



AGRICULTURE IN ALBERTA

TEACHER TOOLKIT

2021



Ag for Life

PURPOSE

The Teacher Toolkit is a collaborative work between many different commodity groups and industry leaders in Alberta. This booklet will provide reference to basic information about agriculture in Alberta, including information about commonly produced foods in Alberta. There are thousands of other agricultural products not listed here that are produced in Alberta.

Further information, including informative pictures for each section in this booklet, is available on our website:

www.agricultureforlife.ca/agriculture-education

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ALBERTA AGRI-FOOD FACTS



FARMLAND

Total land area in Alberta

157,710,720
ACRES

Total farmland

52,127,857
ACRES (2006)

50,250,183
ACRES (2016)

Irrigated farmland (2019)

1,719,967
ACRES

Average farm size

1,055
ACRES (2006)

1,237
ACRES (2016)

Number of farms

49,431
(2006)

40,638
(2016)



FARMERS

Number of farm operators (2016)

57,605
TOTAL

39,845
MALES

17,760
FEMALES

Average age of farm operators (2016)

55.7
YEARS

Number of people living in Alberta (2016)

3,399,372
URBAN RESIDENTS

667,803
RURAL RESIDENTS



INDUSTRY

Number of people employed in the agri-food industry (2017)

75,100
EMPLOYEES

Total food and beverage manufacturing industry sales (2017)

\$14,402,000,000

This represents a 1.1% decrease from 2016.

Average annual household food expenditures (2016)

\$9,119

Share of total household expenditures. (2015)

12.5%

Total acres covered by Greenhouses (2017)

281

ALBERTA AGRI-FOOD FACTS



AGRICULTURAL PRODUCTS

Milk produced (2017)

768,059,000
LITRES

Eggs produced (2017)

70,777,000
DOZEN

Chicken meat
produced (2018)

166,472
TONNES

Honey produced (2017)

18,293
TONNES



EXPORTS

Agricultural and
food exports (2018)

\$11,600,000,000

Percentage of exports
(top five markets in 2018)

37%

UNITED STATES

23%

CHINA

11%

JAPAN

5%

MEXICO

2%

INDONESIA

BUT...

agriculture is more than food to eat (if you didn't think over 70 million eggs each year was enough).

Cloth and textiles begin in the barnyard as wool and in the field with hemp.

Corn is processed into road de-icers, windshield washer fluid, ethanol fuel, soap, toothpaste, paint, varnish and sparkplugs, to name a few.



AGRICULTURE & THE ENVIRONMENT

By necessity and a love of the land, farmers have always been conservationists – whether they are working to control soil erosion, or recycling plant and animal wastes. To ensure the sustainability of farming and food production for future generations, farmers and the agriculture industry have developed numerous proactive initiatives to protect and improve the environment. This section provides an overview of just a few of the many initiatives.

ENVIRONMENTAL FARM PLANS

Protection of the environment, in particular the protection of the nation's water quality, is important to the agriculture and food sector. Animals produce manure, which is spread on the land to grow crops. Animals eat the crops, and the cycle continues. A farmer's goal is to manage that cycle responsibly and match nutrients to their crop requirements. Farmers and other members of the agriculture and food industry are committed to protecting the environment and to being good neighbours and citizens.

The Alberta Environmental Farm Plan (EFP) is a voluntary self-assessment of on-farm environmental risks and is intended to be applicable for all types and sizes of agricultural operations. The goal of the Alberta EFP is to provide producers knowledge of on-farm risks and help them identify measures to mitigate those risks. Completing the EFP, and following up with action, helps ensure healthy water quality and improved soil and nutrient management. Beyond the EFPs and self-assessed risks, there are also environmental laws and regulations in place, which farmers must obey. The workbook consists of three sections. In Section 1, the farmer identifies the location of potential hazards; for example petroleum, pesticide, and manure storage. Section 2 uses that information to determine potential risk in the event of spillage. Section 3 looks at farm practices such as tillage, pesticide application, rotational grazing, wintering sites for cattle, and more. By 2019, over 12,000 farmers in Alberta completed environmental farm plans and many have stated that the EFP process was useful to understand risk, outline possible actions, and use in future farm planning.

GENETICALLY MODIFIED ORGANISMS (GMOs)

For thousands of years, farmers have used different techniques to improve the quality and yield of their crops in order to fulfill the needs of our ever-growing population in a sustainable way. More recently, through the use of biotechnology innovations, scientists have been able to change specific processes in plants to improve their agronomic features. These changes can be accomplished by modifying genes in the plant, something humans have done for centuries via traditional plant breeding. Using genetic engineering, scientists are now able to target and transfer specific genes.

REDUCED, CONSERVATION, OR NO-TILL FARMING

The use of plant science innovations has helped reduce and in some instances eliminated tillage, in turn minimizing the amount of soil disturbance and maintaining as much crop residue cover as possible. The result is better protection of soil from wind or water erosion, less fuel consumption, and better carbon sequestration, which as referenced by RIAS (2015), has resulted in a 3.8 fold increase in carbon sequestration in cultivated land, reducing greenhouse gases (GHGs) by about four million tonnes per year.

Source: www.esrd.alberta.ca/lands-forests/land-industrial/programs-and-services/pesticide-management/pesticide-regulation.aspx

There is less and less debate among scientists about the ecological impact of genetically modified foods, though the debate still exists in popular media and government. In 2002, Jennifer Ackerman published an article in National Geographic that noted arguments to be wary of with regards to the impact of GMOs. Some argued that we may not have enough data to assess the impact of using genetically engineered crops. Particularly, concerns centred on decreased biodiversity, increased pesticide resistant organisms, and gene flow from crops to weeds to create “super-weeds.”

However, Nicolia et al (2013) conducted a meta-study focusing on genetically engineered (GE) crop safety research and found that the most common topics out of the 1,783 studies considered were biodiversity, traceability of GMO product through the ecosystem and food chain, pesticide resistance, and gene flow. The authors concluded that scientific research conducted so far “has not detected any significant hazard directly connected to the use of GM crops.” Another meta-study of 147 published articles on GM crops found that, on average, the use of GMOs reduced chemical pesticide use by 37% and increased crop yields by 22% (Klumper and Qaim, 2014). More recently, the US National Academies of Science, Engineering, and Medicine (2016) published a revision of the available scientific evidence on the safety of GMOs, and “found no substantiated evidence that foods from GE [genetically engineered] crops were less safe than foods from non-GE crops.”

Overall, genetic engineering has tremendous potential to help farmers feed the world in a more environmentally sustainable way. Innovative companies invest in research that helps farmers to produce the most beneficial crops, while having less ecological impact. According to RIAS Inc. (2016), “without pesticides and plant biotechnology, Canada would need to farm almost 50% more land to grow the same amount of food.” The regulatory agencies (Canadian Food Inspection Agency and Health Canada) carry out a risk assessment as part of the review of new products, which includes assessing the environmental and health impact of new biotech products.

RESPONSIBLE USE OF PESTICIDES

Throughout the world, billions of dollars worth of foodstuffs are lost each year to pests such as weeds, insects, fungi, or other diseases, through reduced productivity, contamination, or direct consumption of the product by the pest. Severe infestations of some pests can result in the complete loss of a crop or death of animals. In most cases, though, pests damage a portion of the crops, reducing yields and/or product quality. Without some form of pest control, these losses would be even greater and could result in shortages of food, higher prices, and more people going hungry. Furthermore, without pest control, the contamination of crop products caused by some pests could pose a hazard to the health of humans or animals. When necessary, farmers carefully and responsibly apply pesticides on their land.

INTEGRATED PEST MANAGEMENT (IPM)

A system of managing pests (weeds, insects, disease, fungus, nematodes, and rodents) that involves more than one control method – mechanical (e.g., tillage), cultural (e.g., using certified seed), biological (e.g., use of a pest's natural enemies), or chemical (e.g., pesticides) – in a program that is both economically and environmentally sound.

Health Canada reviews all the scientific information available before any pesticide can be registered in Canada. They ensure that the pesticide has value (necessary and effective against the pest) and that there are no health or environmental concerns related to its use. The agency states that “health and environmental risks are considered acceptable if there is reasonable certainty that no harm to human health, future generations, or the environment will result from exposure to or use of the pesticide, based on its conditions or proposed conditions of registration.”

In Alberta, the government requires anyone applying pesticides that need special handling and training for application take a mandatory certification course where applicators learn to mitigate potential risks and to use pesticides only when necessary. Both conventional and organic farmers may use pesticides – just different types. Conventional farmers use synthetically-produced pesticides while organic farmers use naturally occurring pesticides.

FACTS & FIGURES

- Canada's agricultural industry accounts for 10% of Canada's total greenhouse gas emissions, according to Agriculture and Agri-Food Canada in 2016.
- Alberta's livestock industry contributes about 1% of Canada's total greenhouse gas emissions and almost half of Alberta's agriculture emissions. This mainly comes from methane from the animals and methane and nitrous oxide from manure storage and handling. There are several strategies farmers and ranchers are taking to reduce emissions, including feeding high-quality feed with added lipids, ionophores, and bacterial supplements to aid cattle in digestion. To reduce emissions of manure handling, farmers and ranchers can decrease storage time, optimize application timing, and aerate it during composting.
- Innovative technologies such as the GrowSafe system constantly collect feeding and health information from cattle to help identify those that feed and digest more efficiently for breeding. Genetic gains toward efficient digestion in livestock through selective breeding has lowered greenhouse gas emissions substantially and innovative technologies will continue that trend.
- Canadian croplands have been a net sink for CO₂, even when factoring in the carbon losses from forests and grasslands being converted to cropland, since the year 2000.
- Eating locally grown foods may help consumers to reduce environmental impact, however there is some debate that this movement leads to greater demand for products that are not as naturally suited to Alberta's environment, causing farmers to produce crops that require more fertilizer, pesticide, and water use. This could have a more significant environmental impact than transportation of food.
- Major retailers such as Wal-Mart and McDonald's have implemented programs requiring proof of sustainable practices from producers.



BIOTECHNOLOGY

bio = life | technology = practical application of knowledge

TERMINOLOGY

Bt crops: *Crops that have been genetically modified to carry the *Bacillus thuringiensis* (Bt) gene, allowing the plant to produce a toxin normally produced by Bt. This toxin is non-toxic to humans and other mammals but toxic to pests.*

Genetic modification (genetic engineering): *the method of taking out, adding, or changing genes in a living organism*

Genome: *the master blueprint for an organism's total set of genes*

Glyphosate tolerant (Roundup Ready) crops: *glyphosate is the active ingredient in Roundup, so crops that are tolerant of it won't be damaged*

GMO: *Genetically Modified Organism. The organism's genome has been altered by genetic engineering methods. The GMO will contain one or more genes that are not normally found there. Also known as GEO, Genetically Engineered Organism. GMO crops are sometimes referred to as GM crops or GE crops.*

Pest-resistant crops: *crops that are able to prevent pests from damaging them, such as insects, viruses, bacteria, fungi, and weeds*

Trait stacking: *Combining multiple desirable traits in a GMO product. This means farmers don't have to choose between insect-resistant and herbicide-tolerant traits, for example.*

Biotechnology is the application of science and engineering in the direct and indirect use of living organisms, or parts or products of living organisms, in their natural or modified forms (e.g., using micro-organisms to make wine or cheese).

GENETIC ENGINEERING VS. BIOTECHNOLOGY

The popular press usually uses these terms interchangeably, but in fact, genetic engineering is just one kind of biotechnology. Biotechnology uses living organisms or biological substances to create products or processes. Some common products of biotechnology are yogurt, cheese, wine, and beer. These food products are made with the help of bacteria or yeast, which convert milk, grape juice, and barley hops into something we consider more desirable.

Genetic engineering, on the other hand, refers to the alteration of an organism's genetic makeup with the addition or removal of specific genes. For example, genes from one plant can be inserted into another. The result of the process is what is called a "transgenic" or "genetically modified" organism (GMO). Some GMO products include crops genetically engineered for insect, pesticide, or disease resistance – which provides farmers with another tool for more environmentally friendly practices – and tomatoes that ripen more slowly to lengthen their shelf life. GMOs may also increase crop yield: the same amount of land can produce more crops, and in our expanding population this will be absolutely necessary. When thinking about genetic engineering, consider that the exchange of genetic material between different species also happens naturally in the environment. It is through evolution, the (lengthy) process of natural selection, and traditional breeding methods that scientists have produced organisms (bacteria, animals, plants, etc.) with desired characteristics. Modern breakthroughs in genetic engineering have just provided a means for reaping the benefits of these traditional practices in a shorter amount of time. Genetic engineering gives faster and more specific results because it deals with organisms directly at the genetic level.

ASSESSING THE SAFETY OF AGRICULTURAL PRODUCTS

In 2016, the National Academy of Sciences reported that “while recognizing the inherent difficulty of detecting subtle or long-term effects in health or the environment, the study committee found no substantiated evidence of a difference in risks to human health between currently commercialized genetically engineered (GE) crops and conventionally bred crops, nor did it find conclusive cause-and-effect evidence of environmental problems from the GE crops.”

The principles of regulating the safety of agricultural products are the same whether the product is developed using biotechnology or through conventional production methods. The emphasis is on the characteristics of the product, not on the means by which it is produced. The government is required to review a new agricultural product if:

- There is potential risk to human, animal, or environmental safety.
- The product contains novel traits and the risk is not known.
- The method of production has created intrinsic novelty (i.e., something that has not existed in that crop before) although the traits of the product are the same as those already commercially available.

Regulation of these products is governed jointly by the Canadian Food Inspection Agency (CFIA) and Health Canada under the Food and Drugs Act. Health Canada is responsible for setting standards for safety of the food supply. The CFIA is responsible for inspection and constant monitoring of products to ensure that these standards are met.

PREVALENCE OF GENETICALLY MODIFIED CROPS

In Canada, most canola and sugar beet crops, a large portion of grain corn, and two thirds of soybeans are genetically modified. So far, they are typically modified to be either tolerant to herbicides or insect-resistant – both leading to lower production cost, higher crop yield, and overall less use of pesticides (including both herbicides and insecticides).



FARM SAFETY

For more information, visit www.agricultureforlife.ca/programs/farm-safety

Agriculture is a business where hard work and long hours are normal. There are many hazards that one can face on the farm. That is why Ag for Life promotes safe work and living practices for farmers and rural Albertans.

HOW DOES IT HAPPEN?

1. Unsafe equipment and material handling
2. Workers get tired/fatigued

WHEN DOES IT HAPPEN?

- 65% of all agriculture deaths in Alberta occurred from May to October
- The highest proportion of deaths occurred in September with 14%, followed by August with 13%, and October with 11%

WHO IS MOST AT RISK?

- 89% of those fatally injured as a result of agricultural work were male

TOP 4 CAUSES OF AGRICULTURE FATALITIES AGES 0-14

1. Run overs
2. Drowning
3. Rollovers
4. Animal-related causes

TOP 5 CAUSES OF AGRICULTURE FATALITIES AGES 15-60 +

1. Machine run overs
2. Machine rollovers
3. Pinned or struck by a machine
4. Animal-related
5. Machine entanglements

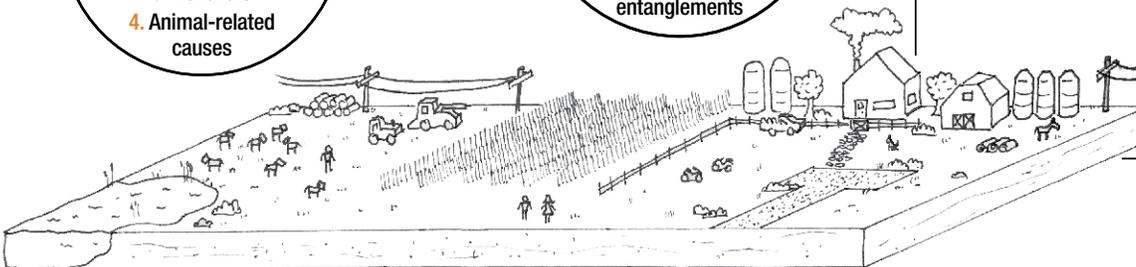
THE ROLE OF Ag for Life

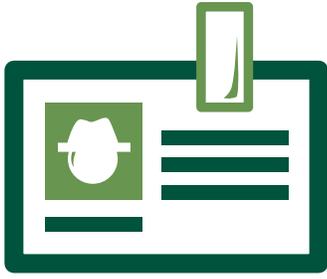
FARM SAFETY

The role of Ag for Life is to eliminate on-farm injuries and fatalities. We do this by funding and delivering educational safety programs to farm and rural audiences of all ages.

Between 1999-2013:

- There were approximately 18 farm deaths per year
- 47% of the fatalities were farm owner/operators





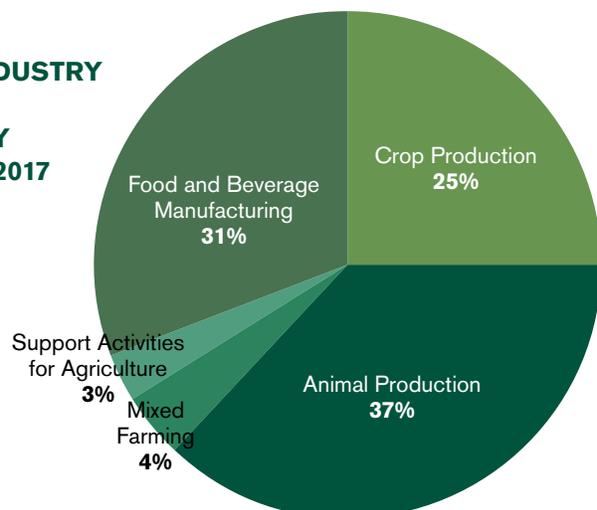
CAREERS IN AGRICULTURE

The agri-food industry accounts for 75,100 jobs in Alberta (2017)! These jobs are not just as primary producers (farmers), but also as scientists and researchers, veterinarians, trades specialists, retail managers, engineers, and communications coordinators, just to name a few. The industry sees steady, predictable growth and is always hiring.

FACTS & FIGURES

- The agri-food industry accounted for 3.3% of Alberta's total workforce in 2017. See the chart below for a breakdown of numbers of people working in each subsector.
- The agri-food industry includes agriculture and food and beverage manufacturing jobs. It excludes food retail trade and food services, which account for 179,300 jobs, or 7.8% of all jobs, in Alberta.
- The agriculture industry contributed \$6.5 billion GDP to the Alberta economy in 2017 – up 2.5% from 2016. This is a resilient industry. (<https://open.alberta.ca/dataset/79f01912-5e5c-469e-8cf4-97cfc6901cea/resource/6a5e24f7-ea77-4a91-8d51-79e9cc9b4d3f/download/ag-stats-factsheet-2018.pdf>).
- Over the last ten years, employment in the agriculture industry has steadily increased.
- Employed women made up only 30.8% in 2018. In Alberta as a whole, 45.5% of employees are female. (www.work.alberta.ca/documents/industry-profile-agriculture.pdf)

AGRI-FOOD INDUSTRY EMPLOYMENT IN ALBERTA, BY SUB-SECTOR, 2017





FARM ANIMAL CARE & WELFARE

Most farmers raise livestock because they like working with animals. Farmers know that properly caring for their animals is the right thing to do and work hard to provide a good life for their animals. Most farmers also know that properly cared-for animals are more productive, which means a better income for them and their families. Nevertheless, there are controls in place to help ensure that farm animals are raised responsibly. There are three H's of responsible animal care: husbandry, housing, and health.

HUSBANDRY

Agriculture and food production is not exempt from laws and regulations governing animal treatment. Alberta farmers are subject to laws outlined in the Criminal Code of Canada and the Federal Health of Animals Act as well as the Provincial Animal Protection Act. Provisions included in these pieces of legislation protect animals from “unnecessary pain, injury, suffering, or neglect.” Offenses are punishable by law. Codes of Practice for the Care and Handling of Farm Animals are currently in place for poultry, hogs, veal, dairy cattle, beef cattle, bison, deer, horses, sheep, goats, rabbits, animals raised on farms for their fur (e.g., fox and mink), and livestock transportation. These Codes have been designed to guide farmers, handlers, transporters, and processors in their practices. The Codes are created by the National Farm Animal Care Council (NFACC) through close consultation with producers, researchers, industry, veterinarians, and animal welfare advocates. They are also subject to a public comment period. The Codes have been well-received and adopted by mainstream agriculture.

For most farmed animal species, an animal care assessment was created following the release of each Code of Practice. The assessments use the requirements from the Code of Practice to create criteria that must be followed on-farm. Most of these assessments are completed through a combination of self-assessment, industry inspectors, and third party auditors using a multi-year cycle. The assessment programs are mandatory for some species and recommended for others. They provide a tool that allows farmers to demonstrate that they are meeting or exceeding the standards of care outlined in the Codes of Practice and are keeping up with continuously evolving requirements and recommendations.

There are exceptions in every line of work or industry. If a situation arises where livestock care is a concern, Alberta is well equipped to address the issue. There are a few options when it comes to dealing with these situations. If you ever suspect any livestock care concerns, you can always call the Alberta Farm Animal Care (AFAC) ALERT Line at 1-800-506-2273 OR the Alberta SPCA at 1-800-455-9003. Both lines work closely together; AFAC's ALERT Line provides early intervention and works proactively to address a potential issue, while the Alberta SPCA deals with more serious cases and livestock in distress.

HOUSING

There are many different animal housing systems available depending on the species of animal. Some farm animals, such as beef cattle or horses, are rarely kept indoors. Other farm animals, such as poultry and pigs, are largely kept indoors, but some farms will provide a mix of indoor and outdoor areas. All systems have their advantages and disadvantages, and the system a farmer chooses is based on many different factors, such as species, location of the farm, climate, availability of land, economics, and markets. Indoor housing requirements for farm animals evolve over time as we continue to learn more about the needs of animals and optimal management and living environment. For example, most laying hens that are kept in cages are now raised in enriched cages with items to meet the behavioural needs of a laying hen – increased space allowance, nest boxes, perches, scratching areas, and sometimes dust baths – while still keeping them safe and healthy.

Various livestock and poultry housing systems have been adopted in Canada for a variety of reasons. One important advantage of indoor-only systems is that they offer protection from weather, predators, accidental injuries, and many diseases that are carried by wild animals and micro-organisms. These housing systems also allow larger numbers of animals to be more easily monitored and handled and to receive individual and consistent care by farmers.

HEALTH

Farmers use health and wellness treatments and regulated products to treat animals that are ill, or to enhance the efficiency of livestock and poultry production. Farmers consult veterinarians in cases of illness, injury, and disease outbreak and when developing herd health programs. This allows farmers to provide the public with safe food at reasonable prices.

Medication is a poor substitute to proper management. Many health problems and production requirements can be more effectively met through sound husbandry practices, selective breeding, and proper nutrition. Just as many people are moving towards preventative medicine, so too is agriculture. As a result, fewer pharmaceuticals are used today than even five years ago, and as advances are made in veterinary science and animal husbandry, future medication requirements will continue to decline.

Animal health products (such as antibiotics) have an important and much needed role to play in the production of wholesome, high-quality meat, milk, and eggs. Much animal suffering and mortality has been made unnecessary and obsolete because of the existence of products to prevent and treat disease. It is a farmer's responsibility to treat an animal when it is sick or injured, regardless of whether the animal is being raised under a specific marketing program (i.e., organic, natural). In addition, much human suffering caused by transmittable diseases (i.e., tuberculosis, rabies, etc.) has also been eliminated or reduced through the use of vaccination programs to help prevent illness and disease. The responsible and appropriate use of these products is recommended and warranted.

ANIMAL RIGHTS VS. ANIMAL WELFARE

Animal rights is the belief that all animals have rights that are similar to or the same as humans and that they should not be used for any purpose, including:

- Commercial animal agriculture and entertainment
- Commercial and sport hunting and trapping
- Science and research

Animal welfare advocates believe that animals should be treated as humanely as possible throughout their lives and that humans can use them for their products and by-products.

It is important to understand that, when treated with medication, there must be a specified withdrawal time that passes after the last treatment and before consuming meat or animal products in order to ensure that there are no antibiotic residues left in the product. All meat and animal products purchased are, therefore, antibiotic free.

When antibiotics are used, in animals or humans, bacteria that are responsive to the drug are killed, while bacteria that aren't responsive (or resistant) survive and reproduce. Overuse or misuse of antibiotics in human and veterinary medicine has increased the issue of antibiotic-resistant bacteria. Concern around antibiotic resistance has prompted farmers to move away from using antibiotics and other health products that are medically important in human health.

Some countries, such as those in the European Union, have banned preventative antibiotic use – so antibiotics can still be used to treat sick animals. This has decreased the overall amount of antibiotics given to livestock in those countries – but particularly the types of antibiotics that are not important to human health. Because of these bans of preventative use of antibiotics, many of these countries have seen a resultant increase in the use of antibiotics that are important to human health.

All plants and animals have hormones naturally in their systems. However, some animals are provided with hormone implants, which are small, slow release pellets placed under the skin in an animal's ear to enhance the production of natural hormones. Using hormone implants directs growth towards muscle and away from fat, which boosts growth rate and means less feed is needed for the animal to gain weight, and as a result there is a smaller environmental footprint to raise that animal. Canada's Food and Drugs Act requires that hormone implants be effective, result in food that is safe for people to eat on a regular basis, and be safe for the animals. Health Canada, the World Health Organization, and the United Nations have all concluded that the use of hormones is a safe practice that can be continued without harm to human health.

THE FIVE FREEDOMS

All animals have basic needs, like food and water, health, and quality of life. The building blocks of good animal care provided by farmers are called the Five Freedoms. The Five Freedoms is a core concept in animal welfare that originated in a UK government report in 1965 and was then refined by the Farm Animal Welfare Council. It states that an animal's primary welfare needs can be met by safeguarding the following five freedoms.

- 1 Freedom from thirst, hunger, and malnutrition by ready access to fresh water and a diet to maintain full health and vigour.
- 2 Freedom from discomfort by being provided a suitable environment including shelter and a comfortable resting area.
- 3 Freedom from pain, injury, and disease by prevention or rapid diagnosis and treatment.
- 4 Freedom to express normal behaviour by being provided sufficient space, proper facilities, and company of the animal's own kind.
- 5 Freedom from fear and distress by being ensured conditions that avoid mental suffering.



COMMON FARM EQUIPMENT

Farmers make use of large equipment to plant, care for, and harvest their crops, and to help with tasks involved with raising and caring for their animals. This equipment is continuously advancing in ways that increase yield, provide better care for animals, provide increased safety for the operator, and lessen agriculture's environmental impact. Much of this equipment is very expensive and represents a significant investment for farmers.

BALER

Balers compress, cut, and rake crops such as hay into bales that are easy to store and transport. They are also used to compress straw after it has been processed by a combine. Different balers make different shaped bales: small square balers, large square balers, and large round balers can be used to bale any hay, grass, or straw. These bales can weigh from 100 lb. to over 2,000 lb.

Cost: up to \$175,000

COMBINE/HARVESTER

At harvest time, combines separate the seeds from the remainder of the plant. This is called threshing. The crop can either be standing or lying in swaths as there are various combine headers that enable the crop to be brought into the combine. Once the seeds are separated from the remainder of the plant, they are then offloaded from the combine onto a truck and transported for storage or sale. These combines

can be configured to harvest a variety of crops from very small alfalfa and canola seeds to corn, wheat, barley, peas, etc. There are other very specialized harvesters available depending on the product that needs to be harvested and can include cotton pickers, potato harvesters, and even berry harvesters.

Cost: up to \$750,000

CATTLE HANDLING SYSTEM

The Cattle Handling System is a program designed to safely and securely handle cattle while they are receiving veterinary care, branding, RFID tags, etc.

Cost: up to \$30,000

FEED MILL

A feed mill consists of the equipment that processes feed for livestock, mixing in ingredients for a nutritionally balanced diet.

Cost: up to \$50,000



PLEASE NOTE

Only those with proper training should ever operate farm equipment as there are numerous safety hazards. Farm equipment is never something to play on.





GRAIN CART

A grain cart is a large cart that is pulled behind a tractor and used to offload the seeds on the combine. The grain cart then delivers the seeds to a grain truck and unloads them. A grain cart allows the combine to maximize efficiency through the field as it does not have to stop and unload. A grain cart can vary in size from 250 bushels to 2,200 bushels and when loaded weigh over 150,000 lb.

Cost: up to \$150,000

IRRIGATION SYSTEMS

Various types of irrigation systems can be used by farmers. The most common and most water-efficient system in Alberta is the low-pressure drop-tube pivot system which automatically irrigates the field.

Cost: up to \$2,500/acre

LIVESTOCK TRAILER

Through its life, livestock such as cows and chickens are often transported to different locations. Livestock trailers are designed with ventilation, and some have suspension and internal partitions.

Cost: up to \$200,000

PRODUCE SORTER

Produce sorters separate produce such as berries, removing high, medium, and low quality produce, leaves, and branches. They can also sort by colour, size, shape, and weight.

Cost: up to \$500,000

RFID TAGS

Radio Frequency Identification Tags are attached to animals or other products that use small computer chips to track them. Tags uniquely identify each animal.

Cost: \$0.10–\$100 each, depending on the type of tag

SEEDER/PLANTER

Seeders or planters have the ability to plant different crops at precise depths and spacing. They enable the farmer to put down a specified amount of seed per acre to optimize the seed's ability to grow. Seeders/planters also apply fertilizers, inoculants, and chemicals to help the seed to grow.

Cost: up to \$1,000,000

SILAGE CUTTER

A silage cutter is similar to a combine but works much differently. A combine is used to separate the seeds from the remainder of the plant, whereas a silage cutter cuts the crop (hay or grain) while it is still green and chops it up into small pieces. A silage cutter transfers this product into a truck where it is hauled and stored in a silage pit. This product is a high-nutrient feed for animals.

Cost: up to \$800,000

TRACTOR

Tractors can come in a variety of sizes. They can be as small as a tractor to cut your lawn or as large as a 700HP, 75,000 lb. tractor used to pull a large seeder or grain cart. Different implements, such as grain carts, augers, air-seeders, and balers, can be attached to and run the PTO (Power Take-Off) to do a variety of jobs on the farm. Other implements like seeders, scrapers, harrows, and cultivators can be pulled by a tractor and can be as large as 130 feet wide.

Cost: up to \$600,000





ALTERNATIVE AGRICULTURE

When someone thinks of livestock, it is usually cows, pigs, sheep, or chickens that first spring into mind. However, taking a closer look at the alternative livestock industry in Alberta reveals a great deal of diversity. Everything from ratites to alpacas can be found in Alberta, and the numbers are growing.

BISON

In Canada, there are approximately 130,000 bison, 50% of which are in Alberta. Bison are desirable animals to raise as they can graze on less land than cattle, they can live outdoors all year without shelter and are generally very hardy. Bison meat sells for up to three times the price of beef. Canadian Bison meat is exported to both the United States and to Europe.

Bison Producers of Alberta: www.bisoncentre.com

CAMELIDS

Camelids (llamas and alpacas) can also be seen on Alberta farms, with 13,761 alpacas and 6,586 llamas registered in 2015. Currently, llama breeding stock and wool are the two main reasons for the interest in raising these animals. Other uses for llamas include predator control in sheep flocks, pets, and even as pack animals or for pulling carts. Mature llamas weigh an average of 280–350 kg and have a life span of 15–20 years. The alpaca is a smaller, heavier-fleeced relative of the llama. They weigh between 40–80 kg. The alpaca has been selectively bred for its quality of fibre and is a superior fibre producer compared to the multi-purpose llama. Their fleece is sheared once a year and comes in variations of eight basic colours, from black to silver, caramel to fawn, and piebald (more than one colour on the blanket). Alpacas were brought to Canada in 1985 from South America.

Canadian Llama and Alpaca Association: www.claacanada.com

DONKEYS

Donkeys are popular in Alberta as guard animals for cattle, horses, sheep, goats, and other livestock. They are naturally aggressive towards dogs, coyotes, and foxes, and therefore indirectly provide protection of domestic animals. Some donkeys will even protect against bears. They have excellent senses of smell, sight, and hearing, and scare away intruders by braying, baring teeth, chasing, and kicking and biting.

The Alberta Donkey and Mule Club: www.albertadonkeyandmule.com

ELK

Elk make good farm animals as they can graze on less land than cattle, can survive outdoors all year without shelter, and are generally very hardy. Elk production is driven by the demand generated by Asian countries for antler velvet. Elk bulls produce antlers every year. These antlers are removed before they become hard and the velvet is processed into capsules. Asian countries have been using velvet and its products to treat many ailments for thousands of years. In addition to velvet, another important product from elk is meat, called venison. Elk are predominantly grazers. They drink water, eat grasses, legumes (alfalfa hay), and grains (corn and oats) and are also provided with vitamins and minerals in their feed. In 2017, there were more than 12,000 head of elk raised on farms in Alberta.

FLOWERS & CHRISTMAS TREES

In 2016, there were 2,403 floriculture farms in Canada. The floriculture industry brought in between \$1.5 billion–\$76.1 million from Alberta producers. That year, there were also 1,872 Christmas tree farms in Canada. Canada is currently the 8th largest exporter in the world of floriculture, nursery products, and Christmas trees.

Flowers Canada Growers: www.flowerscanadagrowers.com and www.canadianchristmastrees.ca

HORSES

According to the Horse Industry Association of Alberta, there are over 341,000 horses in Alberta. The majority of horses bred in Alberta are used for recreational riding, breeding, farm and ranch work, as well as competitions such as racing, jumping, and rodeo.

Horse Industry Association of Alberta: www.albertahorseindustry.ca

RATITES

Ratites are a family of flightless birds. Ostriches, emus, and rheas are members of this family. The kiwi and cassowary are also members of this family. Emus have small wings, but rheas and ostriches have large wings that cover their bodies. Ratites have flat breastbones with no keel. In flight birds, the keel is where the breast muscles of flight attach. Ratites have been around for at least 80 million years. They probably flew in the past but today have adapted to running rather than flying. These birds are used for several things, such as meat, leather, feathers, oil, eggshells, and eggs. There were 14,800 ostriches on farms in Canada in the mid-1990s, but that number has been declining since then and there is now just a small ratite industry.



CATTLE

BEEF VS. DAIRY

There are several differences between dairy and beef cattle. Beef animals are well-muscled animals with powerfully built legs. They are bred and fed to produce lean, high-quality meat with a minimum of bone or fat waste. Dairy animals are more angular in shape than beef animals. Dairy cows are bred and fed to produce milk, not meat. The udders (the bag between the cows' rear legs where milk is stored – the mammary system) of dairy cows are often larger and may hang lower than the udders on beef cows.

WHAT ARE RUMINANTS?

Cattle are ruminants; they can digest fibrous plants that are not edible by humans. All ruminants, such as cattle, sheep, and goats, have a four-chambered stomach. The animal does not chew its food completely. It goes down into the large rumen (first section of stomach), where it is stored and broken down into balls of cud. When the animal has eaten its fill, it rests and “chews its cud.” The balls of cud (feed) are brought back into the mouth, chewed into pulp, and swallowed again. The chewed feed then goes through three more stomach chambers, where it is digested further.

The whole digestive process takes a while. A cow will spend approximately six hours a day eating and approximately eight hours a day chewing its cud: regurgitating boluses of feed from the rumen (the first stomach), masticating (chewing) them, and re-swallowing them to be further digested in the next three stomach chambers called the reticulum, omasum, and abomasum. This lengthy process allows them to efficiently digest low-grade, fibre-based food.

HOW MANY CATTLE ARE THERE IN CANADA?

In July 2019, there were 12.3 million cattle in Canada. This includes approximately 10.8 million beef cattle and 1.4 million dairy cattle. Almost all dairy and beef cattle farms in Canada are family owned.

CATTLE & THE ENVIRONMENT

Cattle eat weather-damaged or feed grain that people can't eat. For example, corn grown for corn flakes only uses the kernels. The cobs, stalks (stems), and leaves can then be eaten by farm animals.

Cattle make use of millions of acres of Canadian grazing land that will not grow crops because it is too dry, wet, rocky, cold, or hilly. Less than 9% of cropland in Canada is used to grow feed for cattle.

Canadian Roundtable for Sustainable Beef (CRSB). (2016). National Beef Sustainability Assessment and Strategy Summary Report. https://crsb.ca/assets/Uploads/About-Us/Our-Work/NBSA/290ae9c611/NBSA_and_Strategy_summary_report_web1.pdf.

Cattle do have an impact on the environment because ruminants produce methane gas as they digest their food. The cattle industry takes steps to reduce this impact as much as possible through feed additives that decrease methane emissions, selective breeding of more efficient cattle, and high-quality feed. Grasslands and pastures for cattle also store carbon, protect vulnerable land from tillage and erosion, and provide habitats for wildlife.

TERMINOLOGY

Bull: *an adult male, kept for breeding purposes*

To calve: *to give birth*

Calf: *a newborn – usually weighs about 40–45 kg*

Cow: *an adult female, kept for breeding purposes*

Heifer: *an adult female that has not had a calf*

Steer: *a male that has been castrated*

Western Canadian cattle producers are some of the most efficient in the world. Alberta's cattle industry accounts for 1% of Canada's total greenhouse gas emissions, according to Environment Canada. As compared to cattle production in other countries, our cattle industry produces less than half the emissions. This is largely due to gains we've made and are continuing to make in genetics, more efficient feed, and better land management practices (Desjardin, et al., 2012).

BEEF CATTLE FARMING

HOUSING

Cows and calves spend the spring, summer, and fall living and grazing on pasture. Often such pastureland is unsuitable for any other cropping practices. During the winter, various methods of protection are provided, such as natural shelter areas or barns. The hardiness of the animals allows them to comfortably adapt to our climate.

After the calves are weaned, they become known as backgrounders or stockers. These weaning calves will be kept grazing on pasture or in feedlots eating a forage (hay-based) diet until they are moved to specialized feedlots.

Today, the majority of cattle in Canada are brought to a finished market weight in feedlots. In these specialized facilities, cattle are able to socialize and have free access to feed and water. Feedlot housing practices are very diverse from farm to farm, ranging from open, dry yards, where protection is provided from inclement weather, to indoor confinement housing. The barns may have any one or a combination of concrete slatted floor systems, straw bedding, or open yards.

NUTRITION

The first meal the calf receives from its mother is thick, sticky milk called colostrum. This milk contains antibodies that provide them with immunity to disease. After two to three days, the colostrum changes to milk. The calf will nurse for about 5–6 months with its diet gradually changing from about 2 kg of milk every day to one that includes forages and water as it matures.

Calves are weaned between 5–8 months of age, after which they will either be kept grazing on pasture or in feedlots eating a forage diet. As the calves grow, they will be switched to diets that contain a nutritionally balanced mixture of forages, such as grasses, alfalfa, or clover, fed either dry or as silage and supplemented with higher amounts of grain, such as corn, barley, or wheat. Cattle will also have free access to mineral supplements and fresh water. Calves are “finished” (ready to be processed for beef) between 15–22 months depending on the feeding system used.

CATTLE MANURE PRODUCTION MANAGEMENT

Manure is a natural by-product of cattle production and is a natural fertilizer. When on pasture, free range cattle randomly distribute manure, which breaks down naturally and recycles nutrients to the soil. Both beef cattle feedlots and dairy farms are required to construct manure containment facilities away from water sources. Manure may be temporarily stockpiled or composted. It is then spread on agricultural lands and incorporated into the soil to act as a natural fertilizer. Regulations currently in place in Alberta provide legal repercussions to prevent deliberate or accidental contamination of water sources.

It all looks very similar to your breakfast bowl of granola (without the milk!) with vitamins and minerals added to balance the animals' nutritional needs.

Beef cattle are sometimes given hormone implants: small, slow-release pellets placed under the skin of their ear. These hormones promote muscle growth instead of fat, which means that less feed will be needed and the environmental footprint decreased. The resultant amount of hormones that end up in humans who eat the beef is insignificant. A common belief is that hormone implants in beef have contributed to earlier-onset puberty, but researchers believe this is more likely caused by increased levels of body fat in children. There is no evidence to suggest that eating beef that had hormone implants is hazardous to human health.

Beef cattle may also be given antibiotics – but all beef sold in Canada is antibiotic-free as all livestock that receive these medications are subject to a withdrawal time before slaughter, which ensures that the antibiotic has been completely metabolized and/or excreted so that no residues remain in the meat. There are many reasons beef cattle may be given antibiotics. To help boost growth, ionophores can be used. These are not used in human medicine and there is no evidence to suggest that they cause increased resistance to antibiotics used in human medicine. Preventative antibiotics may be given as well to cattle with a high probability of becoming ill, and this reduces the need to use more powerful antibiotics if animals get sick.

Each mature beef animal will drink between 35 and 65 litres of water every day depending on their feed source and the outside temperature.

For further information on medications given to beef cattle, see the Farm Animal Care section in this booklet.

FACTS & FIGURES

- In 2016, there were 18,638 beef farms in Alberta – that's 31% of all beef farms in Canada.
- In 2017, 997,784 tonnes of beef were produced in Western Canada.
- Alberta produces 70% of Canadian-fed cattle
- Alberta Farm Cash Receipts for Cattle & Calves averaged \$4.5 billion (2013–17), contributing \$28 billion to provincial GDP.
- Alberta beef accounts for 44% of Canada's market-ready cattle and contributes about \$12.7 billion annually to the Alberta economy.
- 13% of Alberta beef is consumed in Alberta; 29% goes to international markets, and 56% to other provinces (2012–16 average estimate).

TERMINOLOGY

Bull: *an intact (not castrated) mature male – beef or dairy*

Calf: *a newborn – beef or dairy, usually weigh 40 kg at birth*

Heifer: *a young female that has not yet had a calf nor has began to produce milk*

Cow: *a mature female – beef or dairy; must give birth to a calf in order to produce milk; first calf is born usually around 2 years of age*

Milking parlour: *This is the most common way of milking dairy cows in Canada. Systems usually consist of cows being milked on a raised platform. Milk goes directly through a pipeline to the bulk tank (cooled storage tank) in the milkhouse.*

Robotic milking system: *The entire milking system is automated and voluntary. Cows can enter at any time during the day to be milked. They are milked individually by a robot. All information is stored in a computer and each cow wears a transponder either around her neck or ankle, or in her ear. This transponder acts as her identification to the robot and grants her access to be milked. A warning system alerts the farmer if there is a problem with a cow or the robot.*

Pasteurization: *This is the process of heat treating the milk to kill bacteria and make the product safe for consumption.*

Homogenization: *This is the process of breaking down and mixing milk fat into the milk to prevent it from separating.*

DAIRY FARMING

HOUSING

There are a couple of basic variations in dairy cattle housing – the bedded pack or free-stall setup. The size of herd and the farmer's preferences for management and milking all play a part in housing decisions.

In all types of housing, the cows have ample room to move around and lie down comfortably. The bed is made of straw, wood shavings, sand, or synthetic mats that ensure their comfort. They have free access to feed and water at all times. They are kept in the barn to allow the farmer to control the environment and ensure the cows are comfortable. They spend most of their time when they're not being milked in the barn.

NUTRITION

The average dairy cow eats about 30–45 kg of feed every day. Her diet is scientifically formulated through working with a dairy nutritionist to keep her in good condition while maximizing her milk production. The feed may include alfalfa hay, rolled oats, barley, corn, and silage, combined with a balance of vitamin and mineral supplements. Artificial or synthetic growth hormones (such as rBST) to stimulate milk production are not permitted in Canada. Farmers are permitted to administer prescribed medications (antibiotics) to their dairy cattle, however the milk from cows being given antibiotics is discarded and does not enter the food chain. There is rigorous testing for both quality of and antibiotics in all milk in Canada.

FACTS & FIGURES

- There are approximately 500 licensed dairy farms in Alberta.
- Alberta dairy farmers produce over 800 million litres of milk every year. This is about 9% of milk produced in Canada annually.
- Dairy products contributed \$614 million in farm cash receipts in 2018.
- On average, there are 164 cows in an Alberta milking herd.
- The average dairy cow produces 30–35 litres of milk/day from 2–3 milkings.



CHICKEN FARMING

TERMINOLOGY

Bedding: *straw or wood chips covering the floor of the barn*

Broiler: *a meat chicken, raised to 2.65 kg or less*

Chick: *a baby chicken (male or female) from newborn to about three weeks of age*

Cockerel: *a young male*

Cornish hen: *a small meat chicken*

Drinkers: *automated water lines*

Feeders: *automated feed pans which dispense chicken feed, allowing birds 24-hour access to feed*

Flock: *a group of birds raised by a farmer*

Pullet: *a young female*

Roaster: *a larger meat chicken, raised to 2.65 kg or more*

Free Run: *housed in a cage-free indoor environment*

HOUSING

Chickens raised for meat are called “broiler” chickens (or “broilers”). They do not lay eggs. The birds are kept in climate-controlled barns to protect them against hot summers, cold winters, predators, and disease.

In these barns, the broiler chicks roam free on a floor that is covered with a bed of straw or wood chips. They have access to food and water through automatic feed and water lines. As the chickens grow, the farmer will continually adjust the height of the lines to accommodate the height of the birds. This allows maximum comfort and access to feed and water at all times. The amount of space allotted to each chicken in these barns is strictly regulated. All Canadian broiler chicken farms follow third-party audited Animal Care and Food Safety Programs.

NUTRITION

Chickens are omnivores; in its natural state, a chicken will dine on plants, but it will also snack on bugs and slugs and other meat protein sources. In commercial production, the feed will mimic the composition of a natural diet as closely as possible while providing all of the essential nutrients for growth and good health. A typical feed is usually based on corn or wheat and a supplemental protein source, such as soybean meal. The feed is nutritionally balanced with a government-approved mineral supplement.

The chicken industry does not use Category 1 or 2 antibiotics and is currently working to reduce the preventative use of Category 3 antibiotics. Category 1 antibiotics are those that are most commonly used to treat human infections, and overuse of Category 1 antibiotics can lead to antibiotic resistant bacteria. Hormone and steroids are never given to chickens and have been illegal in Canada since the 1960s. For further information on medications given to chickens, see the Farm Animal Care section in this booklet.

FACTS & FIGURES

- Of the 2,800 registered farms in Canada, Alberta is home to 250 registered farms.
- Alberta chicken production in 2018 was 166,472 tonnes of meat.
- Economic contribution of the chicken industry is \$220 million in farm cash receipts.
- In 2016, per capita consumption of chicken in Canada was 32.5 kg. Chicken remains the number one consumed protein in Canada, followed by beef at 25 kg and pork at 20.9 kg. Chicken has been the highest per capita consumption of all the meats since it surpassed beef in 2004.
- Alberta chicken farming contributes \$623 million to GDP
- Alberta is the fourth largest chicken-producing province in Canada after Ontario, Quebec, and British Columbia.



CROP FARMING

TERMINOLOGY

Active ingredient: *The compound within a pesticide that controls its target pest(s). Pesticides also contain compounds that help disperse the active ingredient or otherwise aid it in reaching its target.*

Auger: *a long mechanical tube used to move grain from one location to another, for example, from a grain bin to a grain truck*

Combine: *a machine used to harvest crops*

Crop rotation: *the practice of planting different crops on a field year after year to minimize pest population build up, improve soil health, avoid pesticide resistance issues, and encourage diversify (e.g., a common rotation in Alberta is canola, wheat, and pulses repeated every three years)*

Elevator: *Temporary storage places for grains, oilseeds, pulses, and other field crops for human consumption. Here, the farmer and elevator company sell crops to mills or plants that will process or compile them for transport. Alberta's crops are purchased through domestic and internal markets.*

GRAINS

Wheat, oats, and barley are grains commonly grown in Alberta.

WHEAT

Alberta farmers grow both spring and winter wheat. Spring wheat is planted in early May and takes approximately 100–120 days to grow. Farmers use a seeder to plant the seeds in straight rows while fertilizing the land at the same time, adding nutrients into the soil that will help to grow healthy wheat. In June, wheat starts to sprout up from the ground. Into July, the “head” of the wheat where the seeds are stored starts to come out – the seeds are the most important part of wheat because they eventually turn into our food. In August, wheat starts to turn from green to gold in the heat of the summer sun.

Harvest starts around August/September depending on the farmer's location in Alberta and what the weather was like that season. Combines are used to cut the wheat off the field and separate the seeds from the chaff.

- Wheat is the third largest production crop in the world and the largest crop grown in Canada.
- Almost 7 million acres of wheat was harvested in 2017 in Alberta.
- Alberta produced 9,980,100 tonnes in 2017.
- The total economic value of Alberta wheat in 2017 was \$2.065 billion.

BARLEY

Barley is used for three purposes: animal feed, malt, and food barley for human food consumption. These barley end products are often grown as different varieties. Approximately 80% of Alberta's barley is used as feed for livestock, such as cattle and pigs, while 20% is used for malting, creating an end product that makes up beer, spirits, and some human food production. Less than 1% of Alberta's barley is used for human food consumption.

- 2,500,000 acres of barley was harvested in 2017.
- 8 million tonnes of barley are produced every year across the nation; in 2017, 3.9 million tonnes of barley was produced in Alberta.

GMO: *Genetically Modified Organism. This means that the organism's genetic material has been altered using genetic engineering techniques. In the past, we have altered genetic material by artificial selection using breeding techniques.*

Grain bin: *large structural containers used to store grain or oilseeds on farms*

Hectare (ha): *A hectare is 100 metres x 100 metres. It is equal to 2.5 acres. A hectare is about the size of two soccer fields.*

Harvest: *process of gathering mature crops off the field at the end of a growing season*

Hybrid: *plants produced by crossing two or more inbred lines of plants that are genetically quite different*

Marginal land: *land that is too hilly or wet, or contains soils that are fragile and of lower quality for crop production*

Organic crop farming: *Farming method using no synthetic fertilizers, synthetic pesticides, or GMOs. However, non-synthetic fertilizers and pesticides can be used, often with varying effects on the environment.*

Pesticides: *Chemicals which help to control various pests, such as insects, bacteria, fungus, and weeds. Herbicides are a type of pesticide that are toxic to certain plants and are used to control weeds. Insecticides are used to minimize damage by insects, and fungicides minimize damage by fungus. Farmers use pesticides as sparingly as possible, as they can be expensive and hard on the environment.*

OATS

Oats are a functional food that provide specific nutritional and health benefits. They contain bran, fibre, and beta-glucan, which are all important in a healthy diet. They also do not contain gluten, which is vital for people with gluten intolerances and allergies. Eating oats can help reduce the risk of heart disease and lower cholesterol levels. They are a good source of protein, as well as provide vitamin E, zinc, copper, and iron.

Oats grown in Alberta are used both for human and animal consumption. Approximately 578,300 acres of oats were harvested in 2019, producing 834,800 tonnes and contributing \$29.8 million in farm cash receipts.

FACTS & FIGURES

- In 2017, there were 31.3 million acres of field crops grown in Alberta.
- In 2015, 5,053 farms in Canada were certified organic, 380 of which were in Alberta.
- In 2011, 78.6% of crops planted were field crops, such as wheat, canola, oats, barley, and pulses, while 25.2% was hay, used to feed livestock. Fruits, field vegetables, sod, and nursery represented 0.1%.
- In 2015, 18,600 jobs were in crop production in Alberta.

OILSEEDS

Oilseeds include canola (also known as rapeseed), sunflower, flax, and mustard.

While a grain such as wheat has an oil content of 1%–2%, canola's oil content is over 40%. After harvesting, the small, round, dark canola seeds are processed, either by the pre-press solvent extraction method or the cold-press method. The latter removes oil through mechanical pressing only, which is less efficient, while the former involves use of heating and chemicals along with mechanical equipment.

- In 2019, almost 5.8 million acres of canola were harvested (due to inclement weather conditions), producing 5.3 million tonnes of canola seed. The economic contribution of canola to Alberta was \$2.429 billion in farm cash receipts.

Seeder: *A machine used to plant seeds into the ground. Seeders are commonly used to simultaneously fertilize the soil to grow healthy crops.*

Soil type: *The texture of the soil based on the percentage of sand, silt, and clay. Sandy soils drain water quickly, while clay soils hold water and often require tile drainage.*

Tile drainage: *System in which water is drained by way of a pipe buried 0.75 to 1 metre into the soil. This system allows farmers to get on their fields quicker in the spring because excess water is drained away and often increases yields.*

Tillage: *Cultivating soil to prepare for planting or to reduce weeds. Conventional tillage is when farmers loosen the top of the soil. This leaves it exposed to erosion and can wear away nutrients in the soil needed to grow a crop and keep the environment healthy. Farmers are moving away from conventional tillage towards conservation tillage and no-till farming – techniques that minimize soil disruption. In 2011, only 19% of fields were conventionally tilled.*

- In 2017, Alberta grew 62,200 tonnes of flax on 85,000 acres. Flax is used for both human and animal consumption and has industrial uses as well with its oil (linseed oil).
- Sunflowers are grown either for humans or animals to eat as a seed or for their oil. In Canada, in 2007, 79,000 hectares were harvested, producing 125,000 tonnes (90% of which were grown in Manitoba). This contributed \$55.9 million in farm cash receipts nationally.
- Mustard is a type of oilseed that was first planted on just over 100 acres in 1940. In 2017, mustard was planted on 93,000 acres, producing 27,100 tonnes of product.

PULSES

Pulses include dried green and yellow peas; green and red lentils; black, pinto, great northern, and faba beans; and kabuli chickpeas.

Pulses are the dry, edible seeds of legume plants harvested for dry grain. The name “pulse” is derived from the Latin *puls*, meaning thick soup or potage. In the 1960s, an increasing number of Alberta farmers started to introduce pulses into crop rotations to restore soil fertility for their grains and oilseeds. Planting pulses is a good fit for a sustainable farming operation in Alberta, as pulse crops fix their own nitrogen (so there is no need to add that type of fertilizer), use water efficiently, and can be planted with no-till techniques. Also, pulses can have a positive impact on future crops grown in the same field, reducing incidences of disease that affect other crops planted in the field.

Alberta producers can grow pulses for export or domestic use for human consumption, animal feed, or fractionation markets. Fractionation is the process that takes whole pulses and processes them into their protein, fibre, and starch components.

- About 6,500 Alberta farmers grew pulses on 2 million acres in 2019.
- The most commonly grown pulse crop in most areas of Alberta are dry field peas – 1.7 million tonnes were harvested in 2019.
- Dry beans, lentils, and chickpeas are primarily grown in the southern part of the province. Faba beans and soybeans are also grown in Alberta.

SUGAR BEETS

The sugar beet is a white beet that is grown for the sugar located in its root. It is of the *Beta vulgaris* species and its main use is for the refinement of white sugar. Currently, this sugar is processed in Taber, Alberta, which is the last remaining sugar beet processor in Canada. However, sugar beets can also be used in the creation of ethanol and other renewable fuels, for animal feed, and even bioplastics. Additional uses for the sugar beet crop continue to be explored and are growing every year. By-products from the sugar beet during processing include molasses, which is used in making a variety of alcoholic products, and dried pulp, which is used for livestock feed.

Sugar beets have been grown in southern Alberta since the early 1900s and are known as a specialty crop. The crop is grown on a four-year rotation with other crops, such as potatoes, wheat, barley, and pulses, to ensure soil diversity and fertility while preventing disease. Canola shares a nematode with sugar beets, which can lead to disease, so any farmer that grows canola and sugar beets must follow a two in eight-year rotation. In Alberta, 100% of sugar beets are verified as sustainably grown using FSA at the Silver Level.

Southern Alberta sugar beet farmers have a rare claim to fame. They are the sole producers of 100% Canadian sugar, as there is nowhere else in Canada where sugar beets are grown and processed. The only way to know if you are using Canadian sugar is to look for the Roger's brand of sugar that has a black stamp on it that starts with #22. If the bag has that stamp, you are using sugar made from sugar beets grown by Alberta farmers. Otherwise, you are consuming sugar that has been refined from raw cane sugar from other countries.

- Over 170 southern Alberta farm families grow sugar beets; many of these families are 3rd and 4th generation sugar beet farmers.
- Over 28,000 acres of sugar beets are grown on an annual basis, and this results in over 120,000 tonnes of sugar being refined from the sugar beets.
- Sugar packages that have a black stamp on them that starts with #22 under the Roger's sugar brand is how you know you are eating 100% Canadian sugar.

For educational videos on sugar beets visit:

<https://www.youtube.com/channel/UCd18S3i282g3b2IQLcwI9zg/featured>

VEGETABLES AND FRUITS

Alberta produces a variety of vegetables and some fruits, most commonly sugar beets, potatoes, beans, carrots, corn, onions, raspberries, strawberries, and Saskatoon berries. There is a thriving greenhouse industry in Alberta, which largely produces tomatoes, peppers, and cucumbers.

- 2,065 acres of sweet corn was planted in 2017, producing 15,956 tonnes of product.
- 148 acres of raspberries were planted in 2017, producing 70 tonnes of product.
- 59,000 acres of potatoes were planted in 2020, producing 1 million tonnes of product.
- Alberta's greenhouse vegetable area in 2017 was 12.3 million square feet. Greenhouse product sales totaled \$134.6 million.

FORAGE SEEDS

Forage Seeds include creeping red fescue (grass), bromegrasses (grass), clover (legume), and alfalfa (legume). Timothy, orchardgrass, wheatgrasses, and bird's-foot trefoil are also grown for seed in Alberta.

Farmers use seed to plant hay fields and pastures to feed their horses, cattle, or other grazing animals. Farmers plant most forage seed in their fields in rows about 15 cm apart. Once the plants are established, they grow every year without having to be replanted. The farmers harvest one seed crop a year, usually between late July and early September. It is transported either directly to a boat heading to Europe, or directly to a seed company in Canada or the United States. Seed companies take the seed and either sell it directly to farmers, or mix it with other kinds of seed, package it in small bags, and sell it to stores all over North America as lawn grass seed.

After a few years, grasses become overgrown and reduce seed production. To increase seed production, farmers will rejuvenate the field and let the grass regrow. In order for clovers and alfalfa to produce seed, the plant must be pollinated by either honeybees or leafcutter bees.

- To produce seed that other farmers will use as seed, a farmer must have the crop inspected by someone from Agriculture and Agri-food Canada, both in the field and once the seed has been harvested. In 2020, inspections were conducted on a total of 129,875 acres in Canada.
- Alberta produced about 15% of the Canadian production of forage and grass seed in 2019. This is about 1.7 million kg of seed (or 3.7 million lb.).
- Total forage production for 2019 was 8.4 million tonnes. This was up 8.7% from 2018 and 2% above the 10-year average.



EGG FARMING

TERMINOLOGY

Breeder farms: Farms in which hens (mature female chickens) are kept with roosters (mature males) and lay about 300 eggs a year. Hens lay eggs each day, which are collected, cleaned, and carefully stored, to be sent to the hatchery.

Candling: The process where the egg is passed over a strong light to make the interior of the egg visible; this allows the grader to see the condition of the shell, the size of the air cell, and whether the yolk is well centred

Hatchery: Fertilized eggs are incubated and hatch in 21 days. The newborn chicks are vaccinated and beak-trimmed with a laser by trained professionals who work in the hatchery.

Layer: Hens that lay eggs. They will start laying eggs at 18–20 weeks of age. These eggs are not fertilized and will not hatch. They are produced specifically for consumption.

Grading: At the grading station, eggs are divided into three grades; Canada Grade A eggs are sold in retail stores for household use and are the most commonly bought consumer egg

Pullet: a young hen, from one day old to 19 weeks

Pullet farms: farms where chicks are transported within 24 hours of being hatched

Broiler: a meat chicken, raised to 2.65 kg or less

CHICKENS RAISED FOR MEAT VS. CHICKENS RAISED FOR EGGS

Chickens produced for meat are not the same breed as those that are raised for their eggs. Leghorns lay white, medium sized eggs and are the most popular breed in the commercial egg-laying industry. Isa Browns (a hybrid of Rhode Island Red and Rhode Island White chickens) are another egg farming breed that lay brown, large-to-extra-large sized eggs.

HOUSING

Conventional hen housing has been the most common system for egg production, but the Canadian egg industry has begun shifting towards alternative hen housing systems, including furnished or enriched housing, free-run (barn style or aviary), and free-range, where access to outdoors is available, weather permitting. Each system has benefits and challenges, but every system provides the necessities – food and water, protection from predators, and a clean environment. Indoor systems also provide controlled temperature, humidity, and lighting.

NUTRITION

Laying hens are fed a nutritious, well-balanced diet that is vital for maintaining hen health, which also contributes to the production of high-quality eggs. Egg farmers work with nutrition specialists to ensure that their hens receive a diet consisting of grains, proteins, vitamins, and minerals. Egg farmers follow feed regulations set by the Canadian Food Inspection Agency. In Alberta, the majority of farmers use crops grown on their own farm as the main source of protein in the feed.

Hormones and steroids are illegal in the Canadian egg industry. Antibiotics are not routinely administered to laying hens because they are not required, and the Canadian egg industry has banned the use of Category 1 antibiotics – those that are important in treating infections in humans. If there is a need to treat a specific illness, antibiotics may be prescribed by a poultry veterinarian or used by a feed nutritionist. Any use of antibiotics is done in compliance with the Canadian Food Inspection Agency, and eggs from those hens cannot be sold until residual antibiotics are no longer present.

COLOUR

The only difference between white and brown eggs is the colour of the hen that laid them; white hens lay white eggs and brown hens lay brown eggs. There are no nutritional differences between regular white and brown eggs.

FACTS & FIGURES

- There are approximately 170 registered egg farmers in Alberta.
- Alberta farmers raise over 2.5 million hens each year, which each produce approximately 300 eggs per year. The number of eggs produced in 2020 in Alberta was 76.5 million dozen.
- The average number of birds per egg producer in Alberta is approximately 16,500. This is the smallest average flock size in Canada. For comparison, Ontario's average flock size is over 20,000. In Alberta, every egg farm is either a family farm or owned by a Hutterite colony.
- Total economic value to the province is \$112 million in farm cash receipts.
- Eggs take about one week from the time they are laid to the time they are stocked in the grocery store after being washed, inspected, graded, packaged, and shipped.
- Unregistered egg farmers are allowed to raise up to 300 laying hens in Alberta, if the municipal rules allow.
- All licensed egg producers are required to maintain strict animal welfare and food safety standards by following national programs, including the Start Clean—Stay Clean, Egg Quality Assurance (look for the logo on Canadian egg cartons), and Animal Care Program.
- Alberta is the only province that has an on-farm environmental program (Producer Environmental Egg Program), which was launched in 2014 and has 100% egg farmer participation.



HONEY FARMING

TERMINOLOGY

Apiary: *location where bees are kept (or, the “bee yard”)*

Apiculture: *the maintenance of honeybee colonies, usually in hives, for the purpose of collecting honey and other products the hive produces*

Colony: *a group of bees that live together and contain three casts: one queen bee, worker bees, and drone bees*

Drones: *Male bees, almost twice the size of a worker bee. Their only known function is to mate with new queens. In colder climates, when that is done, worker bees drive them out of the hive to die. They don't work, forage, or sting.*

Hive: *the structure in which bees live*

Propolis: *An amalgamation of bee-produced wax and resins from various woody and herbaceous plants. It not only has an architectural purpose (used by bees to seal gaps in the hive), but it also functions as a type of social immune defense – a colony-level defense mechanism to pathogens and parasites that arise due to the collective behaviour of individuals.*

Royal jelly: *A secretion from glands of worker bees, fed to all young larvae, but more copiously to queens. This is the reason queen bees develop so differently from the rest of the bees.*

HOUSING

In North Africa, 9,000 years ago, people began keeping bees in pottery vessels. The movable comb hive was invented in the mid-18th century in Europe, which enabled beekeepers to harvest honey without destroying the hive and killing the bees.

The most commonly used hives in North America are vertical, stackable frame hives. In these, bees build honeycomb into frames, which can then be easily moved. They are designed to prevent bees from attaching honeycombs, which would connect frames to each other or to the walls of the hive. Each hive (a four-sided box) has several removable frames, and this allows the beekeeper to manage the bees.

NUTRITION

All larvae are fed honey, pollen, and royal jelly (a secretion from the worker bees). If a young worker (female) larva is fed strictly royal jelly, it will become a queen. Worker bees forage for nectar, pollen, resin, and water. Bees bring nectar back to the hive to produce honey, which they feed to larvae and young bees that don't leave the hive. During the winter, bees don't leave the hive and rely on their honey storage for food. They produce more than they need – which is why we get to enjoy honey too.

BEES AND THE ENVIRONMENT

Honeybees are an important part of our environment and of our agriculture industry. They provide a pollination service as they move from flower to flower, bringing pollen from one flower to another in a symbiotic relationship, fertilizing the flowers while they forage. This is so important that many farmers will pay beekeepers to have hives on their land – increasing crop yields by up to 300%.

Some pesticides can be harmful to bees, though bees are not the target of pesticides, so farmers work closely with beekeepers and agronomists to ensure that their pest management plans do not negatively impact bee health and the mutually beneficial relationship. Over the past several years, honey bee health has been an important topic of discussion. Scientific consensus suggests that many factors impact bee health, including viruses, diseases, loss of habitat and nutrition sources, and pesticides. Initiatives to address the lack of species diversity in urban areas and in areas with monoculture, where only one crop type is grown, are in place to increase and protect biodiversity.

Queen bee: Typically the only breeding female bee in the colony; all the other bees are her offspring. She can lay half a million eggs in her lifetime of three years – up to 3,000 eggs in one day! This is more than her own body weight.

Worker bees: The majority of bees in the colony are female worker bees. They live for six weeks at their busiest time (summer) and for up to sixteen weeks at other times of the year, including through the winter. They perform various tasks depending on their age – housekeeping, making wax, feeding larvae, ventilating the hive, guarding the entrance, and foraging for nectar, pollen, and water.

FACTS AND FIGURES

- Canada had over 7,000 beekeepers with over 600,000 colonies. Alberta, Saskatchewan, and Manitoba produce 80% of Canada's honey with 475,000 colonies of bees.
- Alberta produced 18,057 tonnes of honey in 2017.
- The total economic value to the province was \$68,454,000 in 2017.
- Allowing bees to forage on different flowers produces different flavours and colours of honey. Most honey in Canada is from clover, canola, and alfalfa.
- Honey does not spoil.



PIG FARMING

TERMINOLOGY

Barrow: a male pig that has been neutered

Boar: an adult male pig kept for breeding purposes

Farrow: to give birth

Feeder pig: a piglet after it's weaned from the sow, also known as "weaner" pig

Gilt: a female that has never farrowed

Litter: a group of piglets born at one time, from the same sow

Market hog: a barrow or gilt raised for meat production, weighs up to 110 kg

Piglet: a newborn pig, weighs 1–2 kg

Pork producers: farmers, the people that raise pigs

Runt: the smallest piglet in the litter

Sow: adult female pig (Note that "sow" rhymes with "cow"!)

HOUSING

Most pigs in Alberta are kept in barns to provide protection from predators, extreme weather, parasites, and disease. All the pigs in Canada are kept in barns in the winter. Barns maintain an optimal environment with ventilation systems that control humidity and temperature. Strict sanitation and restricted farm entry programs are designed to help farmers maintain optimal animal health and biosecurity.

NUTRITION

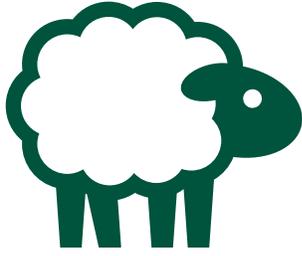
Pigs are omnivores, which means they eat a diet of animals and plants. Today's commercially raised pigs are fed grain-based, nutritionally balanced rations that are often in a pelleted form, similar to dog kibble. These complete rations are typically based on barley, wheat, canola meal, and peas/beans with vitamins and minerals added to balance dietary requirements for each stage of growth and reproduction. Mechanized feeding systems are used on most farms. Fresh water is always available for pigs to drink. The average water requirement for a market hog varies from 5–8 litres per day.

ANIMAL HEALTH & BIOSECURITY

Some farmers might ask you to take a shower or put on plastic boots over your shoes before you go into their barn. Other farms do not allow any visitors at all, people or animals. These protocols are part of what is called "biosecurity," and it's one part of a herd health program that helps to keep pigs healthy. Not allowing visitors into the barn helps to keep germs or sickness out. Farmers do treat animals with medications when they are sick, but prefer prevention over treatment. Pigs in Canada are not given hormones or steroids.

FACTS & FIGURES

- There are 300 hog farms in Alberta, with almost 1.5 million pigs.
- 240,111 tonnes of pork was produced in Alberta in 2017.
- Alberta's pork brought \$492.6 million in 2017 to the province through international exports.
- We export 75% of our pork product to over 90 countries.
- The pork industry in Alberta accounts for 10,000 jobs.



SHEEP FARMING

TERMINOLOGY

Ewe: *a female that has had a lamb*

Ewe lamb: *a female that has not yet given birth to a lamb*

Fleece: *a sheep's wool after it has been shorn off in one piece*

Flock: *a group of sheep*

Lamb: *a sheep under one year old, or the meat that comes from a lamb*

Lambing: *when lambs are born*

Mutton: *meat from mature sheep*

Ram: *a male*

Ruminant: *a four stomached animal that chews its cud, including cattle, sheep, goats, and deer*

Shepherd: *one who cares for sheep*

Wether: *a neutered male sheep*

HOUSING

Some shepherds prefer to keep their flock in the barn year-round, where nutrition, lighting, and lambing can be closely monitored and there is protection from predators, such as coyotes, wolves, bears, and even their neighbours' pet dogs. Sheep are kept together in group pens in the barn.

Others prefer to leave the sheep in the field all year, depending on pastures, to graze for their food. Hay and grain are offered when the snow gets too deep. Even though sheep have wool, they still need shelter (barns, windbreaks, etc.) and/or extra bedding to stay warm and productive in the winter.

Most farms use elements of both systems.

NUTRITION

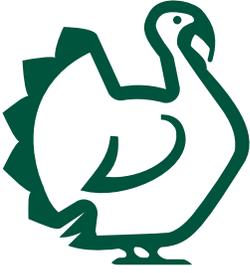
Sheep are ruminant herbivores. The majority of a sheep's diet is forages – pasture and hay that can include grasses, alfalfa, and clover. Sheep often graze on land that can't be cultivated for human food production.

At certain times in the production cycle, shepherds may also feed grains, such as corn, barley, oats, and roasted soybeans, which are mixed with supplemental vitamins and minerals as needed. Grain supplementation is an important part of a balanced diet for fast-growing lambs, ewes in late gestation (within weeks of giving birth), or ewes with high milk production.

A mature sheep will eat approximately 3 kg of hay and grass per day. Weaned lambs will eat about 1 kg of grain and 1 kg of hay or grass every day.

FACTS & FIGURES

- In Alberta, in 2017, there were approximately 2,100 sheep farms caring for 194,000 sheep and lambs. In Canada, there were around 1 million sheep on 11,000 farms.
- The main product from sheep in Canada is lamb meat – Canadian farmers produce 40% of the lamb we eat, and we import the rest, mainly from New Zealand and Australia.
- The economic impact of the lamb industry in Alberta in 2017 was \$25.2 million in farm cash receipts.
- Flocks range in size from a few animals to over 3,000 ewes.
- A sheep may give up to 2 litres of milk per day to feed their lambs. There are sheep dairies in some locations, where the milk collected from ewes is mainly used to produce specialty cheeses.
- One mature ewe can produce up to 4.5 kg of wool per year. In addition to making wool into clothing, it has other interesting uses such as helping to clean up oil spills. The wool can be squeezed out and reused up to eight times.
- Some of the most popular breeds of sheep in Canada include Suffolk, Dorset, and Canadian Arcott.



TURKEY FARMING

HOUSING

Most turkeys are raised in specially designed, environmentally controlled barns that provide protection from predators, disease, and bad weather. Turkeys are not raised in cages; they roam freely around the barn, similar to broiler chickens, on a floor that is covered with a bed of straw or wood shavings.

NUTRITION

Turkeys are fed a mixture of corn, wheat, and soybeans that are ground up to look like granola. The birds grow quickly, so farmers spend a lot of time adjusting feeding rations to match the growth stages of the birds to reach the required market weight. Young turkeys (poults) are fed a “starter” mixture, then as they grow, the feed is changed to a “grower” mixture. Each type of feed includes protein, energy, fibre, fat, and other elements such as calcium, phosphorous, magnesium, and vitamins. Water is always provided throughout the barns so they may drink freely. Turkeys drink 2 litres of water for every kilogram of feed they eat.

FACTS & FIGURES

- There are 522 turkey farmers in Canada, 49 in Alberta in 2019.
- In 2019, the total turkey production was 165 million kg in Canada.
- Nationally, turkey sales contributed \$382.6 million to our economy in 2019.
- In 2019, Canada exported 22.4 million kg of turkey.
- Canadians consumed an average of 3.8 kg each in 2019.

CONTACTS

For More Information About Farming and Food

TOPIC	AGENCY	CONTACT INFORMATION
Agriculture in General	Ag for Life	www.agricultureforlife.ca info@agricultureforlife.ca
	Alberta Agriculture and Forestry	www.agric.gov.ab.ca
	Agriculture & Agri-Food Canada	www.agr.gc.ca
Agrology	Alberta Institute of Agrologists	www.aia.ab.ca
Barley	Alberta Barley	www.albertabarley.com
Beef Cattle	Alberta Beef Producers	www.albertabeef.org
Bison	Bison Producers of Alberta	www.bisoncentre.com
Canola	Alberta Canola Producers Commission	www.albertacanola.com
Chicken	Alberta Chicken Producers	www.chicken.ab.ca
Dairy	Alberta Milk	www.albertamilk.com
Eggs	Egg Farmers of Alberta	www.eggs.ab.ca
Farm Animal Welfare	Alberta Farm Animal Care	www.afac.ab.ca
Forage Seeds	Peace Region Forage Seed Association	www.peaceforageseed.ca
	Alfalfa Commission of Alberta	alfalfaseedab.com
Goats	Alberta Goat Breeders Association	www.albertagoats.com
Honey	Alberta Beekeepers Commission	www.albertabeekeeperscommission.ca
Oats	Alberta Oat Growers Association	www.poga.ca
Pigs	Alberta Pork	www.albertapork.com
Potatoes	Potato Growers of Alberta	www.albertapotatoes.ca
Pulses	Alberta Pulse Growers	www.albertapulse.com
Sheep	Alberta Lamb Producers	www.ablamb.ca
Sugar Beets	Alberta Sugar Beet Growers	www.albertasugarbeets.ca
Turkey	Alberta Turkey Producers	www.albertaturkey.com
Wheat	Alberta Wheat Commission	www.albertawheat.com

TEACHER RESOURCES

AG FOR LIFE EDUCATION SYMPOSIUM

Attend a day of professional development and learn how to bring agriculture into your classroom.

KNOW YOUR FOOD TRAILER

Hitting the road in the fall of 2021, bring this mobile classroom to your school for an interactive introduction to all things Alberta agriculture.

FEED YOUR FUTURE

An exclusive half-day event for high school students who have an interest in agriculture and the diverse nature of career opportunities in the industry.

CLASSROOM AGRICULTURE PROGRAM

Grade four classes are invited to participate in this program that brings a volunteer from the agriculture industry into your classroom for an interactive presentation; please sign up at www.classroomagriculture.com.

AG 101: FOOD AND FARMING PROGRAM

Ag for Life will set up an interactive day of learning about agriculture in your school for junior high and high school students. Topics can be tailored to suit your students' needs.

SUSTAINABLE YOUTH CHALLENGE

Engage students with the UN's Sustainable Development Goals and provide opportunities to pioneer innovative solutions that address some of the world's biggest challenges related to agriculture, food production, and sustainability.

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Students take on the role of the investigative reporter as they consult with agriculture experts to gather information and craft a compelling story about "Farming in the 21st Century."

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Understanding modern agriculture and the role it plays in the world is more essential than ever. Journey 2050 is a FREE sustainable agriculture education program that allows schools to experience agriculture like it has never been taught before.

For more information, visit our website at agricultureforlife.ca or email us at info@agricultureforlife.ca

PROJECT AGRICULTURE

We all have opinions about food – how it's raised or grown, what's in it, who's producing it, and how healthy it is. But what do we really know about our food system? What shapes our attitudes about food and farming? What's the science involved in food and farming? What's the latest on sustainability? We'll show you what Alberta agriculture is all about.

www.projectagriculture.ca

THANK YOU

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Alberta Milk

Alberta Oat Growers Association

Alberta Pork

Alberta Pulse Growers

Alberta Sugar Beet Growers

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Bison Producers of Alberta

Egg Farmers of Alberta

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Potato Growers of Alberta

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