TIPS•FOR•TOURS

Farm Tour Tips for Teachers

BRITISH COLUMBIA INVESTMENT AGRICULTURE FOUNDATION

British Columbia Agriculture in the Classroom Foundation

BRITISH COLUMBIA Ministry of Agriculture and Food

This document has been compiled by the
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in cooperation with:

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Why Choose a Farm for a Field Trip?

Farm tours are a delight to all who attend. At the same time farm tours will help teachers to meet the prescribed learning outcomes in the following areas:

Prescribed Learning Outcomes

Grade K-1
Life Science - Science

- Describe the appearance and behaviour of a variety of animals
- Determine the requirements of healthy plants and animals
- Identify the stages in the life cycle of an animal
- Demonstrate how plants and other organic material can be recycled back into then environment

Grade 2/3
Science-Life Science (Animals in the Environment)

- Compare and contrast different types of animal life cycles
- Compare and contrast plant and animal life cycles
- Describe structures that enable animals to survive in different conditions

Social Studies
Society and Culture

- Describe ways members of a community meet one another's needs
- Identify contributions of various occupations to BC's communities
- Describe how technology affects individuals and communities
- Describe the historical development of various BC communities

Grade 4
Science-Life Science (Body Systems and Digestion)

- Compare and contrast the digestive systems of humans and various animals
- Describe the basic structure and function of the organs involved in digestion

Earth and Space Science –Water

- Categorize the various uses of water

- Outline the importance of water to life
- Describe human impacts on the Earth's water resources

Social Studies Environment

- Analyze how people interact with their environment in the past and in the present
- Demonstrate an understanding of why immigrants come to Canada, the challenges they face and their contributions to Canada

Grade 5
Science-Life Science (BC's Living Resources)

- Identify living resources in the local environment
- Describe how humans use BC's living resources
- Describe the known and potential environmental impacts of using BC's living resources
- Devise a strategy for sustaining a living resource

Applications of Science

- Describe the technologies that allow humans to extend their natural abilities
- Identify ways that science is used responsibly in their communities

Social Studies Economy and Technology

- Analyze the relationship between the development of communities and their available resources

Environment

- Demonstrate an understanding of sustainability, stewardship, and renewable versus non renewable natural resources
- Assess effects of lifestyles and industries on local and global environments

Society and Culture

- Demonstrate understanding of why immigrants come to Canada, the challenges they face and their contribution to Canada

Grade 10
Social Studies Economy and Technology Canada 1815-1914

- Identify factors that contributed to the economy of BC (What did the activity entail? How did it contribute to the local and provincial economies? Did the industry expand or decrease? What were the career opportunities?

Environment (Canada from 1815 to 1914)

- Identify key local and provincial resource development issues from 1815 to the present, considering the concepts of stewardship and sustainability.

Farm Tour Topics

A farm tour provides the opportunity to raise awareness of the role of agriculture and food production in our daily lives.

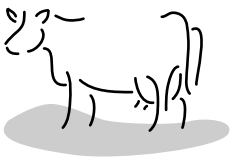
Agriculture is a business that affects all of us within our communites. During the course of a tour students can begin to understand the multifaceted role of a farmer— in the stewardship of the land and the farm, in the care and well being of the livestock, in the machinery and technology and in the interactive role with the community. Some of the topics that can be introduced are the:

- history of farming, the farm family, how farming has changed, plights and joys of farming, the farm lifestyle;
- importance of agriculture in providing diverse career opportunities;
- top quality products BC agriculture has to offer, the types of foods produced and the process by which they reach the consumer;
- costs of farming—how a tractor compares to a car
- relationship of farm animals and crops to the food and non-food products we use daily;
- chemicals used on a dairy farm both natural and artificial; their use and handling; chemical costs and alternatives;
- safety standards for workers and for food handling and preparation;
- weather and seasons— impacts on farm and production
- problem solving and innovations;
- animals on the farm—their similarities and differences; the variety of crops and types of animals; care of animals; products derived from the farm;
- role technology has in improving the safety and quality of agriculture and the products it produces.

Farming is our "bread and butter". Seeing, breathing and experiencing farming helps all of us see how we are connected in the most basic of all things—food.

Planning and Arranging a Tour

Choosing a Farm



Not all farms are created equal. Some farms may have more emphasis on one subject area than another. Time of year or season will also effect what you see and the availability of staff to assist you in answering your questions. Dairy farms for example are busiest during the spring, summer and early fall months as field work adds to their already busy schedule.

To determine which type of farm and the best time of year to visit review the following:

Farm Type	What You May See	Farm Availability
Dairy Farm	Wide range of activities both plant and animal. Use of technology e.g. computers, machinery and a systems approach (milking equipment).	Best time is in winter.
Fruit and Vegetable growers	Product on the vine, tree, root. Machinery in use. Some may have a processing plant on-farm.	In fall during harvest is best but availability may be limited.
Sheep Farm	Life cycle, animal care, feeding will be highlights. Machinery or technology may not be highly visible although computers will be used for accounting/records.	Spring-(March/April) after lambing.
Goat Farm (Dairy)	Similar to a dairy cow operation but with goats. Some may have a processing plant in close proximity to goat operation.	Winter is best.
Greenhouse Flowers	Check with grower.	
Greenhouse Vegetables	Check with grower.	Fall during or after harvest.

Tip: For a list of farm tours you can contact the BC Dairy Foudation at 1-604-294-3775 or find them on the web at: **www.bcdf.org** or look for BC Agriculture in the Classroom at: **www.aitc.ca/bc** and look up farm tours in your area.

Link the Farm Tour with the Classroom Studies

- Use videos and Agriculture in the Classroom materials to give students some insights as to what they may see during the visit.
- Find out if anyone has a family member who farms. Get them to share their experiences.
- Review, *Grow BC a Teachers Handbook* to become familiar with the different types of farm productions.
- Have the students prepare some questions ahead of time.
- Learn how to milk a cow— it takes about 10 minutes for an experienced milker to milk a cow that takes a machine half the time. To experience this first hand you will need: rubber gloves, pins and water. Poke a small hole in the bottom of each finger. Fill glove with water and hold open end firmly with one hand. To "milk" pull down and gently squeeze on one of the fingers.
- Worksheet for bus ride—spotting items on the way that relate to agriculture.

Prior to the Tour

- ❑ Book the bus or arrange car pooling.
- ❑ Permission slips sent, returned and signed by parent or guardians prior to the event.
- ❑ Visit the farm and go over the tour plan if possible.
- ❑ Arrange for volunteer supervisors.
- ❑ Complete *Information Sharing Form* in this package.
- ❑ Equipment—camera, video, note pads, pencils, first aid kit.

Last Minute Reminders

- Wear easy to clean warm clothes and wear waterproof footwear for wet weather.
- Use washroom facilities before you leave the school.

Other possible stops or things to note while enroute:

1. Processing plant
2. Farmer's market, grocery store
3. Other farms
4. Agricultural research station
5. Agri-business—e.g. feed mill, farm machinery dealer

Information Sharing Form

For the teacher to fill out.

Before the Tour

- Pre-Visit the farm and go over tour plan if possible
- Pre-payment of contract
- Arrangement of specific activities or achievement of specific goals

Things the farmer needs to know

- Teacher's name_____
- School_____
- Contact #_____
- Age level of the group_____
- Number of children and supervisors (does not include one teacher per class)

Children_____ Supervisors_____

Recommended ratios of children to adults:

1. *Primary (kindergarten-Grade 3):*
   6 children to 1 adult
2. *Intermediate (Grades 4-7):*
   10 children to 1 adult
3. *Secondary (Grades 8-12):*
   supervisors if any children with special needs or behaviour problems

- Topics the teacher would like introduced

_____

_____

_____

_____

- If there are any special needs children (e.g. wheel chair accessibility) or children with allergies (e.g. hay allergies)

_____

_____

_____

- What are the hours, days or months that the visit is preferred_____

For the farmer to fill out.

Things the teacher needs to know

- Name of farm_____
- Contact name_____
- Contact #_____
- Type of farm_____

_____

_____

- What specific time limitations are there (e.g. they must be gone by 2 pm before milking)

_____

_____

- Appropriate clothing (e.g. rubber boots, jackets, rain gear, etc.) required

_____

_____

- Restrictions on group sizes. If they will need to be divided into supervised smaller groups

_____

_____

- Any monetary charges for visit or for snacks (e.g. cartons of milk)_____

_____

- Contract required: yes ❑ no ❑

Location of the farm

- Provide a map with a clearly marked route. Indicate distance from the school.
- The type of parking facilities and distance to the assembly area—is there capacity for cars (car pooling) or buses.
- Where to assemble upon arrival

During the Visit

- Class supervision is necessary during the entire visit. **Ensure that parents agree to stay focused on the tour at all times. The farm tour is educational and not a time to socialize.**
- Follow the farmer's rules for your safety around animals, machinery, equipment and structures. Remember the farm is a working farm and like any manufacturing workplace dangers are possible.
- Avoid loud noises and sudden movements. These will frighten the livestock and potentially create dangers for you reducing production for the farmer.
- Always be on the lookout for potential hazards. What may seem obvious to him/her as a danger, may not be to you and your group.
- Students or teacher/supervisor collect memories

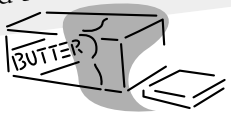
1. Take pictures for school displays. Remember some pictures, drawings or stories written by the children may be appreciated by the farmer too.
2. Tape sounds.
3. Samples of feed, hay (with permission from farmer). Bring plastic grocery bags.

What to do After the Visit

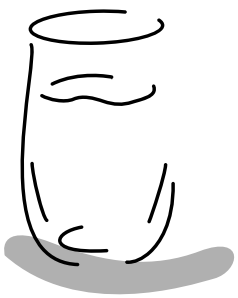
- Use the notes, pictures, samples collected and make illustrated big books.
- Library display of farming and related books.
- Career day—listing and outlining all the various careers—invite professionals to the class.
- Theme week or skit to share with a wider audience within the school.
- In-depth research of some of the issues revealed during the farm visit.
- Art display of farm sights and activities.
- Poster contest of what farming is all about or where food comes from.
- Arrange for an "adoption"—follow the growth of a dairy calf from birth to her first calf.
- Use Agriculture in the Classroom lesson plans where available.
- Take a product, e.g. jug of chocolate milk, and determine all the job related activities.

Make butter

You will need: glass jar with a lid and cream. Pour about 1 cm of cream into a jar, close lid and shake the jar vigorously until the cream turns into butter. It will take about 5–10 minutes of very vigorous shaking. Add salt to taste.



- Create a board game with issues and dangers concerning the farmer's operation.
- Create a model of the farm.
- Consider entering agriculture models and issues in Science Fairs.
- Chronicle a week in the life of a farmer.
- Consider incorporating *Butter Churns and Stern Wheelers* – grade 4-5
- Compile a catalogue of (milk) products or create a sales flyer advertising things a farmer might need.
- Collect recipes for a (milk) cookbook. Try one of the recipes with the class.
- Compose a song about the farm or product produced on the farm visiting, e.g. update and rewrite, "Old MacDonald's Farm".
- Research why some people are allergic to milk
- Collect ads about milk and other beverages (e.g. colas)—compare the nutrition and the language changes.
- Find out how many famous stories, riddles, sayings have farm terms in them, e.g. Jack and the Beanstalk; "Don't cry over spilt milk".
- Math relationships. Determined how many litres of milk one cow would produce. (See trivia section.) Get the children to keep a list at home how much milk they use on cereal, in milk drinks, parents coffee, butter on toast, etc. Could they keep a cow at home?
- "Tasting" Centre—do a taste test
    1. Compare homo, 2%, buttermilk, skim, powdered milk, chocolate milk, organic milk.
    2. Have children taste each sample and record their comments.
    3. Graph results.
    4. Have a selection of many different product cartons/packaging—talk about all the people involved to get the raw product to this stage.



Related Dairy Facts

- All cows are female.
- Males are called bulls.
- The most common breed is the Holstein, (black and white cows) and it represents more that 85% of Canadian dairy herds. Ayrshire, Jersey, Brown Swiss, Canadienne, Guernsey, and Milking Shorthorn make up the remaining 15%.
- A Holstein's spots are like a fingerprint or a snowflake. No two cows have exactly the same pattern of spots.
- A cow sees in black and white, not colour.
- Cows have difficulty judging distances.
- Cows have extremely sensitive hearing and can detect sounds that people can't hear.
- Cows require clean and dry environments in which to sleep, eat and bear their young.
- Cows require fresh, well balanced diets that include forage, grains, minerals, vitamins and water. Cows prefer to eat all day, with peak feeding times after activities like milking.
- Cows are mammals and like all mammals produce milk for their young.
- The cow must be a mother before she will produce milk.
- When a dairy cow reaches about 15 months of age she is bred, usually by artificial insemination. Pregnancy in a cow lasts about 9 months.
- Once she calves (gives birth) she continues to give milk for approximately 10 months and then has a 2 month holiday just before she calves again.
- A newborn Holstein calf weighs about 45kg and can walk within one hour after birth.
- The manure a cow produces contains nutrients. The farmer collects all the manure produced, store it and reuses it on the land as a fertilizer or soil conditioner when the plants need it most. The farmer may even bag it and sell it to the local garden store for your garden.
- If a cow gets sick she will be treated and may be given antibiotics.
- Antibiotics are medicines that help the cow fight infections. The farmer works with a doctor (veterinarian) and under his/her advice will provide medicine to the cow. The farmer or vet will take great care in the amount and way they give medicine to the cow. Antibiotics if not used properly will find their way into the milk.
- To be sure antibiotics do not enter in the milk, a sample is taken from every load of milk before it leaves the farm. That sample is tested and if antibiotics are found , the load is destroyed and the farmer heavily fined. If this is a continual problem the farmer may even loose his license to ship milk.
- Cows are built to graze and eat lots of grass. Their cloven hooves provide the traction to walk on pastures, and their large rumens (stomachs) allow them to consume large quantities of grass to digest later when no predators (concerns) are about.
- Milk cows usually have their ears pierced with I.D. tags. Each cow has a different number that allows the dairy farmer to track her activities by computer. The cow's milk weigh may be recorded in the computer as well as any medicines she receives.

- Dairy producer supplies to the community:
    1. milk,
    2. manure (fertilizer), and
    3. markets (machinery sales, seed/ fertilizer sales, veterinarians, processors, etc.).
- Approximately 70% of dairy farmers are located in the Fraser Valley because:
    1. easy access to all supplies (equipment, feed, chemicals, processors, expertise, etc.);
    2. good growing soil from the rich soils of the old Sumas Lake bed and Fraser River tributary;
    3. climate—moderate and long growing season; and
    4. location to amenities.
- Dairy farmers grow grass, clover, grains (in the Peace River region), alfalfa (Interior region).
- A number of people are involved in getting the milk from the farm to the table:
    1. dairy farm owner, manager and staff (milkers, herdsmen, field personnel);
    2. producer, breed and industry associations;
    3. artificial insemination technicians;
    4. dairy herd improvement (record keeping) advisors;
    5. veterinarians;
    6. milking equipment, farm equipment, building and facility suppliers;
    7. feed producers and nutritionists;
    8. dairy processor field representatives;
    9. government inspectors and advisors;
    10. government and university researchers;
    11. milk tank truck drivers;
    12. milk product deliveries; and
    13. store owners and employees.
- A cow that is being milked can eat up to 40kg of grass, forage, and hay a day and drink up to 170L of water a day, especially on hot days. That's over a bathtub full.
- A cow's diet is supplemented with feeds such as barley, wheat, soybean and canola meal.
- A cow's diet is formulated and fed according to the energy, protein and other nutritional needs of the animal.
- On the top front part of the jaw, cows have a tough pad of skin instead of teeth. They have 8 incisors on the bottom front and 6 strong molars on the top and bottom of each side to grind their food. Cows have a total of 32 teeth. Cows use their tongue against the pad to rip the grass.
- Cows are ruminants and regurgitate their food and chew cud. A cow spends a lot of time eating—up to 8 hours per day.
- A cow has 4 parts to the stomach—rumen (the largest), reticulum, omasum and abomasum. It is the abomasum that is the most like ours.
- Dairy farms use large volumes of water. A milking parlour uses water to wash down the facility and the equipment before and after every milking. The farmer will also use water for irrigation, flushing manure from the barn, for the cows to drink and in hot weather he may even use it to spray cows to keep them cool.
- The amount of water required by a dairy animal is affected by her body size, the amount she eats, how fast she grows and how much milk she produces, as well as by salt consumption and outside air temperature. The more she produces the more water she needs. e.g. A cow producing 40 kg milk/day will drink 100-150 litres/

day, while a cow producing only 20 kg milk/day will drink 65-100 litres/day.

- Cows have adapted well to their environment, but do not change that much from season to season. Some extra hair growth will occur, but the cow primarily depends on the farmer to help keep her warm in the winter—he/she provides warm, well ventilated barns and well bedded stalls. In the summer, the farmer provides her with shade and may even sprinkle the cows with water to keep her happy and cool.
- Farming is a way of life. Dairy farmers work 365 days of the year, from morning to night. They do not have to commute to work – just walk to the barn.
- Changes from past to present
    1. Past—one farm was often diversified, i.e. had a variety of animals and crops; often only fed the family members or a very small community; work was done byhand and horse.
    2. Present—one farm, one role, if there is any diversification it may be on a separate farm, run by a manager or other family member; feed a large number of people with the volume produced; and use a large amount of technology and equipment to run the farm.

- Majority of dairy farmers that settled in BC were from Europe. Today's "new" farmer comes from Asia, the Middle East.
- The average cow produces 30 litres of milk a day and is milked for 10 months a year, which equals approximately 9,000 litres of milk per year per cow. That's an average of 100 glasses of milk per day, every day of the year. This amount would fill up 53 bathtubs.

•Milking machines are used to milk a cow. The cows go into a milking barn, their udders are cleaned and a rubber lined suction cup is attached to the teat. The suction cup simulates the suckling action of a calf nursing. The suction cup or claw is attached to hoses and pipes which collect the milk in a holding tank. The milk is then quickly cooled. Cows are milked twice and sometimes three times a day, usually at the same times each day. All equipment used for milking is thoroughly cleaned and sanitized before and after each use.

- It takes approximately 5 minutes to milk a cow by machine—by hand would take at least 10 minutes.
- Machine milking has been around since the early 1920's. Milking machines were not commonly used until sometime after the 2nd world war. As herds became larger providing product beyond the family needs, the farmer needed to become more efficient, and provide a better quality product. Machine milking allowed for more cows, fewer labour costs and as the technology advanced, better milk quality as contamination via milker's hands and open buckets were greatly reduced.
- Dairy farms are inspected and certified before they can produce milk. This includes: all milking equipment, milking procedures, milking parlour and barn—everywhere the cows go must be kept clean and well maintained.
- Biotechnology has created better livestock and crop varieties that are more disease-resistant or better quality. Biotechnology has improved foods, feeds, fertilizers, disease vaccines and pest control products so they have more desirable traits that they had before. Biotechnology uses biological

processes to produce substances that help agri-food production, the environment, industry and medicine. This has been going on for thousands of years. For example technology has:

1. developed plants through genetics which are more nutritious;
2. developed animal vaccines using microorganisms;
3. developed plants that take nitrogen from the air more effectively and therefore help reduce the amount of nitrogen fertilizers needed;
4. introduced computers to keep track of how much each cow eats, how much milk each cow produces and even to match a particular cow with a particular bull for breeding. Farmers also use them for finding information (internet) and financial accounting.

- To ensure the safety of milk, it is pasteurized. This is the process of heating milk quickly to 72°C and cooling it very rapidly to 4°C. This kills any harmful bacteria that may find its way into milk. Pasteurizing milk helps keep milk fresh longer by destroying spoilage bacteria.
- To insure milk quality and safety it undergoes many tests by a certified laboratory, before it is accepted. Other tests are carried out from time to time to ensure purity of the product.
- Before homogenization, the cream always rose to the top. Today, most milk is homogenized. Homogenization ensures that the cream is thoroughly mixed throughout the product so that it does not separate out. This process doesn't alter any of the nutrients found in milk.
- Throughout the entire process from the time the cow is milked until the milk is packaged, milk is never touched by human hands.
- The dairy (processing plant) is also inspected regularly for cleanliness, handling procedures and equipment standards. All milk contact equipment is cleansed and sanitized on a daily basis - failure to do so would result in bacterial spoilage before the "best before" date found on every milk container. Every dairy and their employees who work in the processing area must be trained in food safety and licensed.
- Milk is usually packaged within 24 hours of arriving at a dairy plant.
- Even packaged dairy products are regularly tested by a certified laboratory for composition to ensure the product contains what it claims. This is also the final check point to ensure the product meets the standards established for quality and safety.
- Dairy products at retail outlets are subject to random sampling as a further check of their safety, quality and composition.
- The New World had its first exposure to domestic cattle in 1518, but it wasn't until Samuel de Champlain brought them to Quebec in 1608 that they became an enduring part of N. American agriculture.
- By 1660, breeding cows brought from Brittany and Normandy became the basis of the only breed of dairy cow developed in Canada—called appropriately enough—the Canadienne.
- 1884 Milk bottle invented by Dr. Hervey D. Thatcher, Potsdam, New York.
- In the 1890s there were no cars, few telephones and little electricity. Most of the work now done by gasoline and diesel powered equipment was done by the 17,000 horses in use on BC. farms in 1894.

- 1900– Modern milk distribution on a large scale began in Toronto, Montreal and Ottawa.
- The Canadian dairy sector has developed a cattle population of the highest genetic level in the world. This is based on strong milk recording and genetic evaluation programs, which have been in place in Canada since 1905.
- Tractors first appeared in the early 20th century and by 1922 numbered 332. Today there are well over 33,000.
- 1964 plastic milk container introduced commercially.
- 1973 BC entered the milk market-sharing quota agreement (model developed in 1970).
- Milk producers must strive for efficiency. They must become experts in many areas if the farm is to compete in today's markets. They must:
    1. work within the framework of milk pricing and quota systems;
    2. make optimum use of available feeds and strike a balance between costs and herd productivity;
    3. make good housing, feeding and production decisions in the cows best interest and health;
    4. keep records to monitor business decisions, herd improvements, health and production and improvement of cow productivity through breed selection; and
    5. promote land stewardship through effective cropping, soil management and minimize impacts on wildlife, water and air quality.
- Canadian cattle are free of all major cattle diseases, mostly due to its strict standards for disease control. This is the responsibility of the Canadian Farm Inspection Agency. Bovine spongiform encephalopathy (BSE) or Mad Cow Disease does not exist in Canada.
- Canada's dairy sector is a significant part of the Canadian agriculture and agri-food economy. In 1998, total net farm cash receipts from the dairy sector was approximately $4 billion. This puts the dairy industry in third place in the Canadian agriculture sector behind grains and red meats. Within BC, agriculture places 2nd in the order of contributors to the BC economy.
- The price dairy producers receive for that glass of milk is actually very minimal. For example, a glass of milk in a restaurant will cost, on average, $1.50. Of that $1.50, 16 cents go to the milk producer (who feeds the cows, milks the cows, transports the milk, etc.), 8 cents go to the processor (who pasteurizes the milk, processes and packages it), and $1.26 goes to the restaurant, where the milk is simply poured into a glass and carried to a table.
- An average BC dairy farm (milking 110 cows) in the Fraser Valley, including cows and quota would cost today an estimated $3.5 million. On a percentage basis, this represents: land (100 acres) 32%, house 1%, buildings 10%, equipment 10%, livestock 7%, and quota 40%. In 1912, a farm (which weren't specialized) would cost $1,685 (not including land) in total: house 34%, buildings 14%, equipment 9%, cattle (not all would be dairy) 6%.
- In 1998, dairy products shipped from approximately 270 processing plants were valued at more than $8 billion, accounting for 14% of all processing sales in the food and beverage industry in Canada.
- 26,000 people work on dairy farms, and almost 20,500 other workers are employed at the primary processing level.

- About 81 percent of Canada's dairy farms are in Ontario and Quebec, 14% in the Western provinces, and 5% are located in the Atlantic provinces. BC has 769 dairy farms.
- In 1998/1999, there were 1.2 million cows in Canada on 21,561 dairy farms, delivering 79.5 million hectolitres of milk
- The average Canadian dairy farm had 54 cows. BC's average dairy farm has 110 milking cows.
- Canadian dairy cattle, recognized for their disease-free status and their ability to produce high quantities of milk, are exported to over 50 countries. Major export markets are the United States, the United Kingdom, Mexico, Italy, Switzerland, Spain, Australia, Germany, Japan and Brazil.
- Although the number of farms in Canada has steadily declined in the last 10 years (1,467,000 in 1988, to 1,242,000 in 1998) the amount of milk produced has remained relatively constant. The reasons for this are:
    1. farms are becoming larger;
    2. better feeding, disease control and genetic advancements.
- Canadian dairy product exports totalled close to $401 million in 1998, an 8% or $27 million dollar increase from the previous year. Canada exports easily stored products like butter, milk powders, condensed and evaporated milks to developing countries. In the last few years, more and more value-added products such as cheese and ice cream have been exported to traditional and new markets.
- Dairy product imports into Canada totalled $313 million in 1998.
- Consumption of homogenized milk has dropped and skim milk has increased.
- The dairy processing industry makes a major contribution to the Canadian economy with shipments valued at $8.3 billion in 1998. Second only to meat processing, the dairy processing sector accounts for approximately 15 percent (1996) of the estimated value of all food and beverage industry shipments.
- 1996 Census data indicate that around 276 plants processed milk and milk products in Canada. These plants provided employment for slightly under 20,500 people and paid approximately $822 million in wages. Dairy processing is also indirectly responsible for thousands of other jobs in transportation, packaging, storage and marketing.
- Dairy processing plants are located in every region of the country. Milk is processed for two markets: fluid (table milk and cream) and industrial (dairy products such as butter, cheese, ice cream and yogurt). In 1997-98, approximately 79.1 million hectolitres of milk were processed for sale in Canada for these two markets. Of the 276 dairy plants in Canada in 1996, 168 were primarily industrial milk plants and 108 were fluid processing operations.
- The industrial milk processing sector (e.g. cheese, ice cream, yogurt) generates the greatest manufacturing activity with $4.6 billion worth of dairy products produced in 1996 with a value added of $1.1 billion. The sector employed close to 10,600 people, and paid wages of approximately $426 million.
- Fluid milk processors shipped $3.6 billion worth of goods, employed approximately 9,700 people and paid more than $395 million in wages in 1996. Given that fluid milk processing operations are located close to consumers, the provinces with the largest populations process the most fluid milk. Thirty-three percent of all fluid plants are located in Ontario. In 1996, Ontario plants

processed 2.4 billion litres of total milk and accounted for 34 percent of the value of total fluid shipments, at $1.2 billion. Quebec ranked second, with shipments valued at $913 million.

- Milk is natural—nothing is added except vitamin A and D which is required by law. Milk remains one of the purest and safest foods available.
- Milk is 89% water and 11% solids. The nutrients, such as calcium, riboflavin, vitamin A and protein are in the solids.
- An 8oz. glass of milk contains: 17% protein, 29% calcium, 23% phosphorus, 23% riboflavin, 25% vitamin D, 15% vitamin B-12.
- Used for religious ceremonies and as medicines.
- Cheese, like meat, contains complete, high quality protein. A 60 g (2 oz.) serving of cheese provides as much protein as an equivalent serving of chicken, meat or fish.
- The difference between whole (homogenized) and 2% milk is only 1.25%. In fact, 2% milk contains only 2% fat, while whole milk contains 3.25% fat. In other words, the difference between an 8 oz. glass of whole milk versus a 2% glass of milk is only 4 g of fat. An average man should aim for a maximum of about 90 grams of fat per day, an average woman about 65 grams.
- Fat is an essential nutrient and a concentrated source of energy that is especially important to young children. It also provides vitamins A, D, and E, and helps our bodies absorb them.
- Chocolate milk contains the sugar naturally found in milk (called Lactose) plus added sugar and cocoa. The amount of sugar present in chocolate milk is roughly equivalent to the amount of sugar found in an equal quantity of unsweetened orange juice.
- A 250 ml (1 cup) portion of chocolate milk contains approximately 207 mg of caffeine, or about the same amount present in a 5 oz. cup of decaffeinated coffee.

Glossary

Amino acids: Nitrogen-containing compounds that are the building blocks from which proteins are made.

Antibiotics: A class of drug usually produced by living organisms (molds, bacteria or green plants), which can inhibit or kill undesirable bacteria. Example: penicillin.

Available protein: The portion of the crude protein that can be used by the animal.

Average daily gain (ADG): The average daily liveweight increase of a growing animal, usually expressed in kg, g or lb/day.

Bacteria: Microscopic unicellular organisms found almost everywhere.

Balanced ration: A 24-hour feed allowance that provides an animal with appropriate amounts and proportions of all nutrients required for a given level of performance.

Barn: Place where animals, feed and/or machinery may be housed.

Breed: Variety of animals within a species. To produce offspring.

Bull: Adult male. Potentially a very strong, dangerous animal needed to be treated with respect and distance.

Butter: Fatty substance made from cream by stirring.

By-product: Feeds produced as a result of industrial manufacturing, plant or animal processing. Examples: distillers grains, beet pulp, meat and bone meal, fish meal.

Calf: Young dairy cattle that are between 0 and 6 months of age.

Carbohydrates: Major energy providing substrates including starches, sugars, cellulose and hemicellulose. All carbohydrates contain carbon, hydrogen and oxygen, and are usually divided into two fractions - structural (fibre) and non-structural (sugars and starches).

Chaff: Husks or other seed coverings and other plant parts separated from seed during harvest or processing.

Churn: An old time piece of equipment used to make butter from cream.

Claw: Term used to describe milking machine.

Colostrum : The milk secreted by female mammals for the first few days after giving birth. It is particularly rich in nutrients and antibodies essential for newborn survival.

Complete feed: A thoroughly blended mixture of different feed ingredients formulated to meet specific nutrient requirements.

Concentrate: A mixture of different grains fed to the cows in order to meet the animals nutrient requirements for growth, pregnancy and maintenance.

Cow: Mature female dairy cattle that are over 24 months of age.

Cream: Fat part of milk, which in unhomogenized milk would gather on top of the milk.

Crude protein: Composed of amino acids. Builds strong cows that produce good milk.

Dairy: A room or building used for storing or processing milk and milk products.

Digestion: The changes that occur to a feed within the animal's digestive tract to prepare it for absorption and use.

Dry matter: Feed residue left after all moisture has been removed by drying (i.e., 100% dry matter).

Dry matter basis: An expression of feed nutrient content after the moisture has been removed by drying. Used to compare nutrient composition or animal intake of feeds differing in moisture content.

Energy: A nutrient essential for maintenance, growth, production and reproduction. Energy is required in larger amounts than any other nutrient except water, and is often the limiting factor in livestock production.

Enzyme: A complex protein compound produced in living cells which speeds up chemical reactions without itself being changed or destroyed. It is added to animal feeds to supplement low enzyme production by some young animals or to improve utilization of feeds.

Escherichia coli *(E. coli)*: E. Coli is of the coliform group, which are organisms associated with the intestinal tract flora. Presence of coliforms is usually an indication of unsanitary handling or processing procedures.

Farm holding tank: A refrigerated stainless steel tank used to store milk and keep it cool between 0 and 4 °C.

Fat (nutrient): A term used in a general sense to refer to both fats and oils. Fat supplies 2.25 times as much energy as carbohydrates. Both fats and oils share the same general structure and chemical properties, but have different physical properties, i.e., oil is a liquid at room temperature, while fat is a solid.

Feed additives: Products added to basic feed mixes to improve the rate and/or efficiency of gain, prevent certain diseases, or preserve feeds.

Feed processing: Physical or chemical changes made to feed to make it more nutritious, e.g. pelleted grain, flattened grain, chopped hay, cubed hay, silage.

Food-borne illness: The sickness resulting from eating food contaminated with either bacterial toxins or by certain bacteria in the food, often resulting in vomiting and/or diarrhea.

Forage: Plants or plant parts fed to, or grazed by, domestic animals. Forage may be fresh, dry or fermented (pasture, green chop, hay, haylage or silage). Term is often used interchangeably with roughage.

Free stall: Bedding area in a barn, that holds one cow. Cow can come and go as she pleases.

Grain: Any of the common cereal seeds e.g. oats, barley, wheat.

Hay: Dried, cut forage packaged in the form of bales that can be small square bales weighing around 35 kg to large 1 tonne round or square bales.

Heifer: A young cow between the ages of 6 months and 24 months, that has not had a calf.

Homogenize: To process milk so that the fat globules are finely divided and emulsified that the cream does not separate on standing.

Louis Pasteur: French chemist and bacteriologist who lived from 1822-95. He showed in 1857 that the souring of milk was due to the growth of organisms. He performed experiments using heat to destroy undesirable microorganisms in beer and wine. Heating (pasteurization) to remove undesirable organisms was introduced commercially in 1867.

Metabolism: All of the chemical changes nutrients undergo following absorption from the digestive tract.

Micronutrient: Any ingredient, such as minerals, vitamins or drugs, added in very small amounts to a ration.

Microorganism: Any microscopic animal or plant-like organism including bacteria, yeasts, viruses and single-celled algae.

Milk replacer: A substitute for fresh whole milk, fortified with vitamins, minerals and sometimes antibiotics; used as a nutrient source for young animals.

Macro (or major) minerals: Minerals required in relatively large amounts by livestock. Includes calcium (Ca), phosphorus (P), magnesium (Mg), potassium (K), chlorine (CI), sulphur (S) and sodium (Na).

Micro (or trace) minerals: Minor mineral elements required in very small amounts in the ration of animals. Includes manganese (Mn), copper (Cu), zinc (Zn), selenium (Se), iron (Fe), cobalt (Co), iodine (I) and fluorine (Fl).

Minerals: Inorganic feed elements essential for life.

Mineral supplement: A rich source of one or more mineral elements.

Monogastric: An animal having a single or simple stomach system. Example: swine.

Nutrients: Feed components required for the maintenance, production and health of animals (water, carbohydrates, lipids, proteins, minerals and vitamins).

Nutrient requirements: The minimal amounts of nutrients (energy, protein, minerals and vitamins) necessary to meet an animal's minimal needs for maintenance, growth, reproduction, lactation or work.

Palatability: The appeal and acceptability of feedstuffs. Affected by the taste, odour, texture and temperature of the feed.

Parlor: Area in the barn used to milk cows.

Pasteurize: The controlled heating of a food to a very high temperature for a very short time period in order to destroy all harmful bacteria.

Pathogen: Any microorganism that can cause disease. Salmonella is always considered a pathogenic microorganism. E. Coli is considered an opportunistic pathogen. It is not always pathogenic, but given the opportunity, it can cause food-borne illness.

pH: A measure of acidity or alkalinity. Values range from 0 (most acidic) to 14 (most alkaline or basic). A ph value of 7.0 is neutral (neither acidic nor alkaline).

Pasture: A fenced grass field.

Protein: Naturally-occurring compounds containing nitrogen, carbon, hydrogen and oxygen, and sometimes sulphur or phosphorus. Proteins are made up of complex combinations of amino acids and are essential for animal growth, production and reproduction.

Ration: A diet that may include grains, minerals, vitamins, salt, forages. The 24-hour feed allowance for an individual animal.

Roughage: A term used to describe a feed high in fibre (greater than 18% crude fibre). Roughage tends to be bulky, coarse, and low in energy. Examples: hay. Silage, straw.

Ruminant: A cud-chewing animal having four stomach compartments. The rumen (first stomach), is a major site of microbial fermentation of feeds permitting breakdown of fibre. Examples of ruminants: cattle, sheep, goats.

Salmonella: A group of organisms named after a U.S. veterinarian, D.E. Salmon. There are over 2,000 species within the genus Salmonella that will infect man. These rod-shaped bacteria cause various diseases in man and animals, including typhoid fever and food poisoning.

Saturated fat: A completely hydrogenated fat. Saturated fats are solid at room temperature. Example: animal tallow.

Screenings: Small, imperfect kernels, broken grains, hulls, weed seeds and other foreign material obtained from the cleaning of grain.

Separator: A type of equipment used to separate milk from the cream.

Silage: Feed preserved by an anaerobic (no oxygen) fermentation process. Examples: corn silage, haylage, high moisture corn.

Silage additives: Substances added during the ensiling process to enhance the correct and rapid fermentation of the feed.

Silo: Structure used to store forage. Stores it in a manner that prevents spoilage over long periods of time.

Skim: To skim is to remove the cream or fat from the liquid (milk).

Steer: A castrated bull.

Sterilization: The process of eliminating all viable life forms; nothing is left living in a sterilized product.

Sweet feed: A commercial feed sweetened with molasses to improve palatability.

Teats: Nipples on the udder. The claw is attached to the teats

Tie stalls: Stalls or beds where an animal is designated to and can not roam free.

Total mixed ration (TMR): All ration ingredients, including roughages, mixed mechanically to provide one homogenous mixture. TMRs are used in large dairy or beef feedlot operations.

Udder: The part of the cow that produces milk (mammary gland).

Unsaturated fat: Any fat that is not completely hydrogenated. Unsaturated fats are liquid at room temperature. Examples: corn oil, vegetable oil.

Vitamins: Organic compounds that function as parts of enzyme systems essential for many metabolic functions.

Yogurt: Made from milk that has been "thickened" by the addition of special food safe bacteria.

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