. Studies show that dietary cholesterol in egg yolks has very little effect on blood cholesterol. Eggs are low in unhealthy saturated fats and have no trans fats – two types of fat which are known to raise blood cholesterol.

### Who is involved in producing eggs?

- Egg farmers
- Feed suppliers
- Hatchery operations
- Equipment suppliers and servicers
- Trucking companies
- Packaging designers
- Packaging manufacturers

### FOR MORE INFORMATION:

#### Nova Scotia Egg Producers

55 Queen Street

PO Box 1096

Truro NS B2N 5G9

Tel: 902-895-6341

Website: [www.nsegg.ca](http://www.nsegg.ca)



# Forage Crops

Forage usually refers to whole plants eaten by livestock in the pasture or in the barn. The most commonly used forage plant species in Nova Scotia are bluegrass, timothy, bromegrass, fescues, red clover, white clover, and alfalfa.



Alfalfa

## DID YOU KNOW?

- There are only a few major crops, such as wheat, corn, and rice, that humans use for food, but there are many grasses and legumes that are used as forage for livestock.
- Alfalfa is popular because of its high quality, but its production is limited to the better drained soil types. Corn grown for silage is considered forage and is increasing in popularity on many Nova Scotia dairy farms

- Only ruminant animals (animals with four stomach chambers) are able to efficiently digest the cellulose and hemicelluloses that make up the grass and legume plants. Bacterial action in the first of the chambers (the rumen) allows digestion of forage.

## Where is forage produced in Nova Scotia?

Forage is produced all across the province, with Cumberland, Colchester, Hants, and Kings counties having the largest areas for forage.

## How much forage do we produce?

Forage is Nova Scotia's largest crop. It plays a fundamental role in the food chain, since it is the major source of nutrients and fibre in the diets of dairy cattle, beef cattle, goats, and sheep. Each year, approximately 70 000 hectares of forage are grown in Nova Scotia. There are over 5000 hectares of corn silage, and the amount is increasing.

Generally reliable rainfall and moderate temperatures make Nova Scotia well suited to forage production.

## How is forage produced?

Forage needs to be seeded in a fine, firm seedbed, often achieved by cultivating the soil. The soil has to be analysed and the proper amounts of nutrients added for the forage to grow. Forage may be grazed by farm animals or harvested and stored for winter feeding.



Cutting forage

### How is forage used?

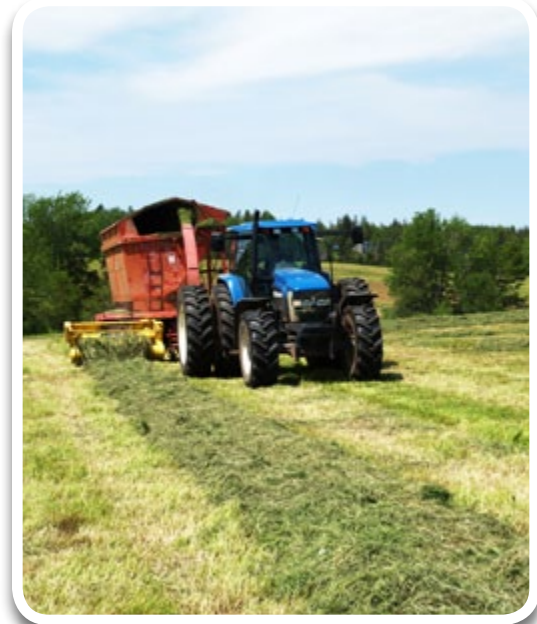
Harvested forage is stored as dry hay, haylage or silage. Hay is made from grasses and legumes which are cut, dried to about 10-15% moisture and baled for storage.



Round hay bales

Silage has a higher moisture content and is made from grass plants which are chopped and packed into a silo where it is preserved by anaerobic fermentation. Tall vertical silos are a familiar part of the traditional farm landscape, and although they are still used today, many farmers now use horizontal silos. In the horizontal silo, forage material is packed into long tunnel-shaped

structures and covered to eliminate air. Silage can also be baled, wrapped in white plastic, and left in the fields. In recent years, there has been a dramatic shift towards the use of silage. Haylage is a low moisture silage.



Silage harvest

### What happens after forage leaves the farm?

Ninety to ninety-five per cent of all forage is used on the farm. Some hay and large, wrapped silage bales are sold and trucked to other farms.

### What challenges do forage producers face?

For the past number of years there has been a real emphasis on increasing the productivity of pastures and the quality of stored forage on Nova Scotia farms. Feed costs represent the largest single cost in most livestock operations. Properly preserved high-quality forage can greatly reduce the need for costly feed concentrates and supplements. The largest single factor affecting the quality of forage is the maturity of the crop at harvest. Timing the harvest of grasses and legumes in the late vegetative or early reproductive stage (before the plant goes to seed) attains high energy and protein content in the forage.



Charolais cattle on pasture

### Who is involved in producing forage?

- Farmers
- Equipment dealers and mechanics
- Fertilizer and chemical sales representatives
- Seed dealers
- Agricultural supply companies
- Agricultural advisors
- Soil and feed testing laboratories

### FOR MORE INFORMATION:

#### Perennia

Kentville Office  
32 Main Street  
Kentville NS B4N 1J5  
Tel: 902-678-7722  
Fax: 902-678-7266  
Website: [www.perennia.ca](http://www.perennia.ca)

# Fruit Crops (Other)

## Strawberries

Strawberries are grown across Nova Scotia and are now available from May to October, thanks to the innovation of “day-neutral” strawberries.

The regular “June bearing” strawberry types are planted in the field in spring and given a year to establish; they are covered with straw during the winter and uncovered the next spring. Flower bud initiation in these plants takes place in the first year. When plants are uncovered in the spring they take about 60 days to flower and produce ripe berries. The fruit is picked in June and July.

The ability of day-neutral plants to produce fruit is not affected by day length, and they can continue to bloom and produce fruit from May until October. Day-neutral plants are grown on plastic-covered raised beds, either in open fields or under low shelters called “tunnels.”

Producing strawberries is labour intensive. To grow crops successfully involves planning, financing, planting, mechanization, pest control, nutrient management, irrigation, harvesting, cooling, packing, storing, marketing, and accounting.

The first certified strawberry plant propagation program in Canada was started in Nova Scotia in 1956. Currently, there are five certified nurseries in Nova Scotia selling plants to growers across Canada, the northern United States, and Florida. Of the approximately 35 million plants grown by these nurseries, 85% are sold to Florida growers.

Nova Scotia growers face competition from producers of imported berries. To help farmers compete, hardier and higher-yielding varieties suitable for Nova Scotia growing conditions are

being developed. The Atlantic Food and Horticulture Research Centre in Kentville is renowned for its strawberry breeding program and has bred several varieties that are very popular with growers across Canada and the northern United States. These include varieties such as Kent, Annapolis, Mira, and Brunswick, as well as newer varieties like Wendy.



Strawberries

Most strawberries are eaten fresh, with about 90% of the crop being sold fresh in supermarkets and farm markets, while 10% is hand-picked by consumers. Strawberries pack a punch of Vitamin C—more than in an equal quantity of oranges.



U-pick farm

## Melons

There are many types of melons but in Nova Scotia two main types are grown: watermelon and muskmelon. Watermelons usually have red flesh. The most common muskmelons are cantaloupes and honey dew melons. Melons are vine plants and need a warm, long growing season. They are grown in a field and are harvested by hand. Melons have a relatively short shelf life because of their perishable nature.

## Kiwi

There is presently only one commercial kiwi grower in Nova Scotia. The type grown here is the winter-hardy, “arctic” variety, which is smaller than the standard kiwifruit, more like a large grape, and doesn’t have a fuzzy skin. Each plant can produce about 90 kilograms of fruit. Kiwis need both male and female plants for proper pollination. Nova Scotia kiwi is sold directly to the retailer, often as a frozen product.

## Raspberries

The plants are grown in wide rows, the canes supported by wire. After harvest the canes that produced fruit are cut off at the soil. The new replacement canes that grew during the season will bear the next year’s crop.



Raspberries

Raspberry acreage has been increasing, but most plantings are small because of the high labour requirements. About 70% of the crop is sold in supermarkets and farm markets. Two of the province’s certified nurseries propagate raspberry canes for both local and outside markets.



Raspberry harvest

## Rhubarb

The stalks of rhubarb are eaten as a fruit and are used in making pies and other baked goods. Rhubarb is a fruit only in the culinary sense, botanically it is a herbaceous perennial plant. It takes 1-2 years from planting the crown divisions of the plant until the first harvest. Rhubarb is harvested in June, by hand, with a long-handled knife. All of the stalks are cut off, and the desirable-sized ones are trimmed and taken to be weighed. They are put in bins and taken to a pre-sorting table, where they are inspected, the obvious defects and weeds removed. The stalks are then prewashed and sent through a series of slicers. The final product consists of slices 1 cm thick. These are washed again and then go through a shaker to remove water. There is a final inspection, and the

rhubarb is placed in pails and frozen, in which state it remains until needed. Rhubarb is used to make pies and other baked goods, with a local pie production facility buying almost all of Nova Scotia's rhubarb. Nova Scotia produces about 20% of Canadian production.



Rhubarb

## Other Fruit

Other fruit grown in Nova Scotia include black currants, red currants, Saskatoon berries, blackberries, and haskap berries.

### FOR MORE INFORMATION:

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#### Horticulture Nova Scotia

Blair House, Agricultural Centre

32 Main Street

Kentville NS B4N 1J5

Tel: 902-678-9335

Email: [hortns@ns.sympatico.ca](mailto:hortns@ns.sympatico.ca)

Website: [www.hortns.com](http://www.hortns.com)

# Fur

Fur farming has a long history in Atlantic Canada as the first fox farm in the country was established in Prince Edward Island in 1895. Mink farming in Nova Scotia started over 100 years ago. Through improvements in nutrition and genetic selection, the mink produced here are recognized worldwide for their quality. The “Jet Black” type was developed in Digby County, Nova Scotia, in the late 1950s and can now be found on mink ranches throughout the world.



Jet Black mink

## DID YOU KNOW?

- Nova Scotia’s fur industry is comprised mainly of mink farms.
- Mink breed once a year, in March, with litters of “kits” born during late April and early May. The litter size ranges from 1 to 12, with an industry average of 5 or 6.
- Most fox production is devoted to the silver fox colour phase. Newborn foxes are called “pups.”
- Foxes breed once per year, between late January and early March, with the pups born from late March through to early May. The litter size ranges from 1 to 9, with an industry average of 3 or 4.

- Nova Scotia’s fur industry is regulated by the Nova Scotia Department of Agriculture. The industry has no quotas or marketing boards.

## Where is fur produced in Nova Scotia?

Eighty-five per cent of the mink production takes place in Digby and Yarmouth counties. Mink farms first began in these areas, and the availability of fish by-products, used in feed, has been essential for their success. Fox production has traditionally been distributed throughout the province. Fur farms can be located in areas of the province on land not suitable for other types of farming.

## How many pelts do we produce?

In 2012, about 120 mink farms produced a total of over 1.4 million pelts, making Nova Scotia the largest producing province in Canada. Although there are many pelt colours in ranched mink raised world-wide, in Nova Scotia the black mink variety makes up over 90% of pelts produced.

In 2008, 10 fox farms produced almost 2,000 pelts.

Fur pelt sales generated about \$140 million in farm-gate sales in Nova Scotia in 2012.



Sapphire type ranched mink

### How are furs produced?

The fur industry is labour intensive. The traditional wet feed ration for mink is made from 85 % waste products from fish plants, slaughterhouses, and poultry processing facilities. These by-products would otherwise be composted or disposed of in landfills. The wet ration is prepared on the ranch or more often at centralized feed kitchens. The adult animals are fed once daily, while the growing kits are fed at least 3 to 5 times per day. Fox farms have adopted dry feed systems, raising the animals on commercially prepared pellet feed.

Mink breeding season is from February to March. Litters of 1-12 kits are born during April-May. Kits are weaned in June and winter fur development begins at the end of summer. The pelts are harvested in late November and early December, when the fur is at its prime.

Fox breeding season is from January to March. Foxes breed only once per year, so the breeder must be on hand to ensure all females are bred when they come into heat. Litters are born from March to May and pelts are harvested from November to December.

Fur farmers operate under Codes of Practice which were developed by Agriculture and Agri-Food Canada in collaboration with the National Farm

Animal Care Council. The code covers topics as diverse as housing environment, biosecurity, feeding management, health, welfare, husbandry, transport and euthanasia.

### How are fur animals used?

Pelts from the mink and foxes are ultimately made into clothing. Oils and fats can be used to produce consumer products such as cosmetics and fine leather preservatives. Carcasses are either rendered or composted to be recycled as fertilizer.

### What happens after furs leave the farm?

Pelts for sale are prepared on-farm or at custom pelting facilities. They are graded for fur quality characteristics, which include clarity, or colour tone, texture, density, size, and length of nap. The nap is the length relationship between the two distinct fur fibers found on the pelt, the shorter underfur and the longer guard hair. A short nap, in which the guard hair is only slightly longer than the underfur, is the most desirable.

Pelts are sold at auction in a worldwide marketplace. Since 2010, mink has been Nova Scotia's leading agricultural export.



## What challenges do fur producers face?

Fur farmers have to adopt new technologies to improve domestic and international competitiveness. In an international marketplace, pelt price is determined by the supply and demand for a fur product. The demand for fox pelts tends to fluctuate more widely than for mink pelts.

New manure handling equipment is being implemented for improved environmental sustainability. Computer-controlled pelt processing equipment and computerized breeding records help farmers improve the efficiency of farm operations.. New technology in housing means farmers need to adapt traditional barn-style buildings, and add improved biosecurity measures.

## Who is involved in producing furs?

- Fur farmers
- Feed processors
- Construction contractors
- Equipment suppliers
- Auction houses
- Veterinarians
- Consultants
- Engineers
- Financial service providers

## CONTACTS AND OTHER RESOURCES:

### Nova Scotia Mink Breeders Association

PO Box 354  
4695 Hwy 332,  
Weymouth NS B0W 3T0  
Tel: 902-837-7789

### Perennia

90 Research Drive  
Bible Hill NS B6L 2R2  
Tel: 902-896-0277  
Fax: 902-896-7299  
Website: [www.perennia.ca](http://www.perennia.ca)

# Goats

Goats are ruminant mammals with a long history of domestication, possibly going back to as early as 7000 BC. Settlers in New France brought goats to North America with sheep in the early 1600s. In Nova Scotia, the dairy goat industry is well established, providing both milk and cheese products.

## DID YOU KNOW?

- There are a variety of breeds raised specifically for milk production, meat, or fibre.
- The male goat is called a buck, the female a doe, and a young goat a kid.
- A goat's udder has only two teats, whereas a cow's has four.
- Many people who are allergic to cow's milk can digest goat's milk without difficulty.

## Where are goats produced in Nova Scotia?

Halifax, Kings, and Pictou counties have the largest numbers of goats, although most counties have some goat producers. In the 2011 census, there were 24 goat farms reported in Nova Scotia, about 2% of Canadian goat farms. There is a goat's milk dairy in Middle Musquodoboit and cheese plants in Aylesford and Earltown.

## What is the value of goat farming in Nova Scotia?

The retail value of goat's milk in Nova Scotia is approximately \$350,000. It is difficult to estimate the value of the meat and fibre produced.

## How are goats produced?

Goats are ruminant animals that will browse a wide variety of plants, including some that sheep and cattle won't eat. Goats kept for production are often



Alpine dairy goat

fed a standardized hay and grain diet and housed full-time in loafing pens within barns. Goats can live up to 15 years.

The gestation period for the goat is approximately 150 days. Goats are seasonal breeders, like sheep, and mate from late summer to early winter. Goats usually have from 1 to 3 kids, which are born between early January and late May. Twins are common, making up about 70% of kiddings in North America.

It usually takes from 4 to 10 months to raise a meat goat for market. Dairy goats are milked twice a day, and on average produce about 1 to 4 litres of milk daily. Goats that are raised for their fleece are sheared twice a year. The adults can produce 4 to 7 kg of mohair or cashmere a year.

## How are goats used?

There are three main products from goats: milk, meat, and fibre that is spun into yarn.

Goat milk is used for drinking, making yogurt, cheese, and frozen treats. Feta is a type of cheese that is traditionally made from goat milk. Goat milk is also used in the production of luxury hand soaps.



Boer meat goats

Goat meat, called chevon, has little fat and a distinct flavour sometimes compared to lamb, veal, and venison, depending on the age of the goat. Many breeds of goat can be used for meat production, the Boer goat from South Africa being one of the most popular breeds.

Angora and Cashmere goats are raised for their fibre. Angora goats are shorn twice a year and their fleece is called mohair. It is used by spinners and weavers and is prized for its softness, durability, and lustre. The fleece from the youngest goats is most valuable for clothing, since it is softer and finer than the fleece from older goats. Cashmere is the name for the soft downy undercoat that most goats produce for winter insulation. The Cashmere goat, however, is a breed that has been selected for high production of quality cashmere fibre. The Cashmere breed is also good for meat production.

## What challenges do goat producers face?

The goat industry in Nova Scotia is relatively small. Some producers are processors themselves and may even do their own marketing and delivery to retail stores. Commercial goat producers must be self-reliant, innovative, and business oriented in order to make a profit from goat farming.

## Who is involved in the goat industry?

- Goat owners
- Artificial insemination workers
- Breed association workers
- Feed industry representatives
- Veterinarians
- Animal health-product suppliers
- Milk processors
- Livestock and milk truckers
- Shearers
- Fibre processors
- Milking and farm equipment suppliers

### FOR MORE INFORMATION:

#### Goat Association of Nova Scotia

RR#3, 1085 Bennets Bay Road  
Canning NS B0P 1H0

Tel: 902-582-3517

Email: [nsgoats@hotmail.com](mailto:nsgoats@hotmail.com)

# Grains

Grains are the seed heads of grass plants. Major grain categories in the world include wheat, rice, corn, barley, oats, and rye. All of these, with the exception of rice, are grown to some extent in Nova Scotia. Most of the grain grown in Nova Scotia is for animal feeds, but interest in local food products has potential to build demand for locally produced food grains.



Specialty Bread

## DID YOU KNOW?

- The use of wheat by humans dates back 75,000 years. Grain crops are also known as cereal crops. The word “cereal” stems from “Ceres,” the Greek goddess of farming.
- A kernel of grain is composed of three main parts: 83% is the starchy interior called the endosperm; 14.5% is the protective seed coat called bran; and 2.5% is the embryo part of the seed that will germinate a new plant called the germ.
- Whole wheat flour contains all three components of the wheat kernel, while white flour consists only of the endosperm component.

## Where are grains produced in Nova Scotia?

Kings and Colchester lead in barley production, followed by Cumberland, Annapolis, Antigonish, Pictou, and Hants counties. Almost all counties report growing oats, but the major producers are Kings and Cumberland, followed by Pictou, Colchester, and Hants. Most of the wheat and grain corn (grown for livestock feed either as dry or high-moisture corn) produced in Nova Scotia is grown in Kings, Annapolis, and Colchester counties.

## How much grain do we produce?

The total production of barley, wheat, oats, and rye is approximately 20,000 to 30,000 tonnes per year. As well, approximately 30,000 to 35,000 tonnes of grain corn is produced each year. The provincial production of grain is less than 20% of the total grain consumed by our livestock. There is also a small but increasing production of soybeans in the province that is utilized for livestock feed.

The production of barley and oats has decreased rapidly, while the production of grain corn and soybeans has been increasing. Wheat production has been stable.

Just over 1000 tonnes of sweet corn is grown for human consumption and a small amount of other grains are grown for milling.

## How are grains produced?

The main cereal grain crops grown in Nova Scotia are barley, spring and winter wheat, oats, and corn, as well as small amounts of rye. Winter wheat is planted in the fall and harvested in late July to early August, whereas most cereals are planted in the spring and harvested early August to September.



Seeder

Special seeding methods can help prevent erosion of topsoil from wind and water. Some farmers leave the stubble from the previous year on the fields over the winter. The roots help hold the topsoil in place. In the spring, they cultivate the soil, turning the stubble into the soil and then using a seed drill to seed the new crop. Other farmers use a special seeding technique called minimum or zero-till. They plant the crop in amongst the stubble of last year's crop. This is done with a machine that cuts a slice in the ground, drops in a seed, and covers the seed. This method saves energy and labour because it reduces the number of times that the farmer has to work the field.

Nutrients are applied, depending on the crop grown and the soil quality. Some Nova Scotia farmers have adopted more intensive grain management practices for specialty crop markets such as milling wheat. An example of such a practice includes using split applications of nitrogen fertilizer to improve the quality of milling wheat. If required, herbicides for weed control are used.

A combine is used to harvest a ripe crop and to separate the seeds from the chaff and straw. Harvested grain is stored in granaries and may require drying or cooling. It is important to maintain a specific moisture level and temperature in grain to ensure that it does not become mouldy.



Grain combine

## How is grain used?

Most grain produced in Nova Scotia is used for livestock feed. In recent years, a small number of farmers have grown wheat to be ground into flour for human consumption. The most common type of flour in Nova Scotia is wheat flour, which is used to make bread, pizza dough, and pastries. We also eat whole grains when we eat porridge made from oatmeal.

Grain is a good source of nutrients for both humans and animals. In wheat, the endosperm contains starch; the bran contains minerals and vitamins; and the embryo (or wheat germ) contains protein, fat, and vitamins. The fat component of wheat germ is the reason that it should be refrigerated, to prevent it from going rancid.



Barley heads

### What happens after grain leaves the farm?

In Nova Scotia, most grain is used on the farm or sold and trucked to local feed mills or grain elevators. At the elevators, the grain is graded for quality and moisture content, to ensure that it is dry and won't go mouldy in storage. From the grain elevator, it is then shipped to local farms or feed mills, or is sometimes sent to the Port of Halifax for export.

Grain grown in Nova Scotia for animal feed is processed on-farm or at feed mills, where it is broken up so that it can be digested better by livestock. Roller and hammer mill equipment is used to break up and grind the grain into smaller, finer particles.

Wheat grown for human consumption is sold to Dover Mills in Halifax or Speerville Mills in New Brunswick for processing into bread flour.

### What challenges do grain producers face?

Like most farmers, grain growers need good weather, especially for planting and harvesting. Taking care of the soil is very important for all crop growers. They need to be aware of new technology and sustainable practices.

### Who is involved in producing grain?

- Grain growers
- Seed growers
- Feed mill workers
- Grain inspectors
- Truckers
- Agronomists
- Pesticide manufacturers, dealers, salespeople
- Seed salesmen
- Fertilizer manufacturers, dealers, salespeople
- Flour mill workers
- Animal nutritionists
- Farm implement dealers and mechanics
- Soil and feed testing laboratories

### FOR MORE INFORMATION:

#### Perennia

Kentville Office

32 Main Street

Kentville NS B4N 1J5

Tel: 902-678-7722

Fax: 902-678-7266

Website: [www.perennia.ca](http://www.perennia.ca)

# Grapes and Wine

Commercial grape production is a relatively new industry in Nova Scotia and a major growth industry. Wines made from Nova Scotia grown grapes have won recognition at numerous international competitions. In 2010, 16 medals were won by Nova Scotia wines at the All Canadian Wine Championships.



Nova Scotia wine

## DID YOU KNOW?

- Grapes are a type of berry that grows in clusters on perennial vines. Grapes can be green, red, pink, purple, or blue. Table grapes are usually seedless, thin skinned, and relatively large. Grapes used for wine-making have seeds and thicker skins, and are usually smaller than table grapes.
- More grapes are grown worldwide than any other fruit, and 90% of them are used for wine-making.

- The most widely planted white variety in Nova Scotia is L'Acadie Blanc.
- Some wineries in Nova Scotia use other fruit, such as strawberries and blueberries, to produce wine.

## Where are grapes produced in Nova Scotia?

Grape production is limited to a few areas in the province that have a longer frost-free growing season, above average heat, and milder winters. These conditions are primarily found in the Annapolis Valley, Malagash Peninsula, Avon River Valley, LaHave River Valley, Bear River Valley, and other scattered areas.

The commercial industry has developed here on the foundation of estate farm wineries. These wineries are in the business of growing grapes and processing them into wine on site.

## How many grapes do we produce?

Nova Scotia has over 50 grape growers and 200 hectares of vineyard. Annual grape production has grown dramatically from 56 tonnes in 1987 to 820 tonnes in 2010. The value of the 2010 grape crop was about 47% higher than the previous ten-year average.

## How are grapes produced?

Grape cultivation is called viticulture. “Viti” comes from the Latin vitis, meaning “vine,” and grapes grow on long thin vines. Because the vines are not self-supporting, growers set up a trellis system, a series of posts, sometimes with cross-arms,

connected by wires. This keeps grapes off the ground and allows workers and machines easy access to fields. Vineyards have rows and rows of grapevines trained on trellis systems.



Vineyard

A grapevine takes ten years to produce at full capacity (3.5 to 4.0 kg per vine). Vines are pruned to control growth and increase yield. Grapes bloom in the spring and are harvested in September and October. All table grapes are picked by hand. The fresh grape clusters are individually cut off with pruning shears or harvest shears and packed into 3-litre baskets, ready for sale. The table grape producers grow different varieties so that their ripening period can extend from 4 to 6 weeks.



Purple grape cluster

Grapes to be used for wine making can be picked by hand or mechanically. Mechanical harvesters straddle the trellis, and the grapes are beaten off onto a conveyor belt, which takes them to a hopper. From there the grapes are put in plastic bins and shipped to the winery.

Grapes used for ice wines are harvested after the temperature has been  $-8^{\circ}\text{C}$  for at least a couple of days. This freezes the water inside the grapes, concentrating the natural sugars. Ice wines are considered a premium type of sweet dessert wine.

### How are grapes used?

The seedless grapes are used mainly for fresh eating, while those with seeds are used mainly for wine, juice, jelly, candy, and “fruit leather.” Both types of grapes can be eaten fresh, and both can be processed. The vast majority of Nova Scotia grown grapes are made into wine.

### What happens after grapes leave the farm?

In Nova Scotia, some producers grow grapes on contract for wineries off-site, but many operate estate farm wineries, where grapes are processed into wine right on the farm. In order to qualify as a farm winery, producers must have at least 4 hectares of grapes adjacent to the winery.

The first step in processing grapes at the winery is to crush the fruit to release the juices.



Processing grapes



Grapes for white wine are pressed immediately to separate the juice from the skins and stems. The juice is then put into containers to ferment. This fermentation process, which creates alcohol and carbon dioxide, takes 10 to 30 days or more, depending on the type of wine that is produced. The wine is then “racked” (put into tanks or barrels to age), after which it is bottled and sold.

Red wine grapes are normally crushed and then placed in a tank with wine yeast. The fermentation produces alcohol, which dissolves the colour and tannins in the skin, giving the wine its red colour. When sufficient extraction has taken place (after about one week), the wine is pressed, and the resulting juice is placed in a large tank to finish fermentation. After this, the wine is bottled for the market.

### What challenges do grape producers face?

The short growing season in Nova Scotia is a challenge to grape growers. The Kentville Research Station is working to breed winter-hardy varieties that will make good quality wines. One such variety is KW94-1, a high-yielding, winter-hardy white wine grape that looks very promising.



Grape cluster.

Grapes require specific climatic conditions, the right soil type and pH, good drainage, and protection from wildlife. It is expensive to set up a vineyard to meet these requirements, and so it may take a long time before significant returns are realized.

Wine is sold on a world market; thus, the price and consumer acceptance of local wines are subject to change.

Most Nova Scotia table grapes are sold fresh, directly from the farm. Consumers can support local farmers by choosing wines and fresh grapes produced in Nova Scotia.

### Who is involved in producing grapes?

- Vineyard owners
- Grape producers
- Agricultural supply companies
- Truckers
- Field workers to prune, spray, and harvest grapes
- Winery owners and workers
- Liquor store employees

#### FOR MORE INFORMATION:

##### Grape Growers Association of Nova Scotia

P.O. Box 373

Aylesford NS B0P 1C0

Email: [ggans@ns.sympatico.ca](mailto:ggans@ns.sympatico.ca)

# Greenhouse Industry

There are just over 212,000 square metres of crop production in greenhouses in Nova Scotia (about the size of 26 football fields). The greenhouse sector is a major employer in Nova Scotia, providing jobs for around 700 people. The value of greenhouse sales in Nova Scotia is in excess of \$29.5 million.

## DID YOU KNOW?

- The greenhouse industry involves the production of plants under glass, plastic, or a similar type of protection that provides a controlled environment.
- Labour is the highest input cost, while fuel for heating is the second highest cost.
- You can look for highway signs in Nova Scotia pointing out greenhouse operations that are members of Greenhouse Nova Scotia.
- Corrugated polycarbonate sheets now used for greenhouse covering provide strength as well as insulation.



Greenhouse producer

## Where is greenhouse production in Nova Scotia?

There are about 100 greenhouse operations located throughout the province, from Yarmouth to Cape Breton. Kings and Hants counties lead in total area of greenhouses, followed by Annapolis and Colchester counties.

## What greenhouse crops do we produce?

In Nova Scotia, plants produced in greenhouses include cut flowers, potted plants, bedding plants, forestry tree seedlings, fresh herbs, and vegetables such as tomatoes, lettuce, cucumbers and peppers.

## How are greenhouse crops produced?

The greenhouse structure enables the operator to control growing conditions for the plants by providing supplementary heat and ventilation and better control of humidity, light, and water.

Growers of greenhouse vegetables often use a hydroponic system, in which plants are grown without soil, in a water-based solution rich in nutrients. This reduces weed and disease problems in the greenhouse and allows the grower to carefully control nutrient levels.

Many growers use an integrated pest management approach to control crop pests and diseases within the greenhouse, incorporating biological controls to minimize chemical usage.

Crops are started as seeds or plugs in the winter when the temperature is too cold outside for crop growth. Growers start and grow transplants from November to February.

Greenhouse tomatoes require 16 weeks to reach production, while cucumbers require 8 weeks. Once production begins, the plants are picked 3-5 times weekly for a period of 5-7 months. Some growers produce several crops each year.

### How are greenhouse crops used?

Tomatoes, lettuce, cucumbers, and peppers are used as fresh produce for eating. They are excellent sources of vitamins, minerals, and fibre. Peppers are a valuable source of vitamin C, containing higher levels than oranges per kilogram.

Floriculture in Nova Scotia, which includes bedding plants for home gardens, cut flowers, and potted plants, is a significant industry, generating over \$15 million dollars in farm sales.

Some Nova Scotia greenhouses specialize in the production of tree seedlings for reforestation.



Forest seedling greenhouse

### What happens after greenhouse products leave the greenhouse?

Most of the greenhouse growers in Nova Scotia are bedding plant growers. Bedding plants are primarily sold from May to July, with many growers extending their business by selling perennials, shrubs, and trees throughout the summer. The largest volume of sales is made through chain stores, followed closely by direct sales from roadside stands and privately owned retail outlets.



Floriculture greenhouse

Greenhouse vegetables are either directly marketed to the consumer or sold to wholesalers who in turn market them through retailers. Direct-market avenues include roadside stands, farmers' markets (at which various producers offer their goods), and farm markets (usually privately owned).

### What challenges does the greenhouse industry face?

This form of agriculture can be very costly and must be approached with a good business plan.

A new greenhouse measuring 63 metres by 63 metres, incorporating all the latest equipment, would cost approximately \$1 million dollars. Required equipment can include heating and

ventilation systems, automatic irrigation, hydroponic systems, and computers programmed to operate these systems. In addition, the costs of energy and labour can be very high. Such costs are incurred in a business that faces relatively small profit margins, strong competition from imported products, and difficulty attracting skilled labour.



Greenhouse lettuce

## Who is involved in the greenhouse industry?

- Greenhouse owners and managers
- Greenhouse workers
- Equipment dealers and repair people
- Construction workers and electricians
- Fertilizer dealers and salespeople
- Fuel companies
- Plant product inspectors
- Packaging designers and manufacturers
- Truckers
- Wholesale and retail store employees

## CONTACTS AND OTHER RESOURCES:

### Greenhouse Nova Scotia

60 Research Drive

Bible Hill NS B6L 2R2

Email: [info@greenhousenovascotia.com](mailto:info@greenhousenovascotia.com)

Website: [www.greenhousenovascotia.com](http://www.greenhousenovascotia.com)

### Horticulture Nova Scotia

Blair House, Agricultural Centre

32 Main Street

Kentville NS B4N 1J5

Tel: 902-678-9335

Email: [hortns@ns.sympatico.ca](mailto:hortns@ns.sympatico.ca)

Website: [www.hortns.com](http://www.hortns.com)

# Honey and Bees

Beekeepers play an important role in Nova Scotia agriculture. In addition to producing honey and wax, bees are important pollinators for all fruit crops. Approximately 17,000 colonies are used for blueberry pollination alone.

## DID YOU KNOW?

- People have gathered honey for thousands of years. Until the Middle Ages, honey was the primary sweetener in food.
- For every pound of honey produced, bees fly over 50,000 km, which is more than once around the Earth.
- The average lifespan of the worker bee in summer is six weeks, and in that time she will produce about 1/10th of a teaspoon of honey.
- Differences in honey colour, aroma, and taste are determined by the flower source, not by the honey bees.
- When honey has been left standing in a cool place, sugar crystals form. This is a natural process and can be reversed by gentle warming.

Honey is a sweet, thick, liquid food made by honey bees from the sweet nectar of flowers.

Because honey has antibacterial properties and contains relatively little water, microbes such as bacteria and molds do not grow in it. For this reason, honey can be stored for a long time and has been known to last for decades. Honey contains simple sugars that are readily absorbed by the body. Pollen grains and a wide variety of other substances, such as minerals and vitamins, are also present in small quantities.

High in carbohydrates, honey is made by bees for food, and centuries of bee-keeping have developed practices that encourage bees to produce more honey than their hive requires.

Honey bees play an important role in the pollination

of agricultural crops. Pollination is the process of transferring pollen grains from one flower to another on the same plant, or from the flowers of one plant to those of another of the same species. Pollination occurs as honey bees move from flower



Bee on apple blossom

to flower collecting nectar for honey or pollen for feeding their brood. Beekeepers transport their hives to the areas in which crops are to be pollinated and back again when the crop has finished flowering.

## Where is honey produced in Nova Scotia?

Bees are kept in all counties of Nova Scotia. The largest concentration is in the Annapolis Valley (Digby, Annapolis, and Kings counties), and Hants, Colchester, and Pictou counties.

## How much honey do we produce?

The estimated value of honey produced in Nova Scotia is approximately \$1.5 million. Besides producing honey and beeswax, beekeepers rent hives



Beehives at blueberry field

to blueberry producers for blueberry pollination and sell hives and queen bees.

Greenhouse operators also use bees to ensure good pollination in their crops.

### How is honey produced?

Foraging bees collect nectar from flowering plants and store it in a special organ called the honey sac. Enzymes in the honey sac change large complex sugars in nectar, called polysaccharides, into simple sugars called monosaccharides.

Upon returning to the hive, the foraging bee will transfer the partially converted nectar to the nectar cells in the hive. House bees then work to concentrate the nectar. They do this by rapidly fanning their wings over the cells to create a draft through the hive. Water evaporates from the nectar, reducing the water content from approximately 70% to less than 20% in the final honey product. The bees seal the honey by capping the cells of the wax comb.

A beekeeper is called an apiarist; the boxes the bees live in are called hives; and the place where hives are kept is called an apiary. There can be 50,000-80,000 bees in one hive, with one queen bee, thousands of worker bees (females), and only a few hundred drones (males).

The queen bee can lay as many as 2,000 eggs per day. The eggs are laid in beeswax cells. The wax is produced by glands on the abdomens of worker bees. It is secreted in flakes and then chewed by the worker bees until it is suitable for forming cells.

The bee larvae are at first fed royal jelly, which is produced by worker bees, and later fed honey and pollen. The queen bee was initially a worker bee larva that was fed a large quantity of royal jelly. This feeding process begins when, for various reasons, a new queen is required by the hive. The extra feeding causes physiological changes, turning a worker larva into a fertile queen. Drones mate with the new queen bee when she takes her mating flight away from the hive, thus fertilizing her eggs. Queen bees can live for 3 to 4 years but are usually replaced by beekeepers every 2 years.



Bees on hive

Honey bees are kept in wooden boxes, called supers, which resemble a natural beehive inside. Inside the hive are frames made of wood or plastic with a wax foundation for the cells that the bees will use to store honey. The bees will draw out the cells, fill them with honey, and cap them with a layer of wax.

When working with the hives, most beekeepers wear special protective coveralls with mesh headgear to protect them from bee stings. Beekeepers must inspect their hives often, checking to make sure there is one healthy queen bee per hive. They also need to ensure the bees have enough room, adding more supers as needed. Crowding in the hive can encourage bees to swarm, during which they move off in a group looking for a new nesting location for their queen. Beekeepers also need to be watchful for diseases and parasites in the hive and may have to erect fences to protect the hives from predators such as bears.

The first step in extracting honey from honeycomb frames is to use a hot decapping knife to remove the small wax caps covering each cell. The frames are then placed in a drum-like machine called an extractor, which works centrifugally. Extractors may hold anything from two frames at a time to more than 120. The frames are spun around rapidly, causing the liquid honey to flow out of the cells. The honey is then collected and pumped through filters before being stored in a tank. The beekeeper can return the empty frames to the hives to be filled again. In the fall, the hives are readied for winter.



Honey frame

## How are honey and bee products used?

Honey is used as a spread on toast and bread or as a sweetener in beverages and in many baked products, including breakfast cereals. Honey is regarded as a fancy sweetener and an alternative to sugar. It is also a popular baste in cooking.

Beeswax, among its many possible uses, is used in making candles and furniture polish. It is also used to coat thread.

While honey is the bees' carbohydrate food source and provides energy, pollen is their protein food source. Some beekeepers sell bee pollen in health-food and drug stores as a diet supplement, and it is used in special animal feeds.

Propolis is a resinous material that bees collect from flower buds. In the hive, propolis is used as a putty to close off holes in the nest or to coat foreign materials that cannot be physically removed. Propolis has strong anti-microbial and hydrophobic (water repellent) properties and thus has been widely used in homeopathic preparations and by the pharmaceutical and cosmetics industries.

## What happens after honey leaves the farm?

Honey can be sold in bulk to a packing facility, or packaged in small containers at the beekeeper's "honey house".

Comb honey is natural honey sealed in wax made by bees in their hives. Chunk honey consists of comb honey that is packed in the same container as liquid honey.

Honey is often pasteurized to inactivate yeasts that are found naturally in it. This prevents fermentation of the honey in storage and gives a longer shelf life.

Creamed honey is made by carefully controlling the natural crystallization process. Fine honey crystals are added to liquid honey held at 14 degrees C. Some consumers like the smooth texture and convenience of creamed honey.

## What challenges do beekeepers face?

Beekeepers make relatively little profit from their considerable labour, and the income they receive from selling honey products is often less than that from pollination contracts. Other types of bees can also be used for pollination of large crops, thus limiting the possible sources of income for beekeepers.

The threat of diseases and parasites means that beekeepers have to learn new methods of detection and control.

## Who is involved in producing honey?

- Beekeepers
- Bee breeders
- Tree fruit and berry producers
- Honey processors and graders
- Beekeeping equipment suppliers
- Packaging designers and manufacturers
- Transporters
- Entomologists (apiculturists)

## FOR MORE INFORMATION:

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**Nova Scotia Beekeepers Association**

Website: [www.nsbeekeepers.ca](http://www.nsbeekeepers.ca)

**Canadian Honey Council**

Website: [www.honeycouncil.ca](http://www.honeycouncil.ca)



# Llamas and Alpacas

Llamas and alpacas are both domesticated species of South American camelids. Llamas were originally bred for size, because their main use was as a pack animal. Alpacas are smaller and were bred for their luxurious fibre. Both llamas and alpacas come in many colors—white, brown, piebald, grey, or black.



Llama

## What do llamas and alpacas produce?

Alpacas are raised for fibre. As well as producing fibre, llamas are raised as pack animals, and guardians for sheep.

The fibre from both alpacas and llamas has microscopic air pockets, making it a natural insulator. It can come in many colours, is super fine, lanolin free, warm, and very strong. The soft fibre is valued by natural-fibre clothing designers, who are part of a small but growing industry in Nova Scotia.

## DID YOU KNOW?

- Alpaca fibre has no lanolin so can be popular with people who are sensitive to sheep's wool.
- Llamas are often housed with sheep as guard animals.
- Both llamas and alpacas (like cattle, sheep and goats) have no incisor teeth in the upper jaw. Mature males develop sharp canine teeth which are used for self-defence and fighting other males.

## Where are llamas and alpacas found in Nova Scotia?

There are about seven registered alpaca farms throughout the province, and approximately 150 registered alpacas. There are few llama farms, with many of the animals kept on farms as companion animals or guard animals for sheep.



Young alpacas

## How are llamas and alpacas raised?

Llamas and alpacas have single births after a gestation period of 11.5 months, and the young are called *cria*, a word derived from the Spanish for

“baby.” The adult female is called a dam. The adult alpaca male is called a *macho*; the unbred female, a maiden.

Adult llamas can weigh 135 to 200 kg. Alpacas weigh from 45 to 90 kg at maturity.

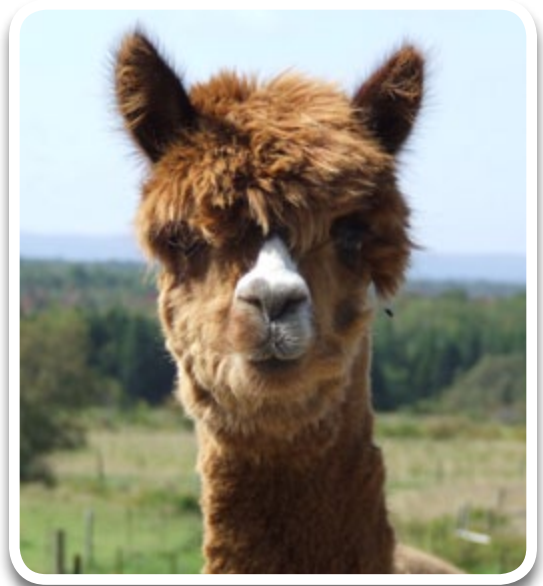
There are two breeds of alpacas, the Huacaya (which make up 90% of the population) and the Suri. Huacayas have puffy fleece, while the Suri have long locks. They are shorn once a year to harvest the fleece, which has an average weight of 2 to 6 kg.

Their diet consists of good pasture or hay with some supplemental grain, minerals, and salt.



Alpacas on pasture

Alpacas and llamas are gentle animals. Although known to spit, they usually do so amongst themselves, and at humans only if they are provoked or frightened.



Alpaca

### What challenges does the industry face?

Although the fibre of alpacas is valuable, the market is limited in Nova Scotia. The sale of both llamas and alpacas for breeding stock can be profitable, but requires an investment in good quality genetic lines.

#### FOR MORE INFORMATION:

##### Alpaca Canada

Website: [www.alpacainfo.ca](http://www.alpacainfo.ca)

##### Canadian Llama and Alpaca Association

Website: [www.claacanada.com](http://www.claacanada.com)

# Maple Syrup

Maple syrup is produced when the sap collected from maple trees in the spring is concentrated by boiling it down. Pure maple syrup is produced commercially only in eastern North America. Nova Scotia ranks fourth in Canada in maple syrup production, after Quebec, New Brunswick and Ontario.

## DID YOU KNOW?

- The sugars found in maple sap are produced by the tree from starches stored in the roots over the winter.
- About 40 litres of sap are needed to produce 1 litre of syrup, but the amount of sap can vary between 20 and 50 litres, depending on the sugar content.
- The preferred species for tapping is the sugar maple (*Acer saccharum*). Red maples (*Acer rubrum*) can also be tapped; however, the sap is generally not as sweet as that from the sugar maple.

## Where is maple syrup produced in Nova Scotia?

Nova Scotia's maple industry is primarily situated in the northern and central region of the province. Cumberland County accounts for almost 80% of the total production. The other 20% is produced in various counties throughout the province.



Maple syrup farm in Earltown

## How much maple syrup do we produce?

Currently, there are more than 60 commercial maple producers in Nova Scotia, with the total number of trees tapped being over 350,000. Annual production exceeds 125,000 litres of maple syrup, with gross farm sales close to \$1.5 million.

There is potential for production to increase, as there are many areas in the province with good sugar maple stands that are not presently tapped.

The province of Quebec is the leader in the industry, responsible for about 75 per cent of maple syrup produced world-wide.

## How is maple syrup produced?

Sugar maple trees in a woodlot may take between 30 to 50 years to grow to a size big enough to tap—at least 20 cm in diameter. Once the trees reach a tappable size, they may be tapped for many years without being harmed.

Early spring is the time when maple sap flows and trees can be tapped, when nights are below freezing and days are 3° to 8°C. When nighttime temperatures remain above freezing and days are too warm, the trees begin to bud and the season ends. This usually happens in mid to late April, but the time varies from year to year.

The first step in sugaring is to drill holes into the tree trunks 0.75 to 1.1 cm in diameter and 3.8 cm to 5 cm. A spout is inserted firmly into the tap hole.

Modern producers attach plastic tubing between trees to collect sap. The tubing is stretched from tree to tree and allows sap to run directly from the trees to the sugar camp or to a holding tank. This system involves less physical labour and a lower chance of contamination than the traditional method of collecting sap in buckets. Some producers use a vacuum pump on the tubing to aid the flow of sap.



Maple spigot

When it comes from the tree, maple sap is mostly water. Syrup is produced by removing much of the water in machines called evaporators, which boil the sap to syrup. Efficiency of the concentration process can be increased by using a reverse osmosis machine, which removes up to 75% of water from sap before it enters the evaporator. The evaporator reduces water content until the syrup measures the right concentration of sugar (about 66%), at which point it is stored in barrels.



Evaporator

Filtering is the process of clarifying pure maple syrup. Raw syrup contains various suspended particles, called sugar sand, brought out in the boiling process. In earlier days, these particles were settled out in bulk containers before retail packaging. Today, they are filtered through paper and cloth membranes, producing clear syrup. Syrup is then graded, reheated, and packed into glass or plastic containers.



Maple syrup bottles

Canada and the United States have different grading standards. The grades and colour classes of maple syrup in Canada are: Canada No. 1 (Extra Light, Light, Medium), Canada No. 2 (Amber), and Canada No. 3 (Dark).

The lighter grades of syrup are preferred for table use, while the darker grades have a stronger flavour and are often used in cooking and baking.

### How is maple syrup used?

Maple syrup is used as a topping for pancakes, waffles, ice cream, cereal, fruit, etc. It can be used as a glaze on ham and vegetables, and it is used in baking.

Unopened containers of pure maple syrup may be left in a cool, dark place for 6 months without refrigeration. After opening, syrup should be refrigerated. Freezer storage keeps open or unopened containers indefinitely, and the liquid does not solidify but gets very viscous.

About 90% of the syrup made in Nova Scotia is sold as pure maple syrup. The other 10% is further

processed into maple butter, maple cream, maple candy, maple sugar, maple taffy, and maple jelly. Look for “Pure Maple Syrup” printed on the label for a genuine, 100% pure maple product.



Maple products

## What happens after maple syrup leaves the farm?

Almost 30% of Nova Scotia’s production of syrup is sold to consumers directly from the farm. The rest of the season’s production is usually bottled on-farm and delivered to stores, farm markets, and restaurants.

## What challenges do maple producers face?

The weather conditions in springtime are a huge factor in how much sap can be collected. Weather conditions throughout the year, however, affect the crop trees and generally determine the amount and sweetness of the sap that they yield in spring. Severe wind and ice storms can cause significant damage in maple woods. Maple producers must deal, too, with ever-increasing fuel, equipment, and labour costs.

## Who is involved in producing maple syrup?

- Maple producers
- Equipment manufacturers and dealers
- Fuel companies
- Container manufacturers and dealers
- Maple packing plants
- Labellers

### FOR MORE INFORMATION:

#### Maple Producers Association of Nova Scotia

PO Box 217

Amherst NS B4H 3Z2

Tel: 902-597-2645

Email: [info@maplesyrup.com](mailto:info@maplesyrup.com)

Website: [www.novascotiamaplesyrup.com](http://www.novascotiamaplesyrup.com)

# New and Specialty Crops

Farmers are always experimenting with new ways of doing things and with growing new things. Some experiments develop into new agricultural sectors, while others demonstrate what doesn't work. Some specialty crops work very well for certain farms because of the presence of a special microclimate or soil type, or because of the farmer's ability to capture a particular market. But they may never be grown on a large scale. Three crops in the early stages of experimentation in Nova Scotia are hemp, hops, and haskap.

## DID YOU KNOW?

- New crops in Nova Scotia can be newly developed varieties of a crop, like day neutral strawberries; crops that have traditionally been difficult to grow in Nova Scotia's climate, like sweet potatoes or hops; crops that were previously only popular in certain parts of the world but have the potential to be consumed more widely, like haskap; and crops that were widely grown in past centuries and are now being revived as their nutritional and other functional benefits are rediscovered, like hemp or camelina.
- Some new or specialty crops will never be grown widely in Nova Scotia as they depend on microclimates or soil types that are found in only a few areas of the province, or they have a limited market available to a few, but not all farmers.
- Some new crops are produced for only a short time if markets fail to become established, consumer tastes change, processing infrastructure does not sufficiently develop, or production problems arise (as recently, for example, with ginseng). However, some new crops become very well established and develop into mature industries (e.g. cranberries).

## Where are new and specialty crops produced in Nova Scotia?

Every part of Nova Scotia has the potential to produce new or specialty crops, depending on the soil and climate requirements of the crop and what the intended market is. Some new crops that are currently receiving a great deal of interest are hemp, hops, and haskap.



Hop field

Hemp can be produced anywhere in the province where the soil is fertile and well-drained. Hemp growers must be licensed by Health Canada and must produce a minimum of ten acres in order to be licensed.

Hops are mainly grown in drier climates than that of Nova Scotia, but because of a recent global market shortage, local microbrewers are interested in working with local farmers to develop a sustainable supply in Nova Scotia. Like hemp, hops also require fertile, well-drained soil.

Haskap in its wild form is known as blue honeysuckle and is native to Nova Scotia. Haskap is the Japanese name for the blue honeysuckle berry and is used in Canada to refer to improved varieties of the plant that have been developed to have larger berries and better taste. Haskap is adapted to a wide range of soil types and fertility levels and is cold tolerant to -40 C.



Hemp field

### How much do we produce?

The harvest of new or specialty crops varies from year to year as new crops are tried. Usually, when the potential for a new crop comes to light, a small

number of farmers will experiment with growing it. If those farmers seem to be successful, more will try to produce the crop, and the sector will often grow rapidly. If the market is unable to bear the resulting increase in production levels, or farmers do not make enough money growing the crop, production will either drop to a level that the market can sustain, or disappear completely.

Currently, there are fewer than 100 acres each of hemp, hops, and haskap being grown in Nova Scotia. Hops and haskap are mainly grown on small-scale farms, while hemp attracts larger-scale farmers.

### How are new or specialty crops produced?

Some new crops are produced in ways very similar to those of existing, well-established crops. Others require quite different production methods.

Hemp is produced in a way very similar to that of other field crops, such as corn, although modifications must be made to harvesting equipment so as to prevent the fibrous hemp stalks from wrapping around axles and other moving parts and thereby causing fires. There are currently no pesticides registered for use on hemp in Nova Scotia, and so farmers must control weeds mechanically.

Hops are a perennial crop propagated from rhizomes. They regrow from their crowns each year and are trained to grow up 4-meter-high trellises. In major hop producing regions, there are mechanical hop harvesters, but in Nova Scotia all hops are harvested by hand. It takes three years for a hopyard to become commercially productive. A few chemical products for countering problems posed by disease and insects are registered in Canada; however, farmers should also try to control weeds and insect pests mechanically.

Haskap is also a perennial crop. Haskap bushes become commercially productive after 3–4 years. The bushes need to be pruned every few years, and fertilizer must be applied to the crop. Work is being done at the University of Saskatchewan to develop a mechanical haskap harvester, but currently haskap

berries in Nova Scotia must be harvested by hand. There are currently no registered pesticides for this crop, and so weed control and powdery mildew may become problems.

### How are new or specialty crops used?

New or specialty crops have a variety of uses, but many new crops are attractive to consumers because of reported health benefits.

Hemp can be used as a fibre to make paper, cloth, building materials, and a variety of other products, but all hemp produced in Canada is used to make food products. Whole hemp seeds, hulled hemp seeds (“hemp nuts”), and hemp oil are used to make a variety of products. Hemp oil has a very good nutritional profile in terms of its omega-3 and omega-6 fatty acid composition. Hemp seeds have a high protein content and many other nutritional benefits as well, in the form of vitamins and minerals.

Hops are mainly used to create the flavour and aroma of beer and to provide an antibacterial effect which favours the activity of brewer’s yeast.

Haskap berries can be eaten fresh, processed into jam, jelly, juice, and liqueur, or used to flavour ice cream, yogurt, and other products. It can also be used in baked goods.



Haskap berries

### What happens after new or specialty crops leave the farm?

Some new or specialty crops are sold directly to consumers, but most are processed beforehand in some way.

Hemp grain must be dried after harvesting and stored at 10% moisture. The grain must be cleaned to remove any weed seeds or other debris. The grain may then be hulled or crushed for oil.

Microbreweries use either wet or dry hops in brewing beer. Wet hops are fresh hops that must be used within 24 hours of harvest. Dry hops are hops that have been dried after harvesting and usually pelletized. Once dried, they can be stored for many months. Nova Scotia currently does not have a hops drying facility. Thus, all hops must be delivered to the purchasing microbrewery immediately after being harvested.



Hop cones

Haskap berries can be sold fresh or frozen. Berries are washed before freezing or undergoing other processing methods.



## What challenges do new or specialty crop producers face?

New or specialty crop producers face a number of special challenges, including a narrow selection of crop varieties, limited knowledge about crop nutrient requirements, limited pest control options, a lack of processing infrastructure, and uncertain markets.

## Who is involved in producing new or specialty crops?

- Farmers
- Crop specialists
- Seed and planting material providers
- Plant breeders
- Fertilizer and pest-control product salespeople
- Food processors

## FOR MORE INFORMATION:

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Canadian Hemp Trade Alliance: [www.hemptrade.ca/](http://www.hemptrade.ca/)

ADEDA Hops Growers Guide: [www.thinkfarm.ca/](http://www.thinkfarm.ca/)

University of Saskatchewan Haskap Information: [www.fruit.usask.ca/haskap.html](http://www.fruit.usask.ca/haskap.html)

Haskap Growers Association of Nova Scotia: [www.haskapnovascotia.com/haskap.htm](http://www.haskapnovascotia.com/haskap.htm)

# Nursery Sod

Nursery sod is a mature grass cover that is produced in an intensively managed agricultural operation, removed intact from one location with a minimum amount of soil and transplanted to another to form an instant turf cover. In Nova Scotia, sod production is an important farm industry, worth almost \$5 million in farm gate sales.

## DID YOU KNOW?

- Nursery sod is used for home lawns, golf courses, parks, commercial sites, roadsides, and playing fields.
- Establishment of vegetative areas and erosion control on steep slopes is almost impossible without the use of sod.
- Sod provides a cooling effect in urban environments where hard surfaces like concrete tend to absorb and radiate heat.
- Sod as a ground cover acts like a sponge by absorbing heavy rains that otherwise might wash pollutants and dirt into water systems.
- Sod filters an enormous amount of dust and dirt from the environment. Healthy, well maintained nursery sod is not only beautiful but functional as well.

Different grass species are used for different sod applications. Bentgrass is produced and marketed to the golf industry for use on greens, tees, and sometimes fairways. It has very fine blades that grow close together and form a very dense and low-growing turf. The farming practices used in growing Bentgrass are far more intense than are those used for the more common Kentucky Bluegrass blends. Sod for most purposes is grown from Kentucky Bluegrass blends and sometimes includes fescue or ryegrass species. Dwarf Bluegrass varieties are being grown on some farms to meet a demand for lower growing, tough grasses for tees and fringe areas of golf courses.



Cape Breton golf course

## Where is sod produced in Nova Scotia?

Nursery sod is produced in Cape Breton, Colchester, Hants, Kings, and Halifax counties.

## How much sod do we produce?

Nova Scotia has about 1200 hectares of nursery sod, with a farm-gate value in 2010 of about \$4.8 million.

## How is sod produced?

A field (preferably with rock-free soil) is cultivated, levelled, and adjusted for a proper nutrient balance before seeding. Nurseries sometimes add organic materials during the cultivation process to replenish volume lost during previous harvests.

A mixture of perennial grasses (most often Kentucky Bluegrass blends) are seeded and maintained during one or two growing seasons. The nature of the seed blend will depend upon the purpose of the sod. The quality of the sod and the speed at which it reaches maturity will be the result of many things, not the least of which are nutrient management and mowing height and frequency. Attaining maturity takes between 11 and 18 months in Nova Scotia, depending on the varieties of grass plants grown.

Sod is cut with a sod harvester when mature. There are several types of sod harvesters in use on Nova Scotia farms. The machines harvest the sod in various lengths and widths. Some farmers harvest sod in large rolls, a method that speeds the installation process but requires special equipment for the customer. Other machines harvest sod flat, folded, or in small rolls. Sod is most often placed on pallets and transported fresh to the customer.

## How is sod used?

Nursery sod is used to create an instant, weed-free grass area or lawn. The customer should have the site prepared for sodding before the turf is delivered. The site is ready for sod when the topsoil (usually recommended at 10-15 cm) is smooth and firm to walk on. Starter fertilizer is normally added before placing the sod. Once the sod is installed it must be kept moist until the transplant process is complete. Successful rooting may take between two to four weeks depending on the time of year.

## What happens after sod leaves the farm?

To prevent damage, sod must be moved and installed soon after harvest as it consists of living plants. Preferably, it is trucked directly to the customer's site and installed. Installing specialty turf like Bentgrass requires more care during transplantation. Sod is used to create sports fields, parks, golf courses, and lawns for commercial properties and homes.

Most sod companies provide after-sale advice to customers on normal maintenance and how to deal with weed and insect problems.



Harvesting sod



Lawn on a commercial property

## What challenges do sod producers face?

The fields where sod is produced need to be very level, so that harvesting can be done efficiently, with little waste of topsoil. The soil needs to be light and free of rocks. Sod is a living complex of grass plants, and producers must be careful to deliver and install it before it deteriorates. The sod farming industry in Nova Scotia understands the need for caution in the use of pesticides and fertilizers. The industry has respect for the environment and uses IPM (Integrated Pest Management) techniques when possible in the production process.

## Who is involved in producing sod?

- Sod nurseries
- Fertilizer, seed, and chemical companies
- Crop advisors
- Truck drivers
- Farm labourers
- Landscape companies
- Machinery dealers

### FOR MORE INFORMATION:

#### Atlantic Turfgrass Research Foundation

20 Rock Garden Road

Truro NS B2N 5E3

Website: [www.TurfGrass.ca](http://www.TurfGrass.ca)

#### Landscape Nova Scotia

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Tel: 902-463-0519

Toll Free: 1-877-567-4769

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Website: [www.landscapenovascotia.ca](http://www.landscapenovascotia.ca)

#### Turf Producers International

Website: [www.turfgrassod.org](http://www.turfgrassod.org)

# Pigs

Pigs have a long history as farm animals, having been domesticated as early as 10,000 years ago from the Eurasian wild boar (*Sus scrofa*). In Nova Scotia, the hog industry has declined in the past decade. Current production is about 30% of the production level in 2001.

## DID YOU KNOW?

- A sow will have between 2 and 2.5 litters of pigs per year, producing approximately 24 pigs per year on average.
- An average sized litter has 11 piglets, but litters range in size from 9 to 14.
- A mature sow weighs about 185 kg, and a boar weighs about 225 kg.
- A piglet weighs about 1.2 to 1.7 kg at birth.
- The time from breeding to farrowing (giving birth) is called the gestation period, and for pigs it runs three months, three weeks and three days (115 days).
- The expression “sweating like a pig” is rooted in a falsehood, not fact. Pigs don’t actually have sweat glands and for this reason pig barns are designed to have good ventilation, with lots of airflow to keep pigs cool. Some barns even have water sprinklers for the pigs.

There are many breeds of pigs, each of which is selected for specific desired traits. For example, the Landrace breed is known for its high carcass quality and rapid early growth rate. Large Black and Tamworth breeds are particularly well suited to outdoor operations because they tolerate sun well and are good foragers.

Purebred breeding farms specialize in one breed of pig and sell their high quality males and females to other farmers. Some farms grow heritage breeds, such as Berkshire, for the specialty market.

Most pigs raised commercially today are crosses of two or three different breeds. The breeds commonly used are Canadian Yorkshire, Landrace, Canadian Duroc, and Hampshires.



Tamworth pig

## Where are pigs produced in Nova Scotia?

Kings County farmers produce the most pigs, followed by farmers in Colchester and Cumberland counties. The province is recognized for its high quality hog breeding stock.

## How many pigs do we produce?

Nova Scotia has about 10-12 registered hog farms that raise about 7,500 market hogs and 90,000 weanling pigs per year. This represents a farm-gate value of \$6 million.

However, the industry has undergone a significant decline in Nova Scotia in the past decade, with current production representing about 30% of the level reached in 2001.

### How are pigs produced?

From birth to 3 or 4 weeks of age, piglets are kept with the sow (mother) in a farrowing house. After weaning, they are moved into nursery facilities until they are 9-10 weeks of age. The last stage of production is the grow-finish barn. The pigs stay in this stage of production until approximately 5-6 months of age, whereupon they are sent to market.

#### There are three main types of hog operations:

**Farrow-to-finish operation**—piglets are born and raised to market weight on the same farm.

**Farrow-to-wean operation**—piglets are kept until they weigh approximately 16 kg and then are sold to other producers to be raised to market weight.

**Finishing operation**—pigs come to the farm from the weaner barn and grow to market weight at this operation.

Some Nova Scotia hog farms use a husbandry system in which piglets are weaned at about 3 weeks of age and shipped to other farms to be raised to market weight. The biological basis of this system is that, prior to weaning, the piglets have some immunity to disease pathogens that may be present in the source herd. This immunity is transferred to piglets in the sow's milk. When piglets are separated at weaning from the source herd and transferred to the finishing operation, they avoid those possible disease pathogens. The production advantages are that the piglets tend to have a greater appetite and grow more quickly in the finishing operation, and that the need to use antibiotics to treat disease is reduced.

Pigs are fed a diet of grains such as corn, barley, and soybeans, with added vitamins and minerals. Pig feed is usually combined in a pellet form and can be mixed on the farm or purchased from a feed mill. In Nova Scotia, many of the ingredients used to make pig feed are imported, as there is not enough grown here to meet the demand. Importing feed adds to

production costs and contributes to the challenges faced by the hog industry in Nova Scotia.



Commercial cross piglet

Some specialty operations in Nova Scotia raise heritage breeds of pigs in outdoor settings. Since pigs are monogastrics (have a simple stomach) they do not have the ability to digest forage as efficiently as ruminants, such as cattle and sheep. They can get about 10-30% of their nutrients from pasture plants, with the remainder of their diet made up by supplemental grains. Pasture-raised pork is often sold at a premium price to local restaurants.



Large Black piglet

## How are pigs used?

Today's pigs have been bred for lean cuts of meat. Pork comes in fresh-cut form, as pork chops, roasts, or spareribs, and in cured forms, as ham, bacon, and wieners, each of which has a particular flavour developed from the curing process. Many sausages, too, have pork as the main ingredient. Pork is a popular choice for animal protein around the world. It is often referred to as “the other white meat,” because today's lean pork is similar in nutritional value to chicken.

The main product from pigs is pork, but many other products are harvested as well. Pharmaceutical products like insulin and pancreatic enzymes for heart-attack patients are derived from pigs. Heart valves from pigs have been used to replace weak valves in people. Other by-products from pigs, including pigskin leather, bristles for hair brushes, and ingredients used in insecticides, lipstick, and plywood adhesives, are used in a wide variety of consumer and industrial goods.

Trimmings and bones are used for many things, including chalk, antifreeze, crayons, floor waxes, rubber, and weed killers. Gelatin, which is extracted from the skins of hogs, is used for thickening foods, including cottage cheese, marshmallows, ice cream, and yogurt.

## What happens after pigs leave the farm?

When pigs weigh about 110 kg, they are sent to market. The primary purpose for raising pigs is to produce pork, but many valuable by-products are harvested as well.

## What challenges do pig producers face?

Consumers demand food products that are nutritious and safe to eat and that are raised in an environmentally responsible manner. To provide this level of quality, farmers must follow programs and regulations to ensure that they are maintaining best practices. The Canadian Pork Council has

developed a food safety program that is a core part of pork production in Canada. This program—the Canadian Quality Assurance program—helps producers demonstrate their commitment to the production of safe pork. Canadian farmers produce some of the highest quality pork in the world.

In Nova Scotia, the hog industry has faced serious financial challenges. Relatively high local production costs, coupled with highly competitive pricing from other pork-producing areas, makes conventional hog farming in Nova Scotia a challenge.

## Who is involved in producing pork?

- Hog farmers
- Feed suppliers
- Veterinarians
- Agri-business and extension representatives
- Meat processors
- Butchers and meat cutters
- Meat brokers
- Meat inspectors
- Transport companies
- Pharmaceutical companies
- Researchers
- Educational and training institutes

### FOR MORE INFORMATION:

#### Pork Nova Scotia

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Tel: 902-895-0581

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Website: [www.porknovascotia.ca](http://www.porknovascotia.ca)

# Sheep

Sheep belong to the family Bovidae, which includes cattle, goats, antelopes, and other hollow-horned, cloven-footed ruminants. They are used for the production of meat, wool, and milk. The milk is used to make cheese and yogurt. Currently, the demand for lamb in Nova Scotia is not met by local production. There may be opportunity for growth in the local industry.

## DID YOU KNOW?

- Sheep originated in the mountains of central Asia and were first tamed and raised there thousands of years ago. The ancestors of sheep today were wild and looked much like modern goats.



Commercial flock

- Ewes are female sheep; rams are male sheep; and young sheep are called lambs.
- A very important member of a sheep farm is the sheep-herding dog. The most popular breed used is the black and white Border Collie. Many other breeds of dog are used for herding in other countries, including the Old English Sheepdog, the Australian Shepherd, the Shetland Collie (Sheltie), and the Corgi. For a farmer with a large flock of sheep, a well-trained herding dog can save a great deal of time and energy. Adhering to a few short vocal commands or whistles, these dogs are able to round up and bring the sheep to where

the farmer wants them.

- Another type of dog which may be found on a sheep farm is the guard dog. Guard dog breeds for sheep protection have been developed over centuries in Europe and Asia and include the Komondor, Great Pyrenees, Akbash and the Maremma.
- There are more than 200 breeds of sheep in the world. Some popular breeds of sheep in Nova Scotia are the Suffolk, Dorset, and North Country Cheviot. Other breeds, such as Clun Forest, Scottish Blackface, Leicester, Texel, Arcott, Romonov, and Hampshire are also found in the province.

## Where are sheep produced in Nova Scotia?

Cumberland, Colchester, Hants, Yarmouth, and Pictou are the main sheep producing counties in the province. In most cases, sheep make up only part of a Nova Scotia farm's total enterprise. For example, sheep and beef operations are quite common, and sheep are often a sideline to off-farm employment.

## How many sheep do we produce?

Nova Scotia has approximately 26,500 sheep and lambs. The value of the sheep industry to the provincial farm economy is about \$2.5 million. Sheep in Nova Scotia are raised for meat production, with wool as a minor source of income. The demand for lamb in the province is currently not met by local production, and so there may be opportunity for growth in the local industry.



## How are sheep produced?

In the summer, sheep usually graze on pasture, and in winter they are fed hay. Besides grass and hay, ewes need a supplement of barley, protein concentrate, and minerals. They need to be well fed before and during breeding to ensure a good conception rate and a high incidence of twins.

Sheep are seasonal breeders, which means they will mate only during one part of the year.

Generally, rams are turned out with the ewes for breeding in the late summer or early fall. Most breeds of sheep mate only once a year, but some can be bred to lamb three times in two years, allowing farmers to supply fresh lamb to the consumer all year round.

The gestation period for sheep is approximately 147 days. Sheep usually have from one to three lambs at birth. Twins are common and preferred by farmers because they increase the financial return. A ewe has two teats on her udder with which to feed the lambs. A newborn lamb may weigh 3.5 to 5.4 kg at birth. In approximately five months, it will weigh 40-50 kg and will be ready for market. Mature rams weigh around 70-150 kg, and mature ewes weigh 55-115 kg, depending on the breed.

When ewes lamb in the spring, farmers carry out several important management practices, including

- identifying the lambs with ear tags soon after birth
- docking (removing) the tails of lambs as an aid in maintaining cleanliness
- dipping the navel in a disinfectant solution to reduce the incidence of disease
- providing a Vit E/selenium injection to prevent disease associated with low selenium levels in feeds grown in Atlantic Canada.

Ram lambs are usually neutered. Wethers (neutered males) are easier to manage than ram lambs and they can be kept with the ewe lambs through the growing period.



Shepherd

## How are sheep used?

Sheep in Nova Scotia are raised mainly for meat. Nova Scotia lamb is a lean meat which is a valuable source of many nutrients, particularly of high quality protein, iron and several B vitamins. Lamb is most often sold in cuts such as lamb chops, leg of lamb or lamb roast. Mutton is the meat from a mature ewe over 12 months of age. Mutton does not have the same tenderness or taste of lamb, and is often used in seasoned meat products, such as sausages.

Once a year, all sheep must be sheared. The wool taken from one sheep is called the “fleece,” and it can weigh 2-5 kg. Although in Nova Scotia the wool is usually a by-product of meat production, wool does have some valuable characteristics. It is used for a huge variety of products, from the finest cloth for suits to heavy-duty carpeting. The characteristics of wool vary with the breeds—for example, Merino wool is prized for its softness, which is due to the fine diameter of its relatively smooth fibres. It has natural “wicking” properties, making it popular for athletic wear because it draws moisture away from the skin. Coarser wool is used for carpeting and seat covers. Because wool is fire resistant, it is commonly used for airplane seats, hotel carpets, and fire-fighters’ clothing. Wool is also used for weaving and by fibre-industry artists. There is a specialty market for different colours of natural wool, and sheep wool

can be blond, red, beige, brown, silver, black, cream, or grey. There is also a market for organic wool. Hides, too, are used to make coats, boots, mittens, and slippers, and may be used as throw rugs and chair covers.

Other by-products include soap, candles, and lanolin for hand cream.



Wool products – yarn and felted soap

### What happens after sheep leave the farm?

Most of the lamb meat produced in Nova Scotia is marketed fresh. Licensed and inspected abattoirs are located throughout the province.

Wool fleece is folded and packed into wool sacks for shipment to a woollen mill. MacAusland's Mill in Prince Edward Island and Briggs & Little Mill in New Brunswick handle most of the wool produced in Nova Scotia. Some sheep producers work together to store and send wool by tractor-trailer load to Ontario for processing.

### What challenges do sheep producers face?

Coyotes have been a major problem for sheep farmers in Nova Scotia in recent years. Coyotes kill lambs and weak ewes, and the stress of being bothered by coyotes can cause reduced ewe ovulation, which decreases the lambing rate and in some cases causes spontaneous abortion in pregnant ewes. This decrease in lamb crop reduces the financial return for the farmer. Sheep producers use various means to reduce losses from predation, including electric fencing, guardian dogs, donkeys, and electronic sounding devices. Often, too, flocks are brought into a barn at night. While good quality electric fencing is reported to provide the greatest protection, it is also the most expensive option.



Sheep resting in barn

Sheep producers continue to improve their breeding flocks by making use of up-to-date technical information in their operations. This information has to do with such things as genetic and management programs, artificial insemination, and improved feeding programs.

There is a great opportunity to expand production and replace imported meat with local products. The sheep industry has to continue to develop ways of lowering production costs and becoming more efficient. To increase retail sales and consumer demand, the industry also needs to educate consumers about the use of lamb.

## Who is involved in producing sheep?

- Sheep farmers
- Processors and meat cutters
- Shearers
- Weavers
- Spinners
- Meat inspectors
- Retailers
- Veterinarians
- Animal nutritionists

### FOR MORE INFORMATION:

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#### **Purebred Sheep Breeders Association of Nova Scotia**

c/o Rosemary Wort

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#### **Sheep Producers Association of Nova Scotia**

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# Turkeys

Modern commercial turkeys are large, domesticated birds descended from wild turkeys native to North America. Most turkeys raised for meat have white plumage. Turkey farms are relatively small but important sector of Nova Scotia agriculture.

## DID YOU KNOW?

- Male turkeys are called toms; females, hens; and the young, poults.
- In many Canadian households, the purchase of whole turkey occurs during traditional holidays. In 2011, 32% of all whole turkey sales in Canada were at Thanksgiving and 46% were at Christmas.



Mature turkeys – hen (left) and tom (right)

- A snood is a distinctive fleshy growth that hangs down over the beak of a turkey. Both toms and hens have the growth, but the snood of toms is larger than that of hens.
- A wattle is a fleshy part on the throat of the turkey. It is used in warm environments to dispel excess body heat.

## Where are turkeys produced in Nova Scotia?

Kings County has the most turkey producers, followed by Annapolis, Lunenburg, and Antigonish counties.

## How many turkeys do we produce?

Turkey Farmers of Canada (TFC), established in 1973, is charged with administering the orderly marketing system for turkey nationally. Its primary purpose is to provide price and supply stability by gearing production towards market needs. In addition to market analysis, the agency is actively involved in areas such as research, marketing, food safety, policy development, trade, and regulatory analysis. Turkey Farmers of Nova Scotia is responsible for issuing licences for both conventional and free-range flocks.

Nova Scotia has about 20 registered turkey farms holding production quota. In 2010, Nova Scotia farmers produced 3,014,000 kg of turkey. This represents about 70% of the peak production levels for the province seen in 2008. In that year, an oversupply of turkey in Canada led to a decrease in price. Some turkey producers in Nova Scotia now lease their quota to producers outside of the province.

## How are turkeys produced?

Turkey Farmers of Canada's Flock Care Program (FCP) is a national program that provides measures to ensure proper handling and care of turkeys. It contains guidelines on humane care and treatment of the birds, based mainly on the Canadian Recommended Code of Practice for the Safe Care and Handling of Farm Animals. The Codes of Practice are nationally developed guidelines for the care and handling of many different species of farm animals.



Turkey flock

Commercial breeders use artificial insemination (AI) for reproduction of domestic turkeys. After insemination, turkey hens begin to produce fertilized eggs. The eggs are incubated for 26 days and then moved to a hatching unit for 2 days. The optimal temperature for hatchability is around 37°C, with a relative humidity of 75% to 80%.

Once hatched, day-old poults are shipped to farms in temperature-controlled trucks. Most turkeys are grown in large, modern poultry barns that are heated and ventilated to provide the proper temperature, humidity, and air circulation. Raising turkeys indoors where they roam freely on a litter of wood shavings can protect them from predators and help prevent illness.

The brooding stage of the growth cycle lasts from day-old to about five weeks of age. During this time poults require a barn temperature which starts at 35°C and is gradually reduced to 21°C. Next is the growth stage which lasts from 6 weeks to market age, which varies depending on the sex of the birds and the desired market size.

At a day old, poults weigh about 65g. Depending on the breed, most hens reach market weight of 5.9 to 8.7 kg in about 11 to 15 weeks. The toms require 18 to 24 weeks to reach their market weight of 15.7 to 21.3 kg. Some turkeys are sold as broilers, which are marketed at a smaller size of about 5.5 kg.

Turkeys require about 2.3 kg of feed per kilogram of weight gain. The diet consists of mixed grains and oilseeds, which typically include corn, soya, wheat, barley, and canola. It should be noted that turkeys are not fed hormones or steroids and are fed non-medicated feed before going to market.

Turkey Farmers of Canada's On-Farm Food Safety Program (OFFSP) is a national program that details specific steps to reduce and control potential food-safety hazards on-farm. The program incorporates biosecurity procedures and requires detailed on-farm record-keeping and documentation, all aimed at producing safe, high quality turkey.

## What happens after turkeys leave the farm?

When turkeys are ready for market they are trucked to a primary processing plant. Once processed, they are packaged or sent to be further processed into turkey products. Food inspectors check each bird that moves through the processing plant to ensure it is safe for human consumption. The turkey products are then sent to retail outlets, institutions, hotels, and restaurants.

## How are turkeys used?

Traditionally, turkey was consumed largely as a seasonal favourite at Easter, Thanksgiving, and Christmas. Today, people enjoy the whole turkey not only on these occasions, but year-round for everyday meals. Turkey is now offered in further processed products such as fresh-cut segments and ground meat, as well as conveniently packaged frozen products. These further processed products have resulted in a more even distribution of demand for turkey throughout the year. As well, health conscious consumers value turkey meat for its high quality protein that is low in cholesterol and fat.

## What challenges do turkey producers face?

Keeping a healthy and disease-free environment for turkeys is a challenge. Due to better breeding and a higher degree of nutrition, turkeys grow much faster than they did in the past, and thus good management on farms is critical to the production of safe, high quality turkey.

## Who is involved in producing turkeys?

- Turkey breeders
- Hatcheries
- Turkey producers
- Equipment suppliers
- Feed company nutritionists
- Field workers
- Transport companies
- Processing companies
- Retail grocers
- Hotels and restaurants
- Pharmaceutical companies
- Provincial animal health veterinarians
- Federal government inspectors

### FOR MORE INFORMATION:

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**Turkey Farmers of Canada**

Website: [www.turkeyfarmersofcanada.ca](http://www.turkeyfarmersofcanada.ca)



Free range turkeys

# Vegetable Crops

Vegetable production in Nova Scotia is highly varied, with over 50 types of vegetables grown here. In an economic sense, production is dominated by a few vegetables. In 2010, carrots had a farm value of over \$6 million; potatoes had a value of \$4.9 million; and onions had a value of almost \$3 million. Commercial vegetable production is highest in the Annapolis Valley, but market gardeners produce vegetables in all parts of the province.

Carrots showed a strong increase in value (almost 36%) in 2010 over the previous 10-year average, while potatoes declined significantly. In fact, the 2010 value of potatoes in Nova Scotia was about half of that seen between 2000 and 2004. Radishes and leeks saw the biggest increase in value over the previous ten-year average, remarkably over 3,500% and 1,000%, respectively. Broccoli is also a significant crop in Nova Scotia, with about 231 hectares grown in 2010.

## The ABC's of Nova Scotia Vegetables

### ASPARAGUS

The young shoots or stems of the asparagus plant are eaten. Usually the shoots are green; however, some Nova Scotia farmers grow white asparagus. Asparagus is one of the season's earliest vegetables. After harvest, the remaining shoots grow into tall, fern-like plants. It takes 3 years before asparagus can be harvested, but established fields are productive for 15 years. Most of Nova Scotia's asparagus is grown in Kings County.



Asparagus

### Harvested area of asparagus in Nova Scotia in 2010 —8 hectares

### BEANS

Beans can be green, yellow, or purple, and they can be round or flat. Beans are used for fresh eating but are also canned or frozen. Some types of beans, such as Jacob's Cattle Beans, soldier beans, and yellow-eye beans, are processed and sold as dried beans. They are machine harvested in September and October, either by direct combine harvesting of standing plants, or by indirect combine harvesting, during which the plants are first pulled and windrowed, and then gathered by a combine that removes the beans and leaves the stalks behind. The beans are dried to 15% moisture in storage. They are cleaned and sorted mechanically, with a final hand inspection. The dried beans are packaged and then marketed, mostly by retail in the Maritime provinces.



Dried bean pod

### Harvested area of beans in Nova Scotia in 2010 —136 hectares

## BEETS

Beets come in a variety of shapes, sizes, and colours. They can be cylindrical or round, dark red or even yellow. In Nova Scotia, the round red varieties are most common. The roots of beets are usually eaten cooked or pickled. Beets are also grown for their leaves, which are used as greens in salads and cooking.

Beets are pulled from the ground by the stems of their leafy tops and then washed, sized, and cooled of field heat. Beet roots are then bagged and sold through farm markets and local retail outlets. The varieties grown for bunch beets have taller tops. They are pulled by hand, 4 or 5 of them are bound with an elastic band and then rinsed in water to clean them off.

**Harvested area of beets in Nova Scotia in 2010  
—18 hectares**

## BROCCOLI

Most of the broccoli grown in Nova Scotia is green, but there are purple varieties as well. The parts of the broccoli plant that are eaten are the flower buds and upper stalks. Broccoli can be eaten fresh or cooked, and it can be frozen. Most of the broccoli in Nova Scotia is grown in the Annapolis Valley. Farmers usually start the seeds in greenhouses and transplant the seedlings when the weather is suitable. Broccoli is harvested by hand and delivered to a facility where it is sorted, graded, bunched, and iced. It is stored in appropriate facilities before being distributed to retail facilities across the Maritimes.



Broccoli

**Harvested area of broccoli in Nova Scotia in 2010  
—231 hectares**

## CABBAGE

Cabbage is a member of the plant family that includes broccoli, mustard, cauliflower, Brussels sprouts, kale, kohlrabi and bok choy. Cabbages can be green or red (purple), and vary in head size from 15 to 30 cm in diameter. Green and red cabbages have smooth leaves, while savoy cabbage has wrinkled leaves. Cabbage can be direct seeded or started in the field from transplants. After it is harvested, cabbage is sold fresh or processed into coleslaw or sauerkraut. In temperature and humidity controlled conditions, fresh cabbage can be stored for 4 to 6 months. The humble cabbage is an excellent source of vitamin C and vitamin K and recent studies have linked consumption of cabbage with prevention of some types of cancer.

**Harvested area of cabbage in Nova Scotia in 2010  
—99 hectares**

## CARROTS

In Nova Scotia, the largest acreage used for vegetable crops is given to carrots. Although typically single, tapering, cylindrical roots, carrots come in many sizes and shapes: long or short, thick or thin, large or very small. Though usually orange, carrots can also be white, yellow, red, or purple. Most carrots are produced in the Annapolis Valley and Colchester and Cumberland counties, but they can be grown across the province. Fields are seeded with precision seeders from late April till the first of June, and it takes 65 to 100 days for carrots to mature.



Carrot field



Carrots are mostly mechanically harvested, by machines that pull the plants up by their tops. The tops are cut off and the carrots are dropped onto a conveyor belt that carries them to a truck. After cleaning, sorting, and cooling, carrots are used for the fresh market or are sliced and diced for the frozen food industry. Carrots trimmed to “baby cut” size are popular for fresh eating.

Bunched carrots can also be purchased with the tops on. These carrots are typically hand harvested at a younger stage, cleaned in water, and then wrapped in bunches.



Carrot bunch

**Harvested area of carrots in Nova Scotia in 2010**  
—1028 hectares

### CAULIFLOWER

Traditionally, cauliflower is a creamy white, but new varieties are chartreuse (a yellowish green), purple, and orange, and have added health benefits. The cauliflower head (actually a cluster consisting of thousands of buds) is eaten fresh, cooked, or pickled. Nova Scotia mainly produces the white cauliflower, the heads of which are kept white by preventing their exposure to sunshine. Varieties have been developed with large leaves that help keep the sun off the cauliflower heads. Cauliflower is packed in boxes and precooled before being sold. Most Nova Scotia grown cauliflower is sold in the Maritimes.

**Harvested area of cauliflower in Nova Scotia in 2010**  
—67 hectares

### SWEET CORN

Each kernel of fresh sweet corn is a soft, yellow seed. To grow a crop of sweet corn, seeds are planted after the last of the frost. Pollen is produced in the tassels (male flowers) at the top of the tall, leafy, reedlike plant, while the cobs (female flowers) develop on the side of the stalk. Sweet corn can be eaten as corn on the cob, but the kernels can also be cut off and frozen, canned, or creamed. Sweet corn is all sold on the fresh market, since there is no processing facility in Nova Scotia.

**Harvested area of sweet corn in Nova Scotia in 2010**  
—190 hectares

### CUCUMBERS

Long cylinders tapering at each end, cucumbers are traditionally green-skinned, but there are also new varieties with yellow skin. Although usually thought of as a vegetable, they are a crispy, juicy fruit, with a white or greenish-white interior. Used for fresh eating, field cucumbers are the main crop produced here, but pickling cucumbers, which are smaller, are also grown for market. Cucumber plants are very sensitive to frost. English cucumbers, longer, thinner, and softer skinned than field cucumbers, are more sensitive to growing conditions and are generally grown in greenhouses in Nova Scotia.



Field cucumbers

**Harvested area of cucumber in Nova Scotia in 2010**  
—24 hectares

## LETTUCE

Christopher Columbus introduced lettuce to the Americas. There are two main types, head lettuce and leaf lettuce. Some types of head lettuce include iceberg, butterhead, and romaine, and leaf lettuce comes in a variety of shapes and colours. Young or immature leaves of lettuce and other plants are grown for specialty salad mixes. Lettuce can be grown outdoors or in greenhouses, and field lettuce is harvested 40 to 70 days after planting. Lettuce leaves are used in salads, sandwiches, and as garnishes. Kings County produces most of the lettuce in Nova Scotia.



Romaine lettuce

**Harvested area of lettuce in Nova Scotia in 2010  
—97 hectares**

## ONIONS

Onions are edible bulbs that come in different shapes and sizes and have different tastes. Onion skin colours can be yellow, white, or red. They can be eaten fresh or added to salads, soup, stews, stir-fries, and sauces. Onions can also be pickled.

They can be direct seeded, grown from sets (tiny bulbs grown by sowing thickly the previous year), or started as transplants. Most Nova Scotia onions are yellow cooking onions. At harvest time, the tops are mowed off and the bulbs are lifted and set on the ground. Within 24 hours they are moved to indoor storage, where they are dried and stored. They are cleaned, graded, sized, and packed for market as needed. Onions are kept in temperature and humidity controlled storage.



Onions

In season, Nova Scotia produces some green onions and scallions. We also have a small acreage of garlic and leeks—whose value in recent years has expanded growth dramatically.

**Harvested area of onions in Nova Scotia in 2010  
—251 hectares**

## PARSNIPS

Parsnips are carrot-shaped roots, and have a strong, sweet flavour. They are a good winter vegetable, frequently used in soups and stews. Parsnips are harvested in the fall, and late-harvested specimens are usually sweeter. They are stored without washing to maintain whiteness, and are washed for market as needed. Parsnips are also hand-trimmed before bagging.

**Harvested area of parsnips in Nova Scotia in 2010  
—unknown**

## PEPPERS

The peppers grown in Nova Scotia do not produce the pepper used in the peppershaker or mill. Rather they are the green, red, purple, white, orange, or yellow coloured fleshy fruit that can be either sweet or spicy (“hot”). Sweet peppers are eaten fresh, often in salads, or cooked, and are considered an excellent source of vitamin C, especially red peppers

which have over 3 times the vitamin C content of oranges by weight. Hot peppers are usually smaller in size, and can be used fresh or dried and cooked with meats and vegetables to give food a spicy flavour. Almost all types of peppers are grown in Nova Scotia. Because they need warm temperatures to thrive, peppers are usually started indoors and transplanted to fields when the danger of frost is past. They are hand-harvested and sold fresh.



Field peppers

**Harvested area of peppers in Nova Scotia in 2010  
—4 hectares**

### POTATOES

The potato is an edible tuber, which is the thick, rounded part of an underground stem consisting of approximately 80% water. Potatoes have white, brown, purple, or red skins and white, golden, or even purple or blue flesh. Potatoes are widely grown in Nova Scotia, with Kings County having the largest production. Some table stock varieties grown in Nova Scotia include Superior, Yukon Gold, and Red Chieftan. The potato tuber has external buds, or “eyes,” that can sprout into new plants. These eyes, rather than seeds, are planted to grow a new crop. They are planted in windrows, or small mounds, that prevent the potatoes from being exposed to light. Light can turn the tubers green, an indication of toxicity in the potato skin. The berries formed on potato plants after blooming are indeed toxic.



Potato field

Nova Scotia potatoes are harvested either early as table stock for the fresh market, or later for processing into potato chips. Potatoes are high in nutrients, but their nutritive value is reduced the more the potato is processed. For instance, French fries have about one-half as much vitamin C as boiled or mashed potatoes.



Potatoes

**Harvested area of potatoes in Nova Scotia in 2010  
—809 hectares**

### RUTABAGAS AND TURNIPS

Rutabagas, sometimes called turnips, are enlarged roots with a sweet, yellowish flesh. Rutabagas are planted in June and July, and pulled by machine or hand in the fall. The tops are removed and the roots are stored. Rutabagas are washed, hand trimmed, and sold as needed. Rutabagas are eaten as a cooked vegetable, and are often added to soups and stews, but they are also extremely good fresh, cut up for a vegetable tray.

Summer turnips (White Globes) are grown for the fresh market and eaten raw. They are smaller than rutabagas, and their flesh is white, sharper tasting, and more watery.

**Harvested area of turnips in Nova Scotia in 2010  
—77 hectares**

**SPINACH**

The crisp leaves of spinach are eaten fresh in salads and on sandwiches, or cooked. Spinach is seeded throughout the growing season for a consistent supply. It can be grown in tunnels (metal frames covered with plastic) or greenhouses over winter. The trend is towards “baby” spinach varieties, which have smaller, more tender leaves.

**Harvested area of spinach in Nova Scotia in 2010  
—12 hectares**

**SQUASH AND PUMPKINS**

There are two main types of squash grown in Nova Scotia: summer squash and winter squash. A summer squash, such as zucchini, is white fleshed, matures quickly, and does not store well. It is picked and marketed right away. The yellow or orange-fleshed winter squash, such as the acorn or butternut types, will last for many months under proper storage conditions. Howard Dill’s Giant Pumpkins and Squash were developed in Nova Scotia. Pumpkins grown in Nova Scotia are mostly sold for Hallowe’en.

**Harvested area of squash in Nova Scotia in 2010  
—116 hectares**

**TOMATOES**

Tomatoes are actually a fruit. They vary considerably in size, from the cherry tomato’s 1 to 2.5 cm diameter to the “beefsteak” type’s 12 to 15 cm. Most tomatoes are red, but they can be yellow, pink, orange, or even black, and many are sold green, before ripening. Tomatoes are very frost sensitive, and are transplanted from greenhouses only when danger of frost has passed. Mainly because of our climate, there is a significant greenhouse tomato industry in Canada. Tomatoes are a versatile food, eaten fresh or cooked, used in

sauces, casseroles, and soups, and they will ripen after being picked, especially if exposed to sunshine. All Nova Scotia field tomatoes are sold for the fresh market. There is an increasing interest in heritage varieties, grown partly for historical interest and also for their open-pollination characteristic, which allows seed saving from year to year.



Greenhouse tomatoes

**Harvested area of tomatoes in Nova Scotia in 2010  
—12 hectares**

**Other Vegetables**

Other vegetables grown in Nova Scotia include brussels sprouts, chard, Chinese vegetables, eggplant, endive, garlic, herbs, kale, kohlrabi, peas, radishes, and shallots.

**FOR MORE INFORMATION:**

**Horticulture Nova Scotia**

Blair House, Agricultural Centre  
32 Main Street  
Kentville NS B4N 1J5  
Tel: 902-678-9335  
Email: [hortns@ns.sympatico.ca](mailto:hortns@ns.sympatico.ca)  
Website: [www.hortns.com](http://www.hortns.com)

# Environmental Stewardship on Nova Scotia Farms

Environmental stewardship is an approach to food and fibre production that attempts to combine environmental, economic, and social systems in order to protect our natural resources, our quality of life, and our communities for current and future generations. This concept acknowledges that agriculture is an important user and sharer of our environment, but recognizes that ideally it ought not contribute to pollution or threaten the health of natural ecosystems. Hence, agriculture must promote sustainability.

The primary goals of sustainable agriculture include

- Promoting environmental stewardship, which means protecting and improving biodiversity and water, soil, and air quality; reducing dependence on non-renewable resources, such as fuel, synthetic fertilizers, and pesticides; minimizing adverse effects upon safety, wildlife, and all environmental resources
- Meeting human needs for food and fibre
- Using natural biological cycles and controls to reduce the reliance on synthetically produced materials
- Providing a more profitable farm income
- Promoting stable, prosperous farm families and communities

The Atlantic Provinces have 6.25% of Canada's classes 1, 2, and 3 land, which is land suitable for and capable of growing crops to meet human needs. Nova Scotia is known for its extensive dykelands and its 6,700 lakes, 100 rivers, rocky landscape, abundant groundwater, and 7400 km of shoreline

and adjoining coastal regions. Many Nova Scotia farms have woodlands and are close to populated areas. The relative scarcity of good farmland increases pressure on the environment, but a healthy environment is a basic necessity. Sustainable agricultural practices are therefore obvious requirements, if we are to continue to feed ourselves and protect the environment now and in the future.

The Environmental Farm Plan (EFP), which is delivered by the Nova Scotia Federation of Agriculture and funded by Agriculture and Agri-Food Canada, promotes environmental stewardship on farms by educating farmers about management practices that reduce their impact on the environment. The EFP is a voluntary program that helps farmers identify and assess environmental risks on their property. The program allows farmers to incorporate environmental considerations into their everyday business decisions, rather than addressing environmental issues in a reactive way. Each individual plan is confidential and its design is determined by the farmer and an EFP Program Coordinator.



Water quality testing

The management practices discussed in the following pages are:

- Soil Management
- Integrated Pest Management
- Riparian Zones and Buffer Strips
- Zero Tillage
- Nutrient Management
- Waste Management
- Organic Farming

Other beneficial management practices include

- Agro-forestry
- Permaculture
- Crop rotations
- Water quantity and quality management methods, such as irrigation management, improved infiltration, and reduced evapotranspiration

# Soil Management

Soil forms the basis of agriculture. The thin soil layer on the earth's surface provides the physical and chemical requirements for the plants that farmers grow. Good agricultural soil is a limited resource on earth, with only about 3% of the earth's surface suitable for farming.

## DID YOU KNOW?

- Soils are a complex integration of mineral material, organic matter, water, air and living organisms.
- Soils differ from region to region and can differ from field to field, or even within a field.
- Most of Nova Scotia's soils are naturally acidic, low in organic matter, and relatively infertile, but good management can improve soils and even make some of them very productive.

Soil is a dynamic mixture of rock, minerals, chemicals, air, water, organic matter, and living organisms. The location of a farm determines some of these components, but good management of soil can improve others and optimize productivity on a farm.



## Where is the agricultural soil in Nova Scotia?

Not all soil is suitable for agriculture. The Canada Land Inventory classification system classifies soils into 7 levels of capability, with class 1 being the best and class 7 the worst. According to the system, Nova Scotia has soils ranging from classes 2 to 7. Soils qualifying for classes 2–4 are considered suitable for cultivated field crops, and those of classes 5 and 6 are considered suitable for some perennial crops, while class 7 soil is considered unsuitable for agriculture. Detailed soil maps have been developed for Nova Scotia so as to delineate the whereabouts of the many different soil types. For example, “Gibraltar” and “Rough Mountain” soil types make up large parts of the province and are both class 7 soil, considered unsuitable for agriculture. The Soils Map of Nova Scotia ([www.sis.agr.gc.ca/cansis/publications/surveys/ns/nss/index.html](http://www.sis.agr.gc.ca/cansis/publications/surveys/ns/nss/index.html)) shows where the agricultural and the other soil types are in the province.

## How much soil do we have?

Of the total land base of the province, slightly less than 30% (1.5 million hectares) is potentially arable land (class 4 or better). Some of this arable land has been developed for other purposes and cannot be converted back to agriculture. About 230,000 hectares of land is currently being farmed, representing about 15% of the potentially arable land. This means that there are over 1 million hectares (just over 20% of the land base in the province) with potential for agricultural development.

Soil is used for agriculture across all of Nova Scotia. However, Cumberland county has the largest area used for farming (area that includes crop and pasture land, summer fallow, natural land for pasture, woodlands, wetlands, and Christmas tree farms), while Richmond county has the least.

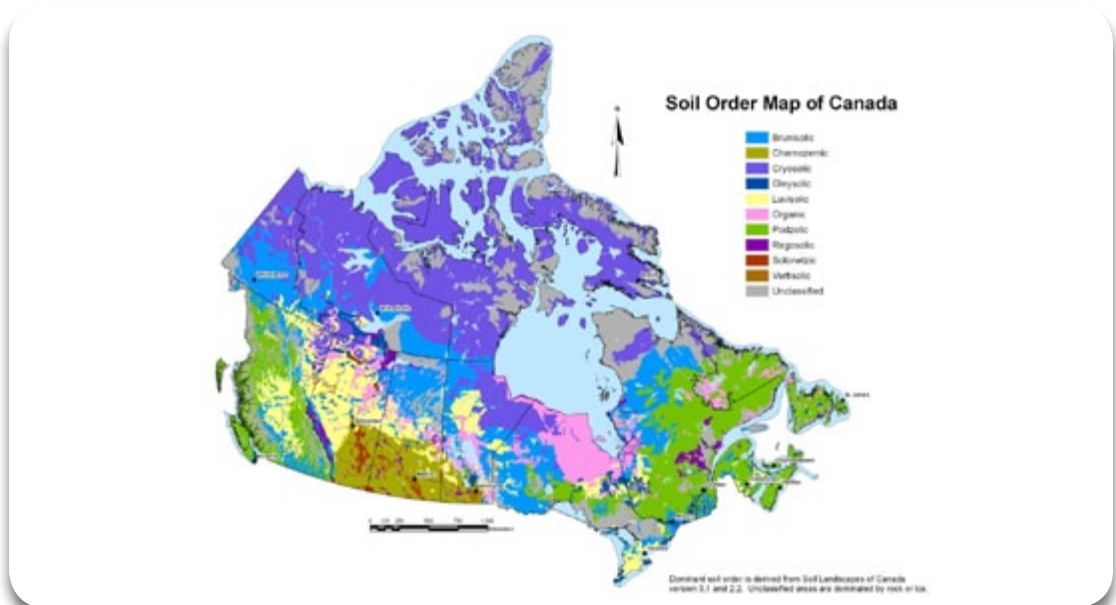
### How is soil produced?

It might seem funny to think of soil being produced, but no soil existed as soil from the beginning of time. Soil starts out as what's called parent material, which is really just rock and sediments. Over time climate conditions (physical and chemical processes) begin to change the parent material. As this material changes, microscopic and then larger forms of life begin to inhabit the soil, eventually developing it into such soils as we have today in Nova Scotia. Even where soil is located influences how it is produced. For example, the soil on top of a hill will be very different from the soil located at the bottom of the hill. Soils will often form in layers called horizons. The horizon closest to the surface is usually the most developed and is known as the A (topsoil) horizon, which is usually followed by a B (subsoil) or even a C (parent rock) horizon. The C horizon is the least developed and most closely resembles the parent material.

The Canadian system of soil classification identifies ten orders of soil type, each based on the conditions of the soil-forming process. Most soils in Nova Scotia are classed as podzolic, according to this system of soil classification. In the Soil Order Map of Canada, you can see that this type of soil is present in most of eastern Canada, as well as on the west coast. These soils are distinguished by high acidity in the A horizon, resulting in the formation of a leached layer and in deposits of iron and aluminum in the B horizon. Many agricultural soils have been tilled, so that these layers no longer remain distinct.

### How is soil used?

In agriculture soil is used to grow plants that are consumed by people or by animals. Soil must be prepared before planting. There are many ways to prepare soil and many different materials, or soil amendments, used to improve it. One of the most common amendments used in Nova Scotia is limestone. Lime is necessary to adjust the pH of our naturally acidic soils. Most agricultural crops prefer a soil pH that is approaching neutral (6.5). In addition, soil fertility can be adjusted, depending on the crop requirements and the natural fertility level in the soil. Crop fertility requirements have been established through many years of research, and soil fertility levels are determined by soil testing.



Soil Order Map of Canada – Canadian system of soil classification. Available at [www.soilsofcanada.ca/](http://www.soilsofcanada.ca/)





Probe used to sample soil.jpg

Some of the more common ways to increase fertility in soil include using manure, incorporating nitrogen-fixing plants and composts, and adding synthetic and organic commercial fertilizers.

The physical state of soil can be improved through tillage practices as well as addition of organic matter. It is important not to overwork soil through too much tillage or by driving over a field when the soil is too wet. These practices can cause compaction, which impairs plant growth. Earthworms play a major role in improving soil fertility and soil structure. The multitude of channels that they create result in better aeration and drainage in the soil.



Earthworms working the soil.jpg

## What happens to the soil after a crop is grown?

Some crops are perennial, so that at the end of the season, after the last harvest, there are still living plants in and covering the soil. This plant cover protects the soil by helping to hold it together, making it is less likely to be lost to erosion. Perennial plants also continue to take up nutrients after harvest, and so nutrients are less likely to be lost to the environment than if the soil had been left bare. In annual cropping systems, unless a cover crop is planted the soil is sometimes left uncovered. Because we have a short growing season, leaving the soil bare is sometimes necessary. But doing so is not ideal, as it leaves the soil exposed and puts it at risk of erosion. Crop residue, the portion of the plant that is not harvested but left on the field, can also help cover and protect the soil, and many farmers leave crop residue in the field for that reason. Soils remain very active after the crop has been harvested. Communities of microorganisms continue to live in the soil, and some help to break down crop residue left in the field. Although the winter and cold temperatures slow the activity of these communities, there is evidence that the toughest of microorganisms still work at their jobs even during the winter.

## What challenges do farmers face with their soils?

Farmers face many challenges with soils in Nova Scotia. These include adverse climate conditions, poor soil structure or permeability, erosion, low fertility, overflow, moisture deficiencies due to soil characteristics, salinity, stoniness, shallowness of soil, adverse topography, and excess water, to name just a few. Farmers have adopted management techniques to address these challenges, but they often find themselves at odds with nature, which in Nova Scotia can be extremely difficult to manage.

### FOR MORE INFORMATION:

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#### **Agriculture and Agri-Food Canada**

Soil Survey reports for Nova Scotia

Website: [www.sis.agr.gc.ca/cansis/publications/surveys/ns/index.html](http://www.sis.agr.gc.ca/cansis/publications/surveys/ns/index.html)

#### **Nova Scotia Soil and Crop Association**

Website: [www.scians.org/](http://www.scians.org/)

#### **Virtual Soil Science Learning Resources**

Website: [www.soilweb.landfood.ubc.ca/promo/](http://www.soilweb.landfood.ubc.ca/promo/)

#### **Perennia**

1-866-606-4636

Email: [info@perennia.ca](mailto:info@perennia.ca)

# Integrated Pest Management (IPM)

Integrated Pest Management involves controlling pest populations within a certain crop by using various management practices. These include cultural methods (crop rotation of potatoes and grains, for example), physical methods (tillage or hand weeding), biological methods (using, for example, predatory insects in greenhouses), and chemical methods (using pesticides as a last resort and only when pest populations reach a certain level).

The reason IPM is used on farms is to reduce environmental risks, health risks, and financial risks to the farmer. This is accomplished by reducing the amount of pesticides used and by better timing of the application of pesticides so that they are more effective on the target pest.

In the past, pesticides were treated as an insurance policy. They were applied to reduce or eliminate a pest problem or the likelihood of one. Over the years this practice has changed. One reason for this is that pesticide prices have gone up, making the practice more expensive. But more products were applied than were needed, and they were often applied more frequently than required. Repeated use of the same products, too, allowed certain pests to adjust and become resistant to or tolerant of some of them. It also allowed other pests that are naturally tolerant to a certain pesticide to come in and fill a void. In addition to these reasons, farmers have become more conscious of the potential effects of pesticides on the environment and want to minimize potential risks.

Monitoring for pests and using pest thresholds in order to trigger pest control measures are important aspects of IPM. These methods are used in combination; how they are used can change from year to year, crop to crop, and field to field.

## SOME IPM TERMS

**Pest**—any organism that can cause a crop reduction or reduction in quality of the crop being grown. Pests can be insects, plant diseases, weeds, or animals.

**Scouting**—visiting fields on a regular basis to determine what the pest levels (per square metre) actually are.

**Action threshold**—the pest level or density in a field that requires a treatment in order to prevent an economic loss.

**Economic threshold**—the pest level or density that will cause a crop loss that is financially greater than the cost of controlling the pest.

## How extensively is IPM used in Nova Scotia?

IPM practices are used at some level on more than 90% of the farms in Nova Scotia. Some crops have more developed programs than others. Most farmers try to rotate annual crops to break pest cycles. They also plant at different times to try to avoid the pest when the crop is at its most vulnerable stage.

Tree fruits have a fully developed Integrated Fruit Production (IFP) program that gives producers a protocol to follow. It includes all aspects of tree

fruit production that minimize pest levels. It entails an intensive scouting program for the major pests, with associated thresholds. It includes all accepted pesticides that fit within the protocol and directions on how to apply them. Other products are registered for use but are not accepted under an IFP program because they are too toxic to beneficial insects in the orchard.



Apple orchard IPM

Several crops like wild blueberry have established thresholds and monitoring techniques for various pests, but not a fully established IPM protocol.

Some other crops follow IPM principles but do not have fully developed IPM protocols.

## What are the challenges in using IPM?

Generally, most crops do not have enough registered pesticides. For example, if there is only one pesticide to control a certain pest, the producer cannot rotate the use of that product with another, which would help prevent resistance development in the pest.

Some of the limited products registered are not “reduced risk.” Reduced risk products have a narrower spectrum of control, break down quicker, or are less toxic to non-target organisms.

Often reduced risk products are more expensive than other products, presenting a challenge to their widespread use, as they can reduce already small profit margins.

Thresholds for certain pests and many crops are not well established, making it difficult for producers to determine exactly when they should apply a product.

Overcoming fear. Farmers’ livelihoods are dependent upon getting crops off the field without significant yield loss due to pests. Applying pesticides as an insurance policy can help remove some of the stress, even though the application may not be required.

Most cultural, physical, and biological control methods do not totally control large pest infestations. For this reason, producers need to develop a pro-active approach to pest management, rather than deal with pest problems as they arise.

## How does IPM contribute to environmental stewardship on farms in Nova Scotia?

Proper use of IPM techniques will reduce pesticide amounts used. Other means than pesticides can keep pest populations low so that pesticides may not be needed at all. Also, an IPM program allows for the correct timing of pesticide application so that it reaches the target pest more effectively.



Crop scouting

IPM programs discourage the development of pesticide resistance in pests. Pesticide resistant pests can be extremely difficult to control and in some cases can make fields not usable for certain crops.

IPM programs use pesticides as a last resort. Focus is directed to other areas of crop production that discourage pests from becoming a problem. If pesticides are needed to prevent an economic loss, then the least toxic and safest product is encouraged, as long as it is effective.

Some benefits of minimizing the use of pesticides:

- Decreased environmental risk: lowers the chances of accidental run-off of pesticides into water courses.
- Decreased danger to farmers, who are at the greatest risk of the harmful effects of pesticides. Applying products less often and using newer “reduced risk” products will help.
- Decreased economic risk to the farmer. Over the long term, a fully utilized IPM system will use smaller amounts of pesticide than a pest management system that uses only pesticides. The IPM system will be more balanced and will not result in as many explosions in pest populations, thus decreasing the potential for total crop losses.
- An increase in consumer confidence in the crop.

# Riparian Zones and Buffer Strips

Nova Scotia farmers can protect watercourses on their farms with areas of natural vegetation. Riparian zones and buffer strips protect water from run-off and also encourage biodiversity on farms.

## What are riparian zones and buffer strips?

Riparian zones are the lands adjacent to streams, rivers, lakes, ponds, and wetlands. These areas are frequently flooded transitional lands, with no definite boundaries between the body of water and drier upland areas. Included in a riparian zone are stream banks, a floodplain, and plant and animal communities. A well vegetated riparian zone keeps the water temperature cool during hot weather and stabilizes stream banks, thereby protecting the habitat of many aquatic communities. They also provide an area where contaminants can be filtered from runoff water before reaching a watercourse.

Buffer strips are grassed areas that separate field boundaries from watercourses. They provide an area where runoff can collect and allow soil particles to settle before the water enters the riparian zone or watercourse.



Riparian zone on banks of stream

## How extensively are riparian zones managed and buffer strips used in Nova Scotia agriculture?

Many cultural practices, such as providing livestock access to streams for a water source and allowing livestock to cross through streams, have been widely used in Nova Scotia. However, due to the effect on riparian zones, such as erosion of banks and removal of vegetation, many producers are fencing livestock from streams and riparian zones. In many cases alternative water sources are provided and crossings are constructed so that the watercourse is inaccessible to livestock. Thus, riparian zones are widely used in Nova Scotia as a way to protect water sources from contamination, either from sedimentation or eutrophication.

Eutrophication is the process by which a body of water undergoes increased growth of plants and algae, usually as a result of mineral and organic runoff from the land. The increased plant growth depletes oxygen levels in the water and often causes a die-off of other organisms.

Buffer strips are often used around fields that are extensively tilled and not covered with plant residue (as in potato and corn production) to 'catch' soil and nutrients that precipitation runoff can carry from the field and into a watercourse. These vegetative strips are able to utilize the nutrients through plant growth but also through soil microbial processes (e.g., denitrifying of nitrate into nitrogen gas).



Wetland protected by rushes

### What are the challenges to maintaining riparian zones and using buffer strips?

Fencing watercourses so that livestock do not have access can require significant investment.

Providing alternative water sources to livestock can be costly, time consuming, and less reliable than traditional sources.

While buffer strips and riparian zones can provide habitat for many plants and animals, some species may be perceived as pests.

In unusual cases, a significant amount of productive land may be taken out of production, thereby reducing profits for the farmer.

### How does using riparian zones and buffer strips contribute to environmental stewardship on farms in Nova Scotia?

Riparian zones and buffer strips contribute to environmental stewardship by

- Providing food and habitat for wildlife (aquatic and terrestrial)
- Improving water quality by filtering precipitation runoff from fields
- Reducing flooding impact and stream bank erosion
- Providing recreational opportunities
- Making areas more aesthetically pleasing



Solar powered watering station

# Zero Tillage

Zero tillage (also known as no-till or direct seeding) in theory means not ploughing a field, but actually is a method of ploughing or tilling a field in such a way as to disturb the soil as little as possible. The crop is planted directly into a seedbed that has not been tilled since the harvest of the previous crop.



## How extensively is zero tillage used in Nova Scotia agriculture?

Zero tillage is being used more every year in Nova Scotia as individual farmers start to recognize its benefits, especially the financial benefit. Recent periods of less-than-normal levels of precipitation in Nova Scotia have shown the importance of increasing the water-holding capacity of soil, thereby conserving its state, which is the goal of zero tillage practices.

## What are the challenges with using zero tillage?

A common perception held by farmers is that zero tilling doesn't work, that crop yields will be lower, and that crop quality will be poorer. Some people think a zero-tilled field is less aesthetically pleasing because the field is left untouched, with plant and weed residues over its surface that can

potentially lead to increased pesticide or herbicide usage and costs. However, these perceptions may be false. It takes approximately 5 years before zero tillage results in a real benefit that can be observed and demonstrated, and so many people tend to be skeptical about it. The benefits include reduced soil salinity, making soil better for plant growth, and conservation of the established soil structure. Also, soil retains its absorbency, in part because, like ploughing, zero tillage prevents soil from becoming compacted, a condition that is bad for plant growth.

## How does using zero tillage contribute to environmental stewardship on farms in Nova Scotia?

Zero tillage practices in cool climates or applied to poorly drained soils, such as those typical of Nova Scotia, do not reap as many benefits as in



dry tropical climates or with well drained soils.

Nevertheless, these are the many benefits:

- Conservation of soil moisture.
- Reduction of soil erosion by wind, because the crop residue cover isn't ploughed under.
- Reduction of farm labour (time actually spent tilling the field), thereby reducing farm expenses (including fuel consumption).
- Increased planting and harvesting timelines, because time spent tilling and preparing the field isn't required.
- Earthworms, as well as other biological organisms, are left alone to live and manipulate the soil by creating tunnels. As with tilling, this natural activity allows for good movement of water and air throughout the soil, resulting in good plant growth.
- Reduced soil compaction. Many years of tilling lead to a very hard, densely packed soil.
- Increased organic matter in the soil, which results in better soil structure and more available nutrients for plant growth. By contrast, tilling increases organic activity in such a way as to exhaust or "burn" organic matter away.
- Increasing the soil's organic matter helps to sequester carbon as carbon dioxide in the soil, reducing agricultural greenhouse gas emissions.

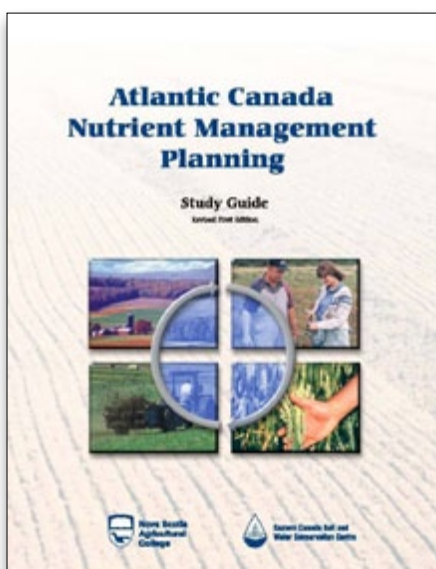
# Nutrient Management

Nutrient management is the concept of budgeting and allocating nutrient sources, such as soil, manures, fertilizers, and crop residues, to provide elements essential for the growth of plants, while avoiding damage to the environment.

These are the main goals of nutrient management:

- cost-effective production of high-quality plants
- minimization of pollution and wastefulness of resources
- efficient use and conservation of nutrient resources (and consequently the conservation of non-renewable resources)
- maintenance or enhancement of soil quality
- employment of stewardship practices and the preservation of our environment and resources for future generations

Many Canadian provinces now have legislation that establishes guidelines and limits for quantities of nutrients applied in the environment, in order that we become good environmental stewards and co-habitants.



Nutrient Management Guide

## What primary nutrients are managed?

Water (hydrogen and oxygen) and carbon are the elements required by plants in the greatest amounts. By simply watering our fields and growing our crops in soil exposed to the atmosphere, plants are able to acquire these elements. All the other nutrients fall into the macro- (required in large amounts) or micro- (required in small amounts) categories. Macro-nutrients usually pertain to crops and farming, and traditionally include nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sulfur (S), sodium (Na), and chlorine (Cl). Of this group, nitrogen is required the most by plants, with phosphorus and potassium following close behind. Thus, these are the primary nutrients that are managed.

## How extensively is nutrient management practiced in Nova Scotia agriculture?

Nutrient management is very widespread in Nova Scotia. Programs like the Environmental Farm Plan (EFP) help to enforce nutrient management planning for every farm in Nova Scotia. Nutrient management plans may soon become law for every farm, in order to promote sustainable agriculture and avoid needless environmental degradation.

## What are the challenges of nutrient management?

These are some of the common challenges of nutrient management:

- More research is needed concerning the interaction of plants and the environment.
- The returns from agricultural production are not high enough to warrant experimenting with alternative nutrient applications.
- Nitrogen recommendations can be high based on outdated research.
- Pathogens can exist in nutrient-waste sources.
- Food safety must remain a primary objective.
- Managed nutrients need to be properly allocated, in the right amount, at the right time.

However, risks can be minimized. In fact, most nutrient management risks are alleviated by following nutrient application recommendations regarding control of runoff from feeding and wintering areas, proper storage and handling of manure, and the development of a nutrient management plan.

## How does nutrient management contribute to environmental stewardship on farms in Nova Scotia?

Successful nutrient management helps to

- optimize the use of on-farm nutrients
- prevent excessive nutrient build-up
- reduce fertilizer costs
- maintain soil health
- properly utilize manure and organic by-products as plant nutrient sources, reducing waste
- minimize agricultural nonpoint source pollution (or pollution whose sources are indeterminable) of surface and groundwater resources
- maintain or improve the physical, chemical, and biological condition of our soils
- promote recycling and waste management of all resources



Manure application by injection

# Waste Management

The proper management of waste from agricultural operations involves reducing, reusing, and recycling, as well as finding appropriate disposal methods for substances so that they do not harm the environment. Waste management helps maintain a healthy environment and, by reusing some wastes, can reduce the use of manufactured products (for example, manure or compost) as nutrient sources. Agricultural waste can include but is not limited to manure, bedding and litter, wasted feed, culled plants, vegetable processing waste, runoff from farmyards, and wash water from buildings like dairy parlours.

## What are common waste management practices?

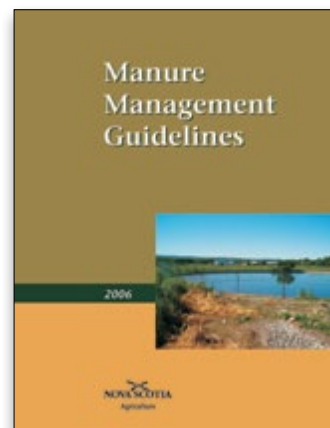
Best management practices (BMPs) are common in Nova Scotia and include such practices as storing manure and utilizing it as a nutrient source during the growing season, using artificial wetlands to treat waste water, reusing plastic to protect livestock feed, growing vegetative strips to catch farmyard run-off, and composting processing waste. Also, Nova Scotia farmers and researchers have been investigating the use of anaerobic digesters, which create biogas (an alternative fuel for energy) from manure and other farm wastes. This technology is widely used in Europe as a way to recycle waste into a valuable commodity.



Manure application

## How extensively is waste management practiced in Nova Scotia agriculture?

Waste management is quite extensive. Given the many laws governing practices, the emphasis on nutrient management planning, and the generally adopted sustainable agricultural practices, waste management has become a part of doing business. For example, a number of constructed wetlands have been put into use on farms in Nova Scotia to treat waste water and manure run-off. This is a proactive and naturalized approach to waste management; it limits the chance of water contamination and increases available space for manure storage.



Manure management guide

## What are the challenges to waste management?

Some common challenges to practicing waste management:

- public perceptions and opinions
- costs of disposing of or recycling wastes, or lack of a market for recycled wastes
- transportation of wastes to a proper disposal location
- disease, pathogens, and bacteria, which may infect or make disposing of certain wastes more troublesome
- odour and attraction of vermin
- lack of technological resources for certain management practices
- contamination of food through waste reuse or handling, or its feared contamination

## How does waste management contribute to environmental stewardship and sustainable agriculture in Nova Scotia?

Waste management contributes by:

- removing, treating, and composting wastes, making for a more aesthetically pleasing environment
- reducing pollution
- recycling nutrients for both environmental and economic benefits
- making extra nutrients available for increased plant and food production, thus reducing the need for manufactured nutrient sources
- providing guidelines about how to deal with sudden problems, such as the disposal of dead animals
- reducing water consumption, as water is recycled and less is used to treat waste
- promoting practices that reduce greenhouse gas emissions

# Organic Farming

Organic farming is intended to be good for the environment, to benefit people socially, and to provide a good living for farm families. There are standards for organic farmers to follow, and synthetic pesticides and fertilizers are not used on a certified organic farm.

On organic farms, manure and crop materials are recycled. The farms also use methods such as

- inter-cropping, in which two or more species are grown in the same field at the same time
- the rotation of crops, wherein crops like clover, forage grasses, cereals, and pulses are grown in a planned sequence in the same field
- mulching, or covering the ground with sawdust, straw, hay, fresh forage, or other materials, to prevent weed growth
- mechanical weeding, wherein the soil surface is cultivated to kill seedling weeds
- the integration of crops and livestock to help control weeds in fields and improve soil fertility



Inter-cropping

Livestock on certified organic farms are fed certified organic feeds in order to be considered organic or to have their products certified as organic.

In addition, organic livestock producers make a commitment to strict standards of livestock handling and housing which maximize the expression of natural behaviours.



Pastured pigs

## How extensively is organic farming used in Nova Scotia agriculture?

About 1-2% of the farms in Nova Scotia are organic farms. Research into organic farming practices that

are suitable for Nova Scotia is currently taking place in Atlantic Canada. For instance, research is being carried out on the use of mulch in blueberry weed control and the employment of organic production methods for apples, potatoes, cereal crops, pulses, and livestock. Such research may encourage farmers to increase the amount of organic farming carried out in Nova Scotia.



Organic fruit production

## What are the challenges to using organic farming?

A conventional farmer who wants to become an organic farmer must wait for three years to allow pesticide residues to reach low enough levels before being able to sell farm products as certified organic. During this time the farmer will be learning new methods of farming, getting lower yields, and not receiving premium organic prices. Even after organic farms are fully certified, they usually have

lower yields. Organic farmers can use fewer products to control pests and weeds, and so they have to plan ahead to keep their crops and livestock healthy. In Nova Scotia, building and maintaining soil quality and fertility is a long-term challenge that can be addressed with forages and soil amendments.

## How does using organic farming contribute to environmental stewardship on farms in Nova Scotia?

Synthetic pesticides and fertilizers are not used, thus preventing contamination of soil, air, water, and food. Organic farms require only about 50-60% of the energy (fuel and electricity) per hectare used on conventional farms. Crop rotations, composted manure, and crop wastes benefit the soil.

### FOR MORE INFORMATION:

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Organic vegetable production

# Glossary of Agricultural Terms

**Acidic soil:** any soil with a pH below 7 (the lower the number, the more acidic the soil)

**Aggregate fruit:** a clustered fruit composed of numerous fruitlets, each with its own seed (*e.g.*, the strawberry)

**Agri-business:** the group of industries dealing with agricultural products and services to agriculture

**Agriculture:** anything having to do with farming (raising crops or livestock for food, fibre, or fur); also, the industry of marketing, processing, and trading in farm products

**Animal rights:** the theory that animals have rights, especially to humane treatment and protection from exploitation and abuse; sometimes taken to mean that animals have the same privileges and rights as people

**Animal welfare:** an animal's well-being; its state of health and comfort. In Canada, the National Farm Animal Care Council develops Codes of Practice for the care and handling of farm animals.

**Annual:** a plant that grows one season and produces seed for the next year (*e.g.*, peas)

**Antibiotics:** products used to kill bacteria, especially those that cause infectious diseases

**Artificial insemination:** the introducing of male reproductive cells into the female reproductive tract by artificial means, commonly abbreviated AI

**Auctioneer:** a person who solicits bids for and conducts a public sale of items, including farm animals and equipment

**Avian:** of or relating to birds

**Bacteria:** microscopic, unicellular organisms found almost everywhere, appearing singly or in chains, some causing disease and some being beneficial

**Baler:** a machine used to compact and package roughage such as hay or straw

**Barley:** a grain used primarily for animal feed

**Barrow:** a male pig that has been neutered

**Bee:** an insect that collects nectar and pollen from flowers. Honey bees aid in pollination by transferring pollen from one flower to another and make honey from the nectar they collect

**Beef farm:** an agricultural site where cattle are kept for the production of beef

**Beta-carotene:** an orange pigment in plants that is a form of vitamin A

**Bin:** a box or enclosed place for grain or feed storage

**Bio-diversity:** biological variety; a measure of the variety of species of plants, animals, and other organisms in an ecosystem

**Biological control:** the use of living organisms, such as bacteria, fungi, or insects, to control harmful weeds, insects, and other organisms that infest crops, without resorting to chemical substances

**Biotechnology:** the use of bacteria and plant and animal cells to perform a scientific or industrial task or function, or to produce a product (*e.g.*, bacteria used to clean up an oil spill; animal cells used in the creation of drugs)

**Boar:** an adult male pig kept for breeding purposes

**Bovine:** a family of animals, including cattle and buffalo



**Brassica:** cruciferous plants with tap roots and erect branched stems, including cabbage, Brussels sprouts, mustard, canola, cauliflower, and kale

**Breeder operation:** an enterprise in which poultry are bred to produce fertilized eggs

**Broiler:** an immature chicken or turkey raised for meat

**Brooder:** a heated house for chicks, piglets, *etc.*

**Brood hen:** a female chicken that is used to keep eggs warm for hatching

**Buck:** the male adult of various animals, including goats and deer

**Bull:** an adult, male bovine used primarily for breeding

**Butter:** a solid, yellow substance consisting of fat, air, water and sometimes salt made by churning cream

**By-product:** a substance produced in addition (secondary) to a main product (*e.g.*, glue can be made from animal hooves)

**Calf:** a baby cow or bull

**Calve:** to give birth to a calf

**Canola:** a crop whose seeds are used for making cooking oil, and whose meal is used as a livestock feed

**Animal Care:** proper provision of the necessities for living things (*e.g.*, providing animals with good food, water, shelter, *etc.*)

**Cash crop:** any cultivated produce destined for sale at market (such as wheat), as distinguished from produce used domestically or locally for livestock feed or other purposes

**Castrated animal:** an animal that has had its testicles removed

**Cattle:** more than one bovine animal (including bulls, cows, and steers)

**Cellulose:** a carbohydrate that is in the walls of plant cells

**Cereal:** crops from the grass family grown for grain (*e.g.*, oats, wheat, barley, rye, corn); also a processed form of breakfast food using such grain

**Chaff:** the empty pods or scale-like seed covers that are separated from grain in threshing and cleaning operations

**Cheese:** a food product made from milk solids

**Chick:** a baby chicken

**Chicken:** a small domestic bird bred for the production of eggs and meat; also, the meat of this bird

**Churning:** vigorously stirring or agitating a liquid to combine or separate its constituents (*e.g.*, turning cream into butter)

**Cleaned seed:** seed that has been screened to remove debris, including weeds, foreign and defective seeds, and chaff

**Coat:** the external covering, usually the hair, fur, or wool, of an animal

**Colostrum:** the thick, yellow secretion that comes from the mammary glands shortly after giving birth, containing antibodies passed on to the young to protect them from disease

**Colt:** a specific term for a male foal

**Combine:** a harvesting machine for cutting and threshing grain in the field

**Commodity:** an economic good, such as raw materials or a basic food product or fuel

**Compost:** a combination of organic matter in a state of partial decay, soil, nutrients, moisture, and lime

**Conservation:** the management and preservation of natural resources for present and future uses

**Corn:** a crop grown for human food and as a feed for livestock

**Corral:** a fenced-in area for animals

**Cover crop:** plants grown on a field to protect soil from erosion by wind and water, and to provide humus or nitrogen

**Cow:** a mature female bovine

**Cream:** the yellowish part of milk containing 18 to 20% butterfat, which is usually removed from the milk during processing

**Cria:** a baby alpaca

**Crop:** the yield of produce at harvest

**Crop rotation:** a crop, soil management, and conservation method in which different crops succeed one another on the same field

**Cross-pollinate:** the passing of pollen from the male part of one plant to the female part of another plant of the same species

**Cud:** a mouthful of previously swallowed food, regurgitated from the first stomach of ruminants, to be chewed again, further breaking it down for digestion

**Cultivar:** a plant variety produced by cultivation that keeps its characteristics even when reproduced

**Cultivating:** preparing the land for the raising of crops

**Cultivator:** an implement that digs into the soil to break it up and rip out weeds

**Cultural practices:** techniques used in growing plants that include planting disease resistant varieties, rotating crops, employing spacing and pruning methods, and providing good drainage and irrigation

**Curing:** preserving meat, fruit, or hides by salting, drying, *etc.*

**Cutting:** any part of a plant that can be severed from the plant and grow into a new plant

**Dairy farm:** an agricultural site where cows, sheep or goats are kept for the production of milk

**Dam:** the female parent of many four-footed domestic animals, including horses and alpacas

**Desiccate:** remove the moisture from anything

**Dioecious:** having male and female reproductive parts on separate plants

**Doe:** the adult female of the goat, rabbit, deer and certain other animals

**Doeling:** a young female goat

**Donkey:** a small, long-eared domesticated member of the horse family (recently used to protect sheep against coyotes)

**Dressed weight:** the weight of an animal after slaughter, evisceration, and the removal of the head, lower parts of the limbs, and either the skin or feathers

**Drone:** the adult male of the honey bee and other bees

**Dwarfing rootstock:** a rootstock that limits the size of the plant that is grafted onto it

**Ear:** the entire head of corn including the cob, husk, and silks

**Ecology:** the study of relationships between the environment and organisms

**Egg:** a hard-shelled, oval reproductive cell produced by female fowl containing an ovum, albumen, air sack, and various membranes, the substance of which can serve in reproduction or be used as food

**Elevator:** a building or terminal where grain is elevated and from which it is transferred to a mode of transportation, usually a truck, railway car or ship

**Embryo transfer:** the procedure in which a female with desirable characteristics is induced to superovulate, is inseminated, and the resulting embryos are transferred to other females

**Entomologist:** a specialist in the study of the forms and behavior of insects

**Environment:** the surroundings of plants, animals, and human beings, forming their dwelling places and influencing their well-being

**Equipment:** any material or apparatus used in farm production and operations

**Estrus:** a recurring period of sexual receptivity in many female animals

**Eviscerate:** to gut; to remove the entrails of an animal

**Ewe:** an adult female sheep

**Farm:** an establishment or plot of land, usually with a house, barn, silo, *etc.*, where food and other goods are produced by growing crops or raising livestock

**Farmer:** a person who operates a farm

**Farm gate value:** the cash value of a product when it leaves the farm

**Farmer's market:** a place where farmers or producers sell their products directly to the consumer

**Farmstead:** an area that includes the human dwelling and other buildings belonging to the farm

**Farrier:** a person who trims, cuts, and fixes the hooves of horses and cattle; a blacksmith

**Farrow:** to bring forth a litter of pigs

**Feed conversion rate:** the rate at which an animal's feed is converted into weight gain

**Feeder pig:** a piglet after it is weaned from the sow, also known as "weaner" pig

**Fertile:** a) of soil, capable of producing an abundance of crops; b) of animals, able to reproduce

**Fertilization:** a) the union of male and female reproductive cells in animals and plants; b) the enrichment of soil for the production of crops

**Fertilizer:** either a natural or a chemical substance added to soil to make it more fertile

**Filly:** a specific term for a female foal

**Flora and fauna:** the plants and animals of an environment or region

**Flour:** the finely ground meal of grain, used in baking

**Foal:** (*noun*) a general term for a young horse, especially under a year old; (*verb*) to give birth to a colt or filly

**Food processing:** operations (canning, freezing, pickling, drying, *etc.*) carried out to prepare food for storage or sale

**Forage:** grass and legume crops used for livestock feeds

**Fowl:** any kind of bird

**Free trade agreement:** an agreement between countries to allow certain goods and services to be traded between them without tariffs, quotas, or other restrictions or duties

**Fresh:** said of produce that has not undergone processing, such as freezing or canning

**Fructose:** a simple sugar found in honey and fruits

**Fruit:** the edible, mature, seed-bearing product of a plant

**Fungicide:** a synthetic or organic substance that kills fungus

**Genetically modified organism (GMO):** an organism that has been developed by insertion of a gene from a source other than the species to which it belongs, through recombinant DNA technology

**Germination:** the point at which a previously dormant seed begins to sprout, forming a new plant

**Gestation:** the process of carrying young in the womb during the period from conception to delivery

**Gilt:** a female pig that has never farrowed

**Gizzard:** the second part of a bird's stomach, in which food is ground

**Goat:** a small ruminant mammal bred for milk, meat, and in some cases fibre production

**Goose:** a long-necked water bird raised or hunted for its meat and feathers

**Gosling:** a young goose

**Grafting:** a method of plant propagation (reproduction) in which a piece of a desired plant (usually stems, buds, or rootstock) is inserted into another plant, the product growing as one

**Grain:** the edible, hard seed or kernel from cereal plants such as wheat, barley, corn, oats and rye; the seeds or the plants collectively

**Grain auger:** a machine used to move or elevate grain from one place to another (*e.g.*, from a truck to a bin)

**Grass:** a narrow-leaved plant with jointed stems and seedlike grains, providing animals with grazing in pasture and people with sods for their lawns, playing fields, *etc.*

**Green manure:** a herbaceous crop (such as clover) ploughed under while green and to provide organic matter and fertility

**Grit:** hard particles such as sand or stone added to chicken feed to increase the efficiency of grinding in the gizzard

**Growth:** the development and maturing of a plant or animal; the measure at a stage of development

**Habitat:** a place that provides the needs for food, water, and shelter of an organism

**Harden off:** to acclimatize a plant to more difficult conditions in a new environment by gradual exposure

**Harrow:** (*noun*) an implement with spikelike teeth or vertical disks, used for light, shallow loosening of soil to level it, prepare seed beds, or kill weeds; (*verb*) to draw a harrow over land

**Harvesting:** the collecting of produce from a crop

**Hatch:** the emerging of a chick from an incubated egg

**Hatchery:** a building with specialized equipment for incubating and hatching eggs

**Hay:** grasses and legumes grown to be harvested prior to maturity and stored as dried roughage

**Head:** the portion of a plant containing the seed (as in grain or grass)

**Heat:** the receptive period of the sexual cycle in an animal, especially the female

**Heifer:** a young cow that has not previously borne a calf

**Hen:** a female chicken or turkey

**Herbaceous perennial:** a soft-stemmed plant that lives from year to year by dying down to ground level at the end of each growing season

**Herbicide:** a synthetic or organic substance that kills plants

**Herd:** a large group of cattle, sheep, goats, or other animals

**Honey:** a sweet, thick fluid made by bees from nectar and stored in the hive to be used as food

**Hooves:** hard, horny, protective coverings of the feet of ungulates (*e.g.*, horses, cattle, goats, sheep)

**Horn:** a hollow, bony projection from the head of an animal (*e.g.*, cattle, goats)

**Horse:** a large, hooved, herbivorous quadruped, domesticated and used for riding or farm work, including stock handling and pulling loads

**Horticulture:** the science and art of growing fruits, vegetables, ornamental trees, shrubs, and flowers

**Hybrid:** the offspring of two animals or plants of different breeds, varieties, species, or genera (especially as produced through human manipulation for specific genetic characteristics)

**Hydro-cool:** to chill by immersion in ice water

**Hydroponics:** the growing of plants in nutrient solutions with or without an inert medium to provide mechanical support

**Incubator:** an apparatus used to keep eggs warm up to the time they are hatched artificially

**Inoculation:** injecting a plant or an animal with a substance that can aid in the prevention or curing of disease

**Insecticide:** a synthetic or organic substance that kills insects

**Inspector:** a person who evaluates a farming operation or product according to standard guidelines

**Integrated pest management (IPM):** an ecological approach to the control of pest populations (insects, fungi, diseases, and weeds) that entails close monitoring of crops and the use of natural predators and selective pesticides

**Intensive cereal management (ICM):** close monitoring of cereal crops so that steps may be taken to improve their condition at the most critical points for optimal and economical yields

**Irrigation:** the provision of water to crops in a dry climate or season

**Isowean:** a production system intended to control disease by separating weaned piglets from the parent herd and from pigs of other ages

**Kernels:** the individual seeds from stalks of grain

**Kid:** a young goat

**Lactation period in cows:** the time from when a cow calves to the time when it is dried off to calve again; the period during which the cow is milked (approximately 305 days)

**Lamb:** (noun) a young sheep; (verb) to give birth to a lamb

**Larva:** the immature, wingless, feeding stage of an insect that undergoes complete metamorphosis

**Laying hen:** a hen specifically raised to produce eggs (also, layer)

**Legume:** a plant that has pods containing seeds and the ability to fix nitrogen from the air, used for food and forage (*e.g.*, beans, peas, clover, alfalfa)

**Litter:** (1) straw, hay, wood shavings, or other materials used for bedding animals; (2) a group of young animals (*e.g.*, piglets) born at one time from the same mother

**Living modified organism (LMO):** any organism that is the result of biotechnology and is capable of metabolizing and reproducing

**Macho:** an adult male alpaca

**Maiden:** a young female alpaca not yet bred

**Mare:** an adult female horse

**Market hog:** a barrow (male) or gilt (female) raised for meat production

**Mechanization:** the use and development of machines to replace hand and animal labour

**Milking machine:** an apparatus that attaches to a cow's or goat's teats and by vacuum draws the milk into a holding tank

**Milking parlour:** a place separate from the barn where cows or goats are milked

**Moisture:** (in germination) the water required by a seed to sprout and, later, to sustain life

**Mulch:** a layer of material (bark, hay, or artificial material) put over the surface of soil to protect plants from erosion, crusting, drying, freezing, or competition from weeds

**Mule:** the sterile offspring of a horse (usually a mare) and a donkey (usually a jackass), horselike but smaller than a horse and having long ears

**NAFTA:** North America Free Trade Agreement, signed in 1993 to establish free trade guidelines between Canada, the United States, and Mexico

**Neutering:** the removal of testicles from male animals to prevent fighting, increase weight gain, *etc.*; also known as castration

**Oats:** a grain used primarily for animal feed but also as a cereal

**Organic:** (of plants and animals) produced according to a distinct set of guidelines and without the use of synthetic chemicals

**Ox:** (plural *oxen*) a type of large domesticated bovine (the ox), especially neutered adult males, still used for draught labour in some countries

**Pasteurized:** the process of heating a food at a temperature high enough and for a period long enough to kill bacteria without radically altering quality

**Pasture:** an area of grassy land where farm animals range and feed

**Pathologist:** a specialist who deals with the nature of disease, especially the structural and functional changes caused by disease

**Pen:** a stall for an animal

**Perennial:** a plant that lives for more than two years

**Pesticide:** a synthetic or organic substance used to kill pests for the protection of crops or livestock (see also *fungicide*, *herbicide*, and *insecticide*)

**Pig:** a short-legged, hooved mammal with bristly hair and a flexible snout, raised mainly for meat

**Piglet:** a young pig, weighing 1-2 kilograms

**Pheromones:** a chemical substance secreted and released by an animal for detection by and response from another, especially of its own species

**Physiologist:** an expert who studies the functions, parts, and activities of living organisms and related physical and chemical phenomena

**Plant:** (*noun*) a living, multicellular organism that ordinarily grows in soil, has leaves and roots, needs water and light from the sun to live, and typically produces its own food through photosynthesis; (*verb*) to place seeds or seedlings in soil to produce plants

**Pod:** the container for seeds on a legume plant

**Pollinate:** the transfer of pollen from the male to the female part of a flower to produce a fertilized egg that will develop into a seed

**Pome fruit:** a firm-fleshed fruit in which multiple seeds are protected by a central core (*e.g.*, apple, pear)

**Pork producers:** farmers who raise pigs

**Poult:** a young turkey

**Poultry:** domesticated fowl raised for meat and eggs, usually chickens and turkeys

**Profit margin:** the income to a business after all expenses have been deducted

**Pullet:** a hen less than one year old

**Pupa:** an insect in the nonfeeding, usually immobile, transformation stage between the larva and the adult

**Queen bee:** the adult egg-laying female of a beehive

**Quota:** a supply management system in which the amount produced is limited to the demands of the market

**Ram:** a male sheep

**Recombinant DNA technology:** a branch of knowledge concerned with combining genes from one organism with those of another

**Record of production (ROP):** a system used to keep track of statistics (*e.g.*, weight gain, quantity of milk, percentage of butterfat, *etc.*) in dairy, beef, sheep, and hog operations

**Retail value:** the cash value of a product sold to the consumer

**Ripening:** the process of maturation in plants, resulting finally in readiness for harvesting and use as food or seed

**Rooster:** a male chicken

**Rootstock:** the underground part of a plant, including a short portion of the stem onto which a scion can be grafted

**Rural:** a place, person, or thing belonging to or connected with the country or a sparsely populated area

**Ruminant:** an animal with four stomachs, including cattle, goats, sheep and deer

**Runt:** the smallest piglet in a litter

**Rye:** a grain crop used mainly for bread flour and animal feed

**Scion:** a portion of a stem used for grafting

**Seed:** a grain or ripened ovule of a plant, containing the embryo of a new plant and used for reproduction or food

**Seed drill:** an implement used for planting seed rows in a field

**Seeding:** the process of planting seed in the ground to grow

**Sheep:** a small domesticated ungulate raised for meat and wool; also, more than one sheep

**Sheep herding dog:** a working dog used to move sheep

**Sheep shears:** clippers, usually electric, used to cut the wool from the sheep

**Shelter:** a building or other structure used to protect animals from weather, into and from which the animals are usually free to go

**Silage:** grasses, legumes, and corn grown, harvested, and preserved by natural fermentation as a roughage feed for cattle

**Silo:** a storage building or pit in which green hay or high-moisture grains are fermented and stored as animal feed

**Sow:** an adult female pig

**Spraying:** mechanically scattering fine particles of water, fertilizer, or pesticide for the purpose of enhancing the development of a crop

**Sprout:** (*noun*) the earliest emergence from a seed as it begins to germinate and grow; (*verb*) to begin to grow, shoot forth

**Stalk:** the straw or stem-like part of the plant that supports the seed head

**Stallion:** an adult male horse used primarily for breeding

**Steer:** a neutered male bovine used for its meat

**Stem:** the stalk of a plant

**Stock:** animals kept on a farm for production purposes

**Stone fruit:** a fruit with fleshy pulp that encloses a single seed in a hard shell, as a peach, plum, or cherry

**Supply management:** a distribution system in which the total quantity of a product produced in an industry is controlled, often through quotas, with an eye to maintaining good financial returns

**Sustainable agriculture:** the practice of agriculture that over the long term conserves or enhances environmental quality and the resource base on which agriculture and society depend

**Swather:** an implement used to cut grain or grass and place it in rows for a baler or combine to gather

**Taproot:** a tapering main root, with small branch roots, that grows downward and stores food (*e.g.*, carrot, turnip)

**Tariff:** a tax or duty to be paid on a particular class of imports or exports

**Thresh:** to separate the seeds or grain from the stalks of plants

**Tom:** the male of certain animals, including the turkey

**Tractor:** a powerful, motor-driven machine used to pull implements and do other work on the farm

**Trough:** a container for drinking water or feed for farm animals

**Tuber:** a fleshy food-storing swelling of an underground stem, (*e.g.*, potato)

**Turkey:** a large bird of the pheasant family native to North America and kept for its meat

**Ungulate:** (noun) a hoofed mammal; (adj.) hoof-bearing

**Vegetable:** any plant whose roots, tubers, bulbs, stems, leaves, or flower parts are used for food

**Vegetative propagation:** increasing plant numbers by using plant parts (rather than seeds) and employing various techniques, such as layering, planting cuttings, and grafting

**Veterinarian:** a person who treats the diseases and injuries of animals

**Watershed:** the entire land surface from which water ultimately drains into a particular stream or river system

**Wean:** to accustom a young mammal to food other than its mother's milk

**Weaner pig:** a pig after it has been weaned

**Weed:** any undesired, uncultivated plant, especially one regarded as posing a threat to other plants

**Weed control:** the elimination of unwanted vegetation from a crop, thus reducing the competition for nutrients, water, light, *etc.*

**Wheat:** a grain crop grown mainly for milling into flour

**Worker bee:** a sterile female bee whose specialty is to collect food and maintain the hive



# Contacts and Resources

## Nova Scotia Department of Agriculture

Website: ..... [www.novascotia.ca/agri](http://www.novascotia.ca/agri)

### REGIONAL OFFICES

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