

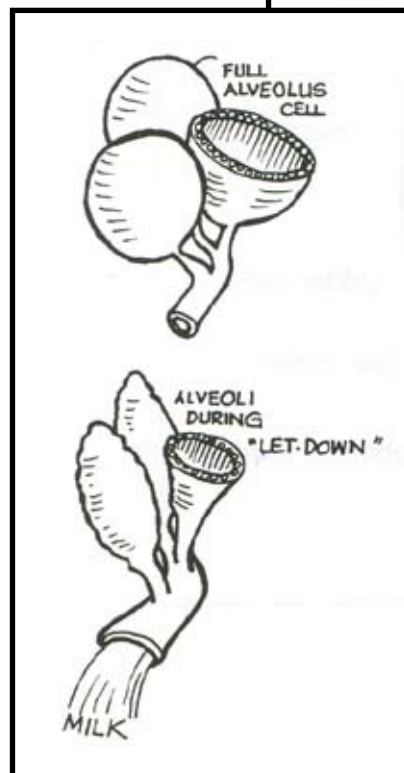
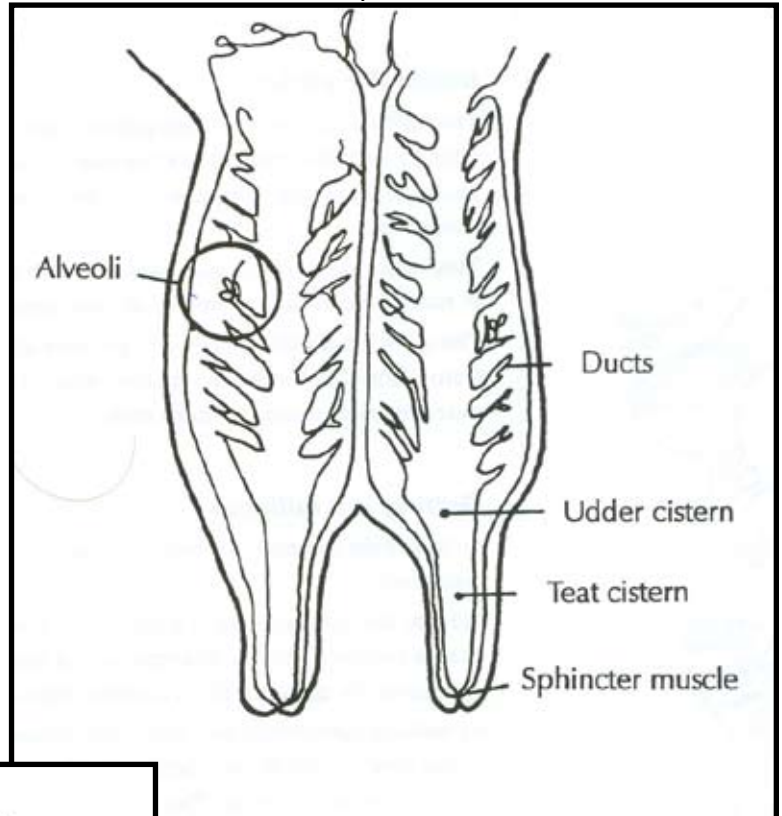
Milk Production & Marketing

Milk production is a full-time job – 365 days a year – for both the producer and their herd of cows. Whether they are eating, drinking, chewing their cud, or lying down: cows' bodies are constantly making milk. It is the farmer's job to ensure that the cow and her udder are healthy due to a suitable environment and a proper milking procedure.

It All Starts in the Udder

The udder is made up of four glands called quarters and each quarter is full of milk producing tissue. While the quarters seem like different compartments, they are connected, similar to rooms in a house that do not have doors separating them. The milk produced remains in the compartment it is produced in, but it is possible for viruses, diseases and antibiotics to pass from one quarter to another.

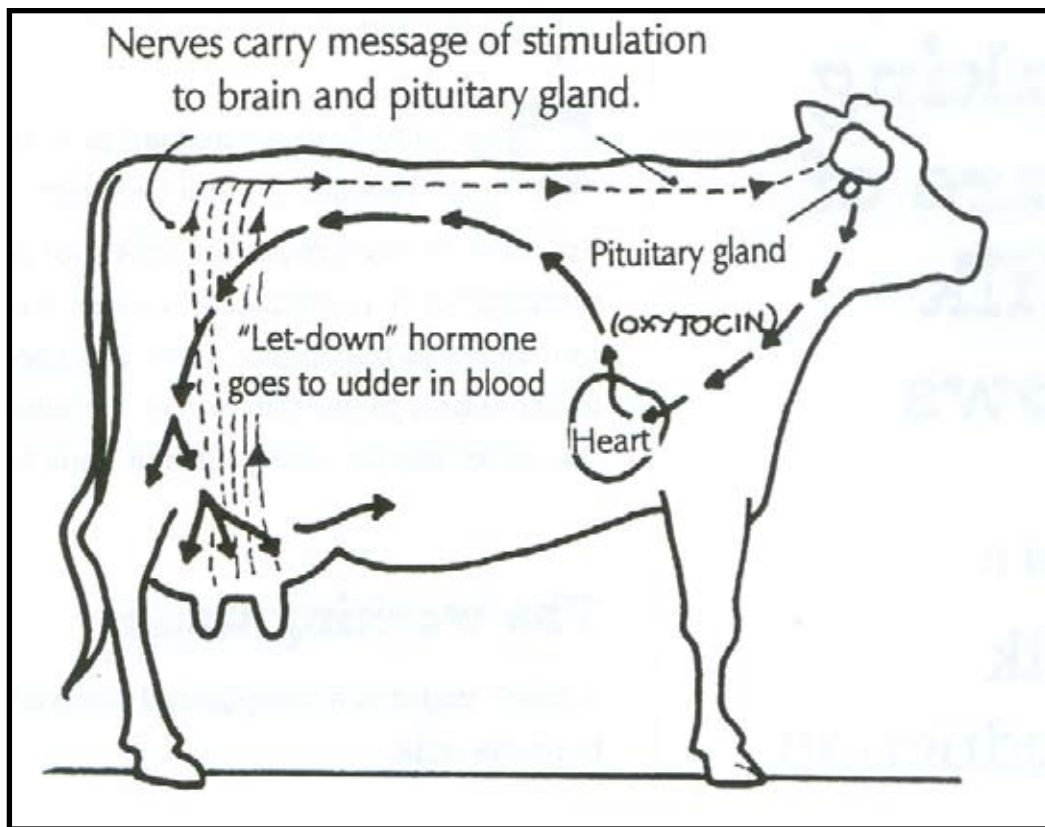
Inside each quarter are thousands of tiny cells called alveoli. It takes the contents of thousands of cells just to make one droplet of milk. To produce milk, alveoli need energy, which comes from nutrient-rich blood flowing through the udder. Nutrients and energy pass from the blood into the alveoli cells so they can make milk.



Getting the Milk Out

Milk let down is an involuntary reflex action that a cow has no control over, just like when you automatically drop something hot that you pick up.

When it is time for a cow to be milked, washing and massaging the udder sends a message to the **pituitary gland** in the cow's brain telling her to start letting down her milk. In response, the pituitary gland sends a hormone called **oxytocin** through the blood to the udder. When it reaches the udder it sends a signal to 'squeeze' the milk out of the **alveoli cells**. When the milk leaves the cells, it travels down through the **udder cistern** into the **teat cistern**. The teats fill with milk and then the milking claw can be attached. The teat opening is held shut by a **sphincter muscle** at the bottom of the teat. When the milking claw is attached, the sphincter opens, letting the milk flow out. Cows who leak before the milking claw is put on them are often high producing cows with a lot of pressure on their teats or animals that have a weak sphincter muscle that cannot be kept completely closed.



Step by Step – Proper Milking Procedures Equal 10 Steps to Happier, Healthier Cows

Now that you know how the udder works, you need to know how to milk the cow!

1. Keep yourself clean

- The person milking the animals should have clean clothes and hands

2. Milk the cows at the same time every day

- The milking schedule varies from farm to farm. Most farmers milk their cows twice daily (2X milking), in the morning and late afternoon/early evening. However, some farmers choose to milk their cows three times daily (3X milking) to help increase their milk production levels.
- The cows should have a clean dry environment with little stress so that they are comfortable during the milking process.

3. Wash the teats with a warm sanitizer solution or pre-dip solution

- This kills germs and bacteria. It also massages the udder, sending signals to the cow's brain to tell her to let down her milk. The udder should be washed/pre-dipped and massaged for approximately 30 seconds to allow time for her brain to send the hormone oxytocin to her udder to let her milk down.

4. Dry the teats using a clean cloth or new paper towel

- Drying teats keeps dirty water from the wash process from getting into the milk. Using a brand new towel for each cow or using a new cloth that can be washed in a washing machine after drying each cow ensures that germs, bacteria and disease are not passed on from one cow to another.

5. Squirt a few streams of milk from each quarter into a strip cup to look for any problems

- Testing the milk in this simple way will let you know if the cow has a clinical mastitis infection. Since the first milk out was the milk at the bottom of the teats, it also contains more bacteria than the rest of the milk. You should discard this milk because the rest of the cow's milk (with fewer bacteria) is of higher quality.
- Squirted milk out also massages the udder even more, so the cow has more time for oxytocin release and becomes even more ready to let her milk down.
- Do not squirt milk into the stall below the cow because it will allow more bacteria to grow in an

area where the cow lies down or where another cow might come into contact with the poorer quality milk.

6. Attach the milking claw to the cow when her teats look full of milk (30 to 40 seconds after washing)

- Timing is everything! If you put the milking claw on too soon, the cow is not ready to let her milk down. If you put it on too late, her brain has stopped sending signals to her udder to let her milk down. Putting it on at the right time causes less damage to the udder because she is ready to let her milk down and the milking claw doesn't have to work as hard to squeeze the milk out.

7. Adjust the milking to make sure the cow milks evenly

- The milking claw should sit squarely under the quarters of the cow. If the milking claw is making a 'squawking' noise, it is sucking air and needs to be adjusted.
- If the hoses connecting the milking claw to the pipeline and/or vacuum line are too short, they will pull on her udder and make the cow feel uncomfortable. If they are too long, she may step on them and pull the milking claw off.

8. Remove the milking claw as soon as the cow is finished: DO NOT OVERMILK

- Getting every drop out of a cow's udder is not healthy and will make her feel uncomfortable as her teats get sore and germs can enter through the sore teat ends
- Cows usually take 4-6 minutes to milk out

9. To remove the milking claw, shut off the vacuum to the claw and remove it

- Never remove a milking claw that is still sucking on a teat because this will make the cow's teat ends sore

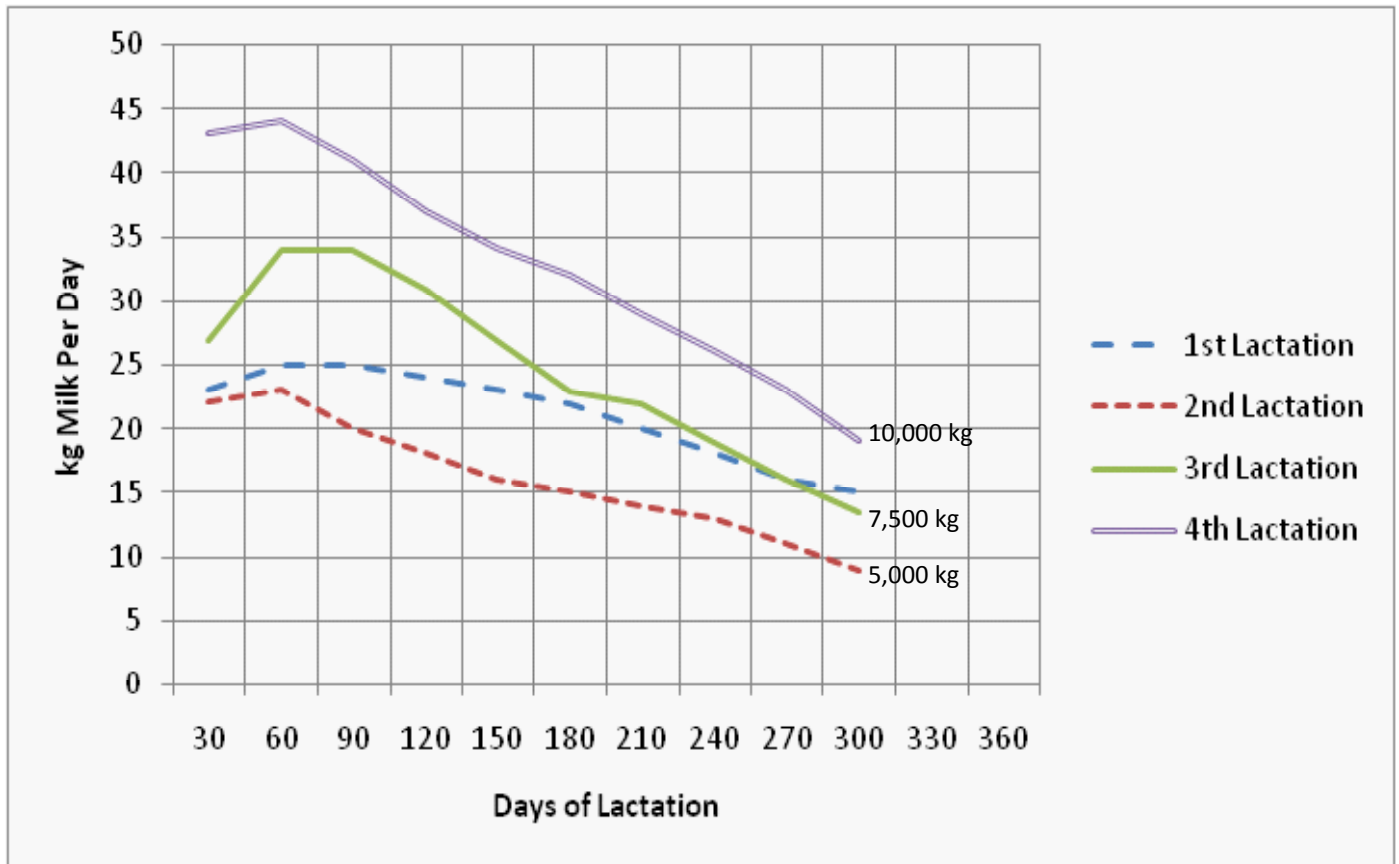
10. Dip the teats in teat dip

- Dipping kills germs and helps stop infections, especially during the vulnerable period right after milking when the cow's teat ends are still closing
- Lanolin or other moisturizers in teat dip also help to keep the teat skin soft and healthy
- The teat dip solution used must be approved by the Food and Drugs Act (Canada)

Lactation Curves – The Cycle of Milk Production

Just like Heifer Growth Charts are used to track of your heifer management program, a Lactation Curve is used to monitor the milk production of the herd and of individual cows. Lactation in dairy cattle refers to the period during which a cow gives milk after she has a calf.

The chart below shows typical lactation curves for lactating dairy cows at various levels of production. This diagram refers to milk production in kilograms, but it is also possible to track fat and protein percentages on a curve in the same manner.



From the diagram, it is possible to see that it takes between one and two months for a cow to reach her maximum milk production level, or peak production, after she calves. Once a cow reaches her peak, her milk production will drop steadily. When cows are four or five months pregnant after they have been rebred, milk production drops even more quickly. The area under the curve shows the total milk production for a particular cow during a given lactation. First calf heifers who have never given milk before will have lower peaks and less total milk production than cows who are milking on a later lactation.

The pattern of milk production for a cow depends on several factors, including genetics, nutrition, reproduction, health and general farm management. When herds and cows differ from typical lactation curves, farmers are alerted that there may be a problem and should adjust their program accordingly to maximize milk production and profitability.



Quality in Quantity: Food Safety is Very Important to Dairy Producers

Dairy farming facilities, animals and operating procedures are subject to stringent rules and regulations to ensure that milk being shipped from farms is safe. Ensuring that milk is a healthy and refreshing beverage starts at the farm level.

Quality refers to producing the best possible products with consistency.

There are many things a farmer can do to improve milk quality:

- Check the milking system twice a year for problems
- Sanitize milking equipment before and after each milking
- Follow proper milking procedures
- Prevent inhibitors by keeping detailed records of when cows are treated, what drug they are treated with and when their milk can go back into the bulk tank
- Reduce high somatic cell counts by developing a comprehensive mastitis control program
- Keep the barn and the cows inside it clean and neat

Milk is typically picked up at the farm every other day, ensuring that it is always fresh. The milk truck driver, a licensed Bulk Tank Milk Grader takes a sample of the milk on each farm. Milk is tested for its content of butterfat, protein, and other solids. It is also undergoes several quality tests, including:

- **Freezing Point** – the freezing point of milk (-0.54 °C) is slightly lower than that of water because of the solids in it. The freezing point varies a little bit from farm to farm and cow to cow, because each one has a slightly different component level. A farm with higher components in their milk will have a lower freezing point. Testing this temperature ensures that there is no excess water in the milk. If a farmer does not have enough milk to fill their quota and adds water to their tank to increase the milk volume, he or she will be penalized because the freezing point of the milk (and water) mixture will be too high.

- **Somatic Cell Count (SCC)** – somatic cells are the cells that fight infection in the cow's udder. When a cow has an udder health problem (i.e. mastitis), there is a high level of somatic cells present in the milk. When the cow's udder is healthy, the somatic cell number is low, although all cows have some somatic cells present in their udder. High somatic cell counts are thus indicators of infection which leads to poorer quality milk that could spoil more quickly.
- **Bacteria** – bacteria are germs that can make people sick. The test for bacteria is called a Bactoscan. High levels of bacteria will grow if the milking equipment is not cleaned properly or if the milk is not cooled properly and maintained at an ideal temperature (between 2 °C and 4 °C). Higher bacteria content results in milk that spoils more quickly.

Did you know?

The testing equipment can detect the equivalent of one droplet of contaminant (i.e. an antibiotic or inhibitor) in an Olympic-size swimming pool.

- **Inhibitors** – inhibitors are substances other than bacterial culture that do not occur naturally in milk and inhibits the growth of bacteria. In other words, inhibitors are drug residues in the milk. When a sick cow is given medicine, her milk must be kept out of the bulk tank for a length of time indicated on the label of the medicine bottle (i.e. the medication's withdrawal time) so that she can heal and the drugs have time to leave her system. If her milk is put back into the bulk tank too soon, the inhibitors will contaminate the milk. Inhibitors **should be completely absent from milk samples**. A positive test will result in a large fine for the farmer. To ensure that this does not happen, farmers must maintain excellent records of drug treatment.



It is critical to produce high-quality milk because quality affects the flavour and shelf-life. A consumer who purchases bad milk is unlikely to continue buying the product. This reflects negatively on milk producers and the agri-food industry.

To ensure that farmers ship high-quality milk, they can be fined or lose their license to sell milk if there is milk in their bulk tank that is not safe. For instance, shipping a tank of milk with inhibitors present contaminates all of the milk that is picked up by the milk truck that day. The farmer would have to pay for the dumped truckload of milk and also would have to pay a large fine on the milk that they shipped the next month.

The following chart indicates the ranges for acceptable and unacceptable quality standards for freezing point, somatic cell count, bacteria levels and inhibitors:

Test Result Ranges			
Test Type	Normal	Elevated	Penalty
Freezing Point Estimate (FPE)	Less than -0.533 (ie: -0.534, -0.535)	-0.525 to -0.533	Greater than -0.525 (ie: -0.524, -0.523)
Somatic Cell Count (SCC)	Less than 300,000	Greater than 299,000 and less than 500,000	Greater than 499,000
Inhibitor (INH)	Negative	Trace Levels	Positive
Freezing Point (CRY)	Less than -0.533 (ie: -0.534, -0.535)	-0.525 to -0.533	Greater than -0.525 (ie: -0.524, -0.523)
Bactoscan (BSN)	Less than 36,000	Greater than 35,000 and less than 122,000	Greater than 121,000
Lab Pasteurization Count (LPC)	Less than 31	Greater than 30	-
Total Coliform Count (TCC)	Less than 11	Greater than 10	-

Source: Dairy Farmers of Ontario

Grade A is a Pass

In addition to meeting the quality standards outlined above, dairy farmers are required to keep their farms clean, neat and tidy, and to have facilities and equipment that meet standard requirements. Before milk can be shipped from a farm, a farmer first gets their license and an inspector must give the farm a Grade A rating. Inspections continue to be done periodically on the farm to ensure that the farm always meets the required standards. If the farm does not meet Grade A requirements, the farmer could face penalties and could have their license taken away. Requirements for Grade A standards are in compliance with regulations at the national and provincial levels.



Milk Quality Recognition

If Grade A is a pass and farmers are penalized for producing low quality milk, is there any reward for ensuring extra high quality? The answer is yes! Producers in Ontario can be awarded certificates based on their shipments of high quality milk from Grade A facilities.



Canadian Quality Milk Program (CQM)

CQM is a food safety program to help farmers prevent, monitor and reduce food safety risks on their farms. The program is based on HACCP (*Hazard Analysis Critical Control Points*) and the Canadian Food Inspection Agency (CFIA) recognizes it as applying HACCP principles on-farm to help ensure the production of high-quality milk. HACCP is an internationally recognized food safety system aimed at identifying and preventing food safety risks. Best management practices should be implemented on dairy farms to meet CQM standards.

All provinces in Canada are actively working on complying with CQM standards by making compliance part of the Grade A requirements for producers to ship milk. The provinces are working on phasing in this program from 2007-2012. In Ontario, the goal is to be compliant by 2010.

Some components of the CQM program that producers need to follow are:

- Standard Operating Procedures posted in milk houses
- Time Temperature Recorders (TTRs) installed to record milk and wash cycle temperatures and times and alarm producers of problems
- Water used for washing and rinsing milking equipment must contain zero levels of *Escherichia coli* (E. coli), *Clostridium perfringens* and coliforms.
- Medical records must be maintained, and medication inventories must be kept
- Someone on each dairy farm must have completed a Livestock Medicines Education Course
- Milking equipment must be assessed annually
- Monitoring use of chemicals on farms to prevent residues in milk
- Comply with regulations for the safe transport of animals

More information on CQM can be obtained by contacting Dairy Farmers of Canada at www.dairygoodness.ca.



Digging Deeper

National Dairy Regulation and Code Production and Processing Regulations

Source:

Canadian Food Inspection System, www.cfis.agr.ca

Just like any local 4-H Association must abide by provincial 4-H rules, which in turn must abide by Canadian 4-H Council rules, provincial dairy organizations must all meet or exceed national industry standards. These standards are outlined in the National Dairy Regulation and Code Production and Processing Regulations. This document outlines general rules related to the following areas of a dairy farm:

1. Construction, Arrangement and Operation of Production Establishments
2. Dairy Barns
3. Milking Parlour
4. Milk Houses
5. Equipment
6. Operations
7. Animal Health
8. Handling and Transport of Bulk Milk

The main features of each of these components of the dairy farm are outlined below. For more specific information, please consult the *National Dairy Regulation and Code Production and Processing Regulations*.

Construction, Arrangement and Operation of Production Establishments (areas and yards around the dairy barn and milk house)

- Surrounding areas must be organized and kept clean and well drained to prevent contamination of milk
- The driveway must be accessible in all weather conditions and must not have any obstacles in the way of the milk truck

Dairy Barns

- Barns must have the following characteristics:
- be clean
- be well maintained
- have a good, clean water source

- be insulated and ventilated to minimize accumulation of odours and water condensation. Manure pits located under barns must also be well ventilated.
- adequate lighting so that udders can be seen and milking can be completed in a sanitary manner
- The barn design must be sanitary and prevent the contamination of milk
- Barn construction must be durable and easily cleaned with no toxic substances in building materials. Walkways and floors (other than bedding areas in loose housing facilities) must be made of concrete or another impervious material that is kept in good condition.

Milking Parlour – There are several necessary components of the milking parlour aimed at keeping the facility clean and suitable for milking purposes. Such features include:

- Hot and cold water
- Equipment arranged in a manner that is easily cleaned
- Well ventilated
- Heating system to prevent freezing
- Adequate lighting so that udders can be seen and milking can be completed in a sanitary manner
- Walls and ceilings that are easily cleaned and waterproof
- Only dairy animal species are allowed to enter
- Walkways that are well maintained and well drained, with traps covering drainage holes

Milk Houses - These structures are for the sole purposes of cooling and storing milk on farm and for cleaning, sanitizing and storing supplies and equipment related to milk production. Since this is where milk is stored and picked up, there are many features that must be included here.

- Location and maintenance should prevent odours from outside or adjacent barns from entering and ensure that the building can be



directly entered from outside when the milk truck driver comes

- Floors must be impervious, in good repair, and provide adequate drainage of rinse water
- Sanitary hot and cold running water must be available to clean equipment and the water must not contain E. coli or coliforms
- Ventilated to eliminate condensation and odours, with screens over windows and doors
- Insulated and heated so that the pipes and equipment do not freeze
- Adequate lighting with shatterproof covers
- Washable, waterproof walls and ceilings
- No animals allowed
- Sinks must be available for washing equipment and for handwashing
- Cleaning chemicals must be stored in the milk house so that there is no danger of them contaminating the milk. Other chemicals should not be stored in this area.
- Bulk Milk Tank – The large refrigerated bulk tank must be able to store milk between 1 ° C and 4 ° C, with enough space to hold 2.5 days worth of production. Milk must be picked up from it every 2 days. Between uses, the tank must be washed and sanitized. The tank must have a dipstick to measure volume and a thermometer to measure milk temperature. The tank must also have an agitator to stir the milk. Milk must be cooled to at least 10 ° C within one hour of milking and to between 1 ° C and 4 ° C within two hours of milking.

Equipment – All milking claws, pipes and hoses that milk comes into contact with must be clean and in good working order. The equipment used for milking cannot be used for any other purpose. All materials milk comes into contact with must be smooth, non-corrodible, and otherwise unaffected by the milk flowing through them.

Operations – there are several day to day aspects of operating the dairy farm that the producer must do:

- Ensure that the dairy barn, milk house and equipment are all clean and well maintained
- After milking, equipment must be washed and sanitized using a three stage cycle which includes a water rinse, detergent wash and acid rinse to ensure the equipment stays clean with no build up of milk or other debris. Prior to the next milking, the equipment must be sanitized.
- Ensure that the animals are clean
- Follow proper milking procedures
- Manure must be removed from the milking barn daily. Loose housing barns may have a small accumulation of manure but there must be enough bedding for the animals to be kept clean.
- Standard Operating Procedures must be posted on the wall for milking equipment cleaning, sanitation and milking procedures
- Detergents, sanitizers, pesticides, and any other chemicals must be approved for use by the Meat Inspection Act & Regulations (Canada) and Pest Control Products Act (Canada)

Animal Health

- Only dairy animals may be present in the dairy barn
- Animals must be clean and free from disease
- Only drugs approved by the Food and Drugs Act (Canada), the Feeds Act (Canada) and the Pest Control Products Act (Canada) may be used
- Treated animals must be identified and records must be maintained
- Young animals must be kept in separate pens from milking animals

Handling and Transport of Milk

When milk leaves the farm it is handled by a Bulk Tank Milk Grader (BTMG) who has completed and passed a training course. Milk is picked up only at licensed milk production facilities that are in good standing. When the BTMG arrives at a farm, he or she makes an initial inspection of the milk (appearance, colour, odour, temperature, presence



of any other abnormalities), agitates the tank for two minutes, takes a milk sample for later testing, and measures the volume of milk taken from the farm. Effort is made to maintain cleanliness when handling hoses, using the milk house hose port, and rinsing the bulk tank after the milk has been removed. If the milk is of obvious poor quality, the BTMG will refuse to pick up the load of milk and report to the producer and Regulatory Agency of the reason.

Provincial Dairy Production Regulations

While national standards must be met throughout Canada, provincial milk production organizations or regulatory agencies have developed regulations that are specific to their respective provinces. Many of these provincial guidelines involve more specific guidelines to administer the national regulations. For example, national code states that farm lanes must be accessible in all weather conditions and free of animals, locked gates and other obstacles in order to allow passage of the milk truck. Provincial guidelines may outline exactly what the dimensions of that lane must be in order for the driveway to pass inspection. Provincial agencies also regulate the implementation of the Canadian Quality Milk Program in their provinces.

Provincial regulatory agencies are also given the right to regulate the marketing of fluid milk within their province, working within federal boundaries.

Some provinces work together to create some common rules. Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island have formed a regional pool known as the P5 to share transportation and promotional costs for industrial or manufactured products. Fluid milk promotional costs are shared amongst Ontario, New Brunswick, Nova Scotia and Prince Edward Island. At the time of printing of this manual, formation of one joint board for these P5 provinces was under discussion.



For specific provincial regulatory or other provincial information, or to receive the most up-to-date information, please refer to one of the following organizations:

Alberta Milk 1303-91st Street S.W. Edmonton, Alberta T6X 1H1	Telephone: (780) 453-5942 Toll free: 1-877-361-1231 Fax: (780) 455-2196 E-mail: policy@albertamilk.com Internet: www.albertamilk.com/
British Columbia Milk Marketing Board 32160 South Fraser Way Ste. 200 Abbotsford, British Columbia V2T 1W5	Telephone:(604) 556-3444 Fax: (604) 556-7717 E-mail: smiles@milk-bc.com Internet: www.milk-bc.com
Dairy Farmers of Manitoba P.O. Box 724, Station Main Winnipeg, Manitoba R3C 2K3	Telephone: (204) 488-6455 Fax: (204) 488-4772 E-mail: general@milk.mb.ca Internet: www.milk.mb.ca
Dairy Farmers of New-Brunswick C.P. 5034 Sussex, New-Brunswick E4E 5L2	Telephone: (506) 432-4330 Fax: (506) 432-4333 E-mail: nbmilk@nbnnet.nb.ca
Dairy Farmers of Nova Scotia Suite 10, 4060 Hwy 236 Truro, Nova Scotia B2N 5A9	Telephone: (902) 893-6455 Fax: (902) 897-9768 E-mail: acraft@dfns.ca Internet: www.dfns.ca
Dairy Farmers of Ontario 6780 Campobello Road Mississauga, Ontario L5N 2L8	Telephone: (905) 821-8970 Fax: (905) 821-3160 E-mail: questions@milk.org Internet: www.milk.org
Dairy Farmers of Newfoundland and Labrador 27 Sagona Avenue Mount Pearl, Newfoundland A1N 4P8	Telephone: (709) 364-6634 Fax: (709) 364-8364 E-mail: milk@dfnl.nf.net
Dairy Farmers of P.E.I. P.O. Box 335 Charlottetown, Prince Edward Island C1A 7K7	Telephone: (902) 892-5331 Fax: (902) 566-2755 E-mail: peimilk@pei.sympatico.ca
Dairy Farmers of Saskatchewan 1-575 Park Street Regina, Saskatchewan S4N 5B2	Telephone: (306) 949-6999 Fax: (306) 949-2605 E-mail: dfs.kelly@sasktel.net
Fédération des producteurs de lait du Québec Bureau 415 555 Roland-Therrien Boul. Longueuil, Québec J4H 4G3	Telephone: (450) 679-0530 Fax: (450) 679-5899 E-mail: fplq@upa.qc.ca Internet: www.lait.org
Saskatchewan Milk Control Board 2500 Victoria Avenue, Suite 1210 Regina, Saskatchewan S4P 3X2	Telephone: (306) 787-5319 Fax: (306) 787-1988 E-mail: milk.control.board@sasktel.net Internet: www.saskmilkcontrolboard.ca/



Dairy Farmers of Ontario (DFO)

(for other provincial organizations, consult the contact information on the previous page).

In Ontario, DFO has the authority to administer quota under the Milk Act. It has the right to adjust quota at any time based on national and/or provincial supply and demand.

DFO is the organization that enforces regulations for milk production and sale within the province of Ontario, issues milk licenses to producers, and inspects facilities to ensure that they meet Grade A standards for milk production. Since all milk in Ontario is purchased from farmers by DFO, it also sells the milk to processing companies. DFO is also involved in research, communication programs and promotion to help ensure a strong and viable market for milk producers.

Rules must be in place to match supply to demand, ensure an adequate price for milk produced, and to ensure that high quality milk is delivered to consumers. DFO has specific rules for farmers related to:

- Quota policies
 - o Administering quota
 - o Quota and production requirements for farmers
 - o Payment for milk produced
 - o Rules for buying and selling quota
 - o Operation of the Quota Exchange
 - o New producer requirements
 - o Appeal procedures
- Raw Milk Quality
 - o Penalty and Quality Recognition programs
 - o Inspection and Grade A requirement compliance
 - o Canadian Quality Milk Program
- Milk Transportation
 - o General information
 - o Maintenance of farm yards, lanes and entrances

For more information on DFO rules and regulations, consult the DFO Policies manual produced by Dairy Farmers of Ontario.



Now that the Cows are Milked...How do we Sell the Product?

In order to sell milk from their farms, producers must have a license issued by their provincial regulatory authority. This license gives farmers the right to sell milk. The amount of milk that can be shipped from a farm is determined by the amount of quota that the farmer has.



The Quota System

Canada is one of very few countries that uses a quota, or supply-management system. According to the International Dairy Federation – Canada, supply-management is a sustainable food marketing system that matches production of milk on the farm to consumer demand. This program ensures that the amount of milk produced in the country matches the amount of milk that consumers will buy.

There are three pillars of supply-management:

1. Production Planning (i.e. Domestic quotas)
2. Producer price setting mechanisms
3. Import (border) controls

How does supply management benefit producers and consumers?

For producers

- o The receive a fair price for milk
- o Earn enough to cover the costs of the average dairy farm
- o Do not rely on government subsidies or taxpayer dollars to make a living
- o Transportation costs are minimized because of a centrally planned transportation route from farm to processing facility
- o Stable incomes mean that investments can be made in long-term housing and equipment to take care of the animals in the best way possible
- o Smaller farms can be more profitable than they would be without supply-management

For processors:

- o They know how much milk they will get every day and how much they will pay throughout the year
- o The milk is tested and of high quality
- o Predictability of milk quality and quantity is like a low-risk insurance policy! Processors can focus on their equipment and other needs to make milk products

For consumers

- o Fresh milk and other dairy products are available throughout the year
- o Helps to control milk prices (milk in Canada is cheaper than in the United States, which does not have supply management)

Milk marketing systems within each province are run by the province's milk marketing organization (i.e. Dairy Farmers of Ontario in Ontario), while national milk policies are established by the Canadian Dairy Commission (CDC) and Dairy Farmers of Canada (DFC). Provincial bodies (such as DFO) also establish the price for milk in their respective provinces.



Buying Quota

There are three ways that milk producers can obtain quota:

1. From family members
2. From the sale of an existing operating dairy farm to a new farmer
3. From buying it on the Quota Exchange

The Quota Exchange is the most common way to obtain quota. Farmers phone or go online to enter bids for quota. The exchange is a monthly process, so bids can be made during the last 10 days of any month. A computer program matches the amount of bids to the amount of quota being sold and establishes a price for the quota, based on the bids entered by both buyers and sellers. In Ontario, anyone who bids at or above that price, called the market clearing price, receives the quota they bid for. In Ontario, bidders pay the amount they bid for the quota, even if the market clearing price is less than their bid. This is called a “pay what you bid” program. Funds collected through this program (in Ontario) are used to finance initiatives that will benefit all dairy producers; alternatively the money is re-distributed evenly to all quota holders in the province.

Quota Calculator: A farm with 36kg of daily quota with cows producing 3.6% butterfat in their milk should try to produce 1000L of milk each day.

Shipping Within Quota

Since 1997, quota has been issued to farmers on a daily basis and administered each month. Monthly production is compared to the monthly quota holdings of the farmer. A farmer’s daily quota is multiplied by the number of days in the month and when compared to the amount of milk shipped that month. This comparison establishes whether a producer is under or over quota.

Quota is calculated in kilograms of butterfat per day. Thus, farms strive to produce an amount of milk each day that meets their daily quota. This requires good management skills because the amount of milk and the butterfat in it are affected by nutrition, health, animal genetics, breed, weather, lactation number, stage of lactation and many other factors.

Since it is difficult to ship exactly the right number every month, milk producers can earn credits. Credits can be earned in the following ways:

1. **Production Incentives** – when milk supply is low in the province or country, producers are allocated days of quota credits so that they can produce more milk and help the overall milk supply meet its demand. Usually these credits are given in the fall and are called ‘Fall Production Incentives’; however, the milk regulatory agency may do this at any time based on market and/or production signals.
2. **Under-Production Credits** – producers can carry forward up to a set number of days (30 days in Ontario) of unused daily quota so that it can be used in another month. For example, if a producer ships less than their amount of quota one month, they are allowed to ship that same amount over their quota holdings in another month or over the course of several months.
3. **Over-Production Credits** – producers can borrow up to a set number of quota days (20 days in Ontario) in order to receive payment for milk produced over their quota holdings. Over-production credits are “paid back” when a producer ships volumes of milk under his/her quota. If a farmer exceeds the 20 days of over quota credits, he or she is ‘fined’ through a reduction on his or her monthly milk cheque for shipping the excess milk. In July 2008, Ontario milk producers were financially penalized at the following rates for over quota production:

Butterfat - \$9.98/kg
Protein - \$8.08/kg
Other Solids (mostly lactose) - \$1.67



When milk is shipped, it first fills the monthly quota, then any incentives, then any under-production credits.

The Milk Cheque

Dairy producers receive monthly milk cheques based on the quantity, composition, and quality of the milk they produce.

Profit on the dairy farm is the difference between the milk cheque and the cost of production. Operating a well-managed farm producing a lot of high quality, high component milk will result in the highest possible milk cheque. If production costs are also kept low, this will increase the amount of profit for the dairy farmer.

The payment for milk produced is based on a system called Multiple Component Pricing. Milk consists of 87% water - the farmer is not paid for this. Payment is made for the amounts of butterfat, protein, and other solids in the milk. The price of each of these components varies month to month, based on how much milk is being used and what products processors are using it for. Processors pay more for milk they are using for fluid milk than for some other dairy products; milk that is used for animal feed is even less expensive. Pricing is also dependent on market growth, long-term sustainability, increased efficiency and the number of other agricultural opportunities available.

The price schedules and quantities of milk sold for each purpose are factored in to result in the 'blend price' that producers receive for their milk. In July 2008, milk producers in Ontario were paid at the following rates:

Butterfat - \$10.00/kg
Protein - \$7.89/kg
Other Solids (mostly lactose) - \$1.60/kg

Just like any other pay cheque, the milk cheque is subject to deductions. Deductions are made for things like administration fees, marketing, research, milk transportation and promotion. Deductions are also made when producers ship milk that does not meet high quality standards. The chart on the next page indicates the penalties paid by farmers when they do not ship high quality milk. It doesn't pay to cut corners when it comes to things like cleanliness, maintenance and repair!



Ontario's Raw Milk Quality Penalty Program

August 1, 2007

Quality Area	Penalty Level	Test/ Inspection Frequency	Penalties Applied If	Penalties Applied per	Penalty Levels				Shut-off Level
					1st	2nd	3rd	4th	
Bacteria	>121,000 IBC	monthly	results are >121,000 IBC* in 2 out of 3 consecutive tests	hi on monthly shipments	\$3	\$4	\$5	\$5	4th and subsequent penalty in 12 months
Somatic Cell Count	>499,000 IC/mL	tests linked to milk pickups from date reported until next tests reported	weighted monthly average is >499,000 in 3 out of 4 consecutive tests	hi on monthly shipments	\$3	\$4	\$5	\$5	4th and subsequent penalty in 12 months
Inhibitors - Load testing	≥0.01 IU/mL	all loads screened	positive producer on a load that screened suspect positive at dairy	hi on monthly shipments	\$6**	\$9**	\$12**	\$12**	2nd and subsequent penalty in 12 months
Inhibitors - Random testing	≥0.01 IU/mL	monthly	randomly selected sample is positive	hi on monthly shipments	\$6	\$9	\$12	\$12	2nd and subsequent penalty in 12 months
Abnormal Freezing Point	>-0.525* Hortvet	tests linked to milk pickups from date reported until next tests reported	tested if screen is >-0.523*H; penalty if cryoscope result is >-0.525*H	hi on monthly shipments	\$2	\$4	\$6	\$8	4th and subsequent penalties in 12 months
Grade A Farm	non-Grade A	a minimum of once in any two years	farm is non-Grade A upon inspection	hi on monthly shipments	\$2	\$4	\$8	\$8	4th and subsequent penalties in 12 months
Grade A Farm	unsanitary non-Grade A	a minimum of once in any two years	farm is unsanitary non-Grade A upon inspection	N/A	N/A	N/A	N/A	N/A	immediate

* >121,000 IBC (Individual Bacteria Cells) is equivalent to >49,000 CFU (Colony Forming Units).

** Load losses & costs also assessed and no payment for the shipment of milk causing the contamination.

Source: Dairy Farmers of Ontario

Solids- Not-Fat (SNF) to Butterfat Ratio (SNF:BF)

Breeding and encouraging animals to produce high protein milk has led to an excess of protein production compared to butterfat. To combat this, and encourage more butterfat production in comparison to protein and other solids, DFO imposed a ratio cap of SNF:BF content in 2006. This also has an impact on the sale price of within-quota milk. The maximum SNF:BF ratio that Ontario producers can be paid for is 2.35. This means that the milk produced can contain 2.35kg of solids that are not fat for every kg of butterfat produced. This ratio cap can be changed as deemed appropriate by the Regulatory Agency.



Management of Milk Marketing -Past & Present

In 1965, the Ontario Milk Marketing Board (OMMB) was formed. Prior to its formation, farmers and processors did not know if they would be able to sell and buy enough milk each day. Consumers never knew what milk products they could buy or what they would cost on a given day. Prices constantly fluctuated and were inconsistent from one geographical area to another. The OMMB fixed these problems and based the price of milk on how much it cost the farmer to produce it.

In 1980 the quota exchange began as a way to transfer quota between producers and give it equity.

In 1995, the OMMB and Ontario's cream producers combined to form Dairy Farmers of Ontario (DFO). DFO manages the milk produced by Ontario dairy farmers. It ensures that the amount of milk produced by dairy farmers is equal to the amount of milk processors require to make enough dairy products for producers to buy. This is called supply-management. DFO is governed by a Board of Directors that consists of elected dairy farmers from across the province.

The National Milk Marketing Plan is an agreement between federal and provincial agencies that determines the target amount of industrial milk to be produced by Canadian farmers and allocates provincial market sharing quota (MSQ). The Canadian Dairy Marketing Regulations Act and Canadian Dairy Commission Act are the federal legislations that the National Milk Marketing Plan falls under when working with the provinces.

Encouraging Milk Consumption

DFO encourages people to drink milk by advertising and educating the public about the health benefits of drinking milk and by addressing consumer concerns and misconceptions. This is done through school education programs, as well as advertising in a number of media outlets.

You Can be a Milk Marketer!

By choosing milk as part of your own healthy diet, and informing people you know about misconceptions surrounding milk, you can have a positive impact on milk sales.

When people hear the same positive messages about milk from dairy farmers they know, dieticians, doctors, educational programs and advertising, they are more likely to act on the messages by purchasing milk products than if they only heard the messages from one source. Promoting common themes throughout the agri-food sector is referred to as **integrated marketing**.

From Cow to Carton

Even fluid milk has several 'stops' to make between the farm gate and the grocery store. The most important step to remember is that of **pasteurization**. This is the process of heating and then immediately cooling the milk to kill bacteria. This process was developed in the 1860s by Louis Pasteur and since 1938, Ontario legislation has required that milk be pasteurized prior to consumption. The Health Protection and Promotion Act makes it illegal to sell or give away raw milk.



First Stop – On the Farm

Milk travels from the cow through a pipeline into a bulk tank. The bulk tank is like a large refrigerator that keeps the milk cold and stirred until it is picked up by the milk truck driver.



Milk on a Mission

Every two days, a milk truck arrives to pick up the milk on the farm. A milk truck is like a bulk tank on wheels that can hold the milk picked up at many farms. It keeps the milk clean and cold on the way to the dairy. The milk truck driver (Bulk Tank Milk Grader) also takes a milk sample so that milk composition and quality can be tested.



At the Dairy

Milk is processed into different milk products at the dairy. When it arrives, it is pumped from the milk truck into an even larger storage tank. The milk is tested for flavour, odour, milk fat and bacteria. The milk is pasteurized, homogenized and processed into ice cream, yogurt, cheese, etc.

Step 1 - Pasteurization – This is the heating of milk to a high temperature and then quickly cooling it to eliminate bacteria. There are three methods:

- High Temperature Short Time (HTST): milk is heated to 72°C for 16 seconds then cooled to 4°C
- Batch-Holding Method: milk is agitated and heated to 62°C and held there for 30 minutes before cooling to 4°C
- Ultra High Temperature (UHT): milk is heated to 138°C-158°C for one or two seconds and then cooled. Unopened products made this way will keep for months without refrigeration.

Step 2 – Homogenization – Milk from the bulk tank is a heterogeneous mixture. If it sits without stirring the cream will separate and rise to the top. To keep this from happening with milk in the store, it is homogenized. A homogenizer forces milk through tiny holes, breaking up the fat globules (cream). When the fat particles are smaller they stay mixed evenly in the milk instead of rising to the top.

Fat is also removed from the milk at the dairy and put back in at different levels to make different fluid milk options available to the consumer (i.e. 1%, 2%, whole or skim). Skim milk has almost all of the fat removed from it.

Step 3- Vitamin Fortification – This means that vitamins are added to the milk. *Vitamin D* is added because it works closely with calcium to grow strong bones and teeth, and its addition to the milk helps your body absorb the calcium found in the milk. *Vitamin A* is also added to low fat milk products. It is a fat-soluble vitamin that is lost when fat is removed from the milk; thus, some must be added back in to get the benefits of Vitamin A, which helps improve eyesight in poor lighting and fights infection.

Step 4 – Milk that is to be made into products other than fluid milk is further processed.



It's Ready to Go!

After processing, milk is packaged into containers which are stamped with a 'Best Before' date. The packages are then shipped to grocery stores. Milk cannot be sold by the grocery store after the 'Best Before' date, but if you have already purchased it, you should be able to keep it in your refrigerator for a few days longer than that.



Why Milk?

Eating Well With Canada's Food Guide includes Milk and Alternatives as a vital part of a balanced diet and healthy lifestyle.

The amount of milk you should drink each day varies with your age and gender. According to the food guide, here is how many servings of Milk and Alternatives you should consume each day:

	Children			Teens	Adults	
Age in Years	2-3	4-8	9-13	14-18	19-50	51+
Number of Milk Servings	2	2	3-4	3-4	2	3

One serving is equal to 250mL of milk, 175mL of yogurt or 30g of firm cheese.

Helpful hint: 30g of cheese is approximately the same size as two of your thumbs!

Canadians are encouraged to drink lower fat milk products, such as skim, 1% or 2% milk. Young children should consume homogenized milk (3.25% fat) because it aids in brain development at a young age.

Milk is important because it contains 15 essential nutrients! Essential nutrients are those that cannot be produced by our bodies so they need to be obtained from our diet. The nutrients and their benefits are outlined in the table below:

Nutrient	What Your Body Needs it For...
Calcium	Necessary for bone and tooth growth and maintenance. Plays a role in transmission of nerve impulses, proper hormone function, blood clotting and muscle contraction.
Vitamin D	Enhances calcium and phosphorous utilization in the formation of healthy bones and teeth.
Phosphorus	Aids in energy release and tissue formation.
Vitamin A	Helps normal bone and tooth development. Promotes good night vision. Maintains health of skin and membranes.
Riboflavin (Vitamin B ₂)	Maintains healthy skin and eyes. Releases energy within cells.
Protein	Builds and repairs body tissues. Builds antibodies (the parts of blood that fight infection).
Magnesium	Aids in the formation of strong bones and teeth. Needed for tissue formation and energy release within cells.
Carbohydrates (Mostly lactose – sugar)	Supply energy.
Vitamin B ₆	Assists in the formation of red blood cells.
Vitamin B ₁₂	Contributes to red blood cell formation.
	Available in smaller amounts...
Thiamin (Vitamin B ₁)	Role in production of energy in body cells. Aids in normal growth and appetite.
Folic Acid (Folacin)	Aids in the formation of white and red blood cells.
Zinc	Aids in energy release and tissue formation.
Niacin (Vitamin B ₃)	Helps normal growth and development. Maintains a normal nervous system and gastrointestinal tract.
Pantothenate	Involved in the release of energy from carbohydrates as well as the breakdown and metabolism of fat.

Source: Dairy Farmers of Ontario Dairy Educator Program Activity 'Nutrients Found in Chocolate Milk'

Meeting Consumer Demands

Dairy farmers and their provincial regulatory agencies strive to produce high-quality milk products that are completely safe and healthy for human consumption. However, some consumers have negative perceptions about milk and milk products.

Did you know?

A glass of chocolate milk contains about as much sugar as a glass of unsweetened fruit juice!

In some cases consumer demands can be met by putting existing milk products in a positive light. Recently, chocolate milk has emerged as a high energy, refreshing replacement for sports drinks after physical activity, which helps to make it seem more appealing to consumers.

Fear of Fat

One long standing negative consumer perception about milk has been a fear of fat because high fat diets are considered unhealthy. Contrary to many opinions, having a low fat diet does not mean eliminating milk products. There are many low-fat alternatives for milk and milk products. Skim and 1% milk have been low fat options for a long time, but processors are creating more and more low fat products (i.e. low-fat ice cream, cream cheese, yogurt and sour cream) to meet consumer demands and help to eliminate concerns about consuming dairy products. Producers have also responded to this need by breeding cattle to produce higher protein levels in their milk.

Developing Niche Markets

Consumer demands have developed the need for a portion of the milk produced to have specific characteristics, such as being produced organically. When a small market is developed aside from the mainstream market, it is referred to as a niche market. Farmers may be paid a premium for producing milk or other products that have that specific characteristic. Niche markets have emerged for kosher, halal, organic, and DHA milk products. The two biggest niches are organic and DHA milk production.

Did You Know...

Milk that has not been pasteurized is referred to as raw milk. It is illegal to sell or provide raw milk in Canada. Before consumption, milk must be pasteurized to ensure the elimination of any harmful bacteria such as listeria, E. Coli, coxiella and yersinia.

Organic Dairy Farming Niche

Organic production is constantly increasing in popularity due to consumer health concerns about the use of chemicals and medicines on conventional farms. To respond to such concerns, some milk in the supply system is produced on certified organic farms and sold for organic milk products. This has formed a growing niche market within the dairy industry. Milk has been separated from the general pool for this purpose since 1996 when a cooperative pool of 'ecological farmers' received permission from DFO to sell some of its milk separately from the rest of Ontario's milk. In 2007 changes were made to bring the sale of organic milk back into the supply-managed system by DFO. Premiums are paid to those producing organic milk.

From a milk production standpoint, all milk, both organic and conventional (non-organic), contains the same nutrient content and is subject to the same quality tests. All milk is safe for human consumption.

The difference between organic and conventional milk is that organic milk comes from dairy cows that are fed organically grown crops and are not given antibiotics. Organic crops are grown without synthetic pesticides or fertilizers.

Third-party certifiers determine the qualifications and standards for farms to achieve and maintain organic status. The provincial regulatory agency (i.e. Dairy Farmers of Ontario) ensures that this milk is directed to a plant that will process it separately. All milk is paid for at the same rate from the regulatory agency, but organic producers may be paid premiums from organizations that market organic milk. There are about 50 organic dairy farms in Ontario, producing 16 million litres of milk each year - a number that is expected reach 30 million by about 2012.

Markets are also available for selling organic animals at a premium.



DHA Milk

DHA milk refers to milk containing docosahexanoic acid, an omega-3 fatty acid. DHA is important in the development and maintenance of the brain, nervous system and the retina of the eye. It is one of the fats that is viewed as being good for you.

DHA milk is produced by cows being fed a special diet. Cattle are fed a supplement that has DHA added. The supplement can be added to a TMR mix and fed to the cows just like any other feed would be. There are no other changes that need to occur on a farm for it to adapt to producing DHA milk.

There is not a lot of research about how being fed DHA feed affects the health of cows, but many believe that cow health could benefit from consumption of the supplement as well.

DHA milk was first sold in stores in Ontario in 2004. In 2007, 21 Ontario farms were producing 11.6 million litres of DHA milk. DHA slightly lowers butterfat content but producers are compensated for this and paid a premium for producing milk to fill this niche market.

Marketing More than Milk

On most dairy farms, milk is the major source of income. However, there are other things that most dairy farmers have to sell. Focusing some attention on these other markets can supplement farm income and increase the value of farm production.

Breeding dairy cattle results in the replenishment of the milking herd. Dairy farmers do not usually have the space or the time to take care of all animals born on their farm, so some animals are usually sold. Animals sold fit into one of three categories:

1. **breeding stock (including live animals and embryos)**
2. **cull cows and bulls**
3. **bull calves**

Breeding Stock

Canadian cattle are world renowned for their high quality genetics. Cattle, semen and embryos are sought around the world for breeding purposes.

Dairy farmers wishing to sell breeding stock should do several things in order to increase the value of their animals and thus increase their revenue from livestock sales:

1. **Raise registered cattle** – registration papers provide a guarantee of an animal's age and pedigree (genetic background). Buyers want to know the parentage and history of the animals they are buying.
2. **Participate in supervised milk recording** – Canwest DHI (Dairy Herd Improvement) and valacta provide undisputable data on the milk production of the animal. Buyers use this information to assess whether the animal will fit into their milk production system and meet their goals.
3. **Participate in type classification** – classification gives the buyer an analysis on the conformation of the cow that he or she is looking at. When buying a heifer, a record of the dam's classification adds value to the animal.
4. **Be involved in the industry and breed associations** – participate in events such as dairy shows, barn and twilight meetings, car and bus tours, county sales, and local dairy organizations or committees.
5. **Be ready for visitors** – keeping the animals clean and well fed will ensure that they always look their best for visitors and potential buyers. Hanging name signs above the cow stalls will help visitors inspect the animals.

Embryos & Semen are a viable option for producers around the world seeking superior genetics. They are easier to transport than live animals and are subject to different rules for importing and exporting. When embryos are produced, they can be 'washed for export'. This means that the embryos are rinsed in a trypsin solution at the time of recovery to help prevent the spread of disease from one country to another.

When the border was closed to live cattle between Canada and the United States from May 2003 to November 2007, embryos and semen could still be sold when accompanied by appropriate documentation. In 2006, semen and embryo sales grossed over \$77 million, but probably would have been less if live animals were exported that year as well.

Live breeding stock and embryos can be sold privately, directly from the farm, or by public auction, in a specialized purebred dairy sale.

Cull Cows and Bulls

Most livestock sales on the average farm result from cull cows and bulls. On average, herds in Canada replace 28% of their animals each year.

These animals are usually sent to stockyards where they are sold for meat. Since these animals are usually older animals, they are typically used in the production of hamburger and processed meat products. Animals sold in this manner are subject to buyer demand and prices vary constantly.

Bull Calves

Bull calves are usually raised for meat purposes. Sometimes dairy farmers raise them for later sale but most dairy farmers do not have the space and time to devote to them so they are sold when they are young and raised by someone else. There are different ways these bull calves can be marketed:

1. **Bob or Drop Calves** – These are young animals that are sold through an auction or purchased privately from a farm. Animals must be several days old before they are allowed to be sold, to ensure that they are healthy and viable. Selling these young animals enables dairy farmers to concentrate on caring for their heifers and milk cows. When these animals are sold they are usually raised for veal.
2. **Red Veal** – When bull calves are kept on farm, this is a common method of raising them. The animals are fattened by eating a high energy diet and are sold for meat when they are six or seven months old.
3. **Steers** – Bull calves could be raised as steers on the dairy farm. This is not usually done unless the farmer has excess feed and space to do so. Steers are usually sold at 13 to 15 months of age when they weigh 450kg to 500kg. These animals do not bring as much money as beef breeds do when they are sold.



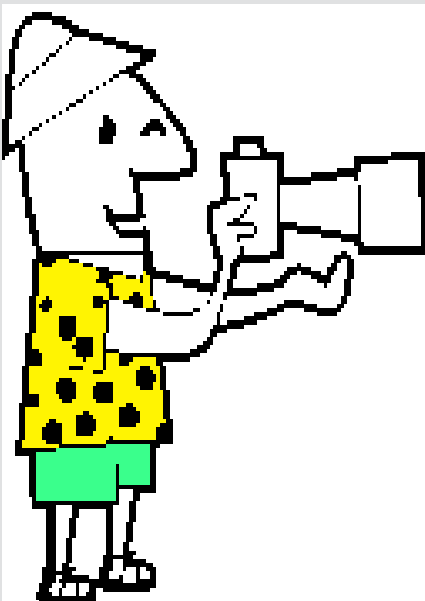
Agri-Tourism

Since only three percent of Canadians live on farms there are a lot of people who know very little about dairy farming, or other types of farming. Dairy farmers can set up their businesses to take advantages of this opportunity for agri-tourism.

Some dairy operations run tours of their farms as a learning experience for school groups or as a way to educate neighbours about farming practices. Others run tours to grab the tourist market. Benefits of agri-tourism include increased farm revenue, increased public knowledge of farming, and a greater appreciation of where food comes from. One of the most popular forms of agri-tourism that has been emerging the past few years is corn mazes. Farmers can create a maze in their field and visitors pay admission to come and venture through it.

When considering agri-tourism, there are a few factors to consider:

- Location – are you in an area suitable for this operation?
- Personality – do you feel comfortable leading tours and entertaining people?
- Legalities – What extra insurance coverage do you need in case someone gets hurt?
- Do not forget that you cannot sell or give away raw milk on your farm so you need to think of a different way to attract people



Products Derived from Dairy Cattle

While cull cattle and bulls sold from dairy farms are primarily slaughtered for beef, there are many more things that can be made from cows. When an animal is slaughtered, 98% of its body is used for some purpose. This means that there is very little waste when an animal is slaughtered.

The products made from cattle appear in all aspects of everyday life for everyone, even if they do not drink milk or eat beef. Some examples of milk products appearing in different aspects of life are:

Medicine and Health

- Sutures (stitches)
- Hormones
- Blood plasma



Food

- Meat and milk
- Milk products (ice cream, yogurt, cheese, etc.)
- Gelatin
- Marshmallows
- Gum

Household and Personal Items

- Soap
- Candles
- Cosmetics
- Combs
- Sports Equipment (i.e. golf balls)
- Bone china
- Paint brushes
- Car waxes
- Crayons
- Pet food



Mechanical and Chemical Items

- Brake fluid
- Oils
- Piano keys
- Tires
- Film
- Sand paper



VO-COW-BULARY

A glossary of Milk Production and Marketing Terms

Alveoli	Tiny cells located in the udder that produce milk.
Homogenization	The process of treating milk by forcing it through tiny holes in a machine so that the fat droplets are emulsified and the cream cannot separate from the rest of the milk.
Inhibitors	Substances other than bacterial culture that do not occur naturally in milk and inhibit the growth of bacteria (drug residues in milk).
Integrated marketing	A marketing scheme whereby common themes are promoted throughout the agri-food sector.
Lactation	The period of milk secretion following the birth of a calf.
Niche market	A small market developed aside from the mainstream market.
Oxytocin	The hormone released by the pituitary gland that initiates milk let down.
Pasteurization	The process of heating milk to a high temperature and then immediately cooling it to kill bacteria.
Pituitary gland	A gland at the base of the brain that transmits hormonal messages, such as oxytocin to stimulate milk let down.
Processing	Putting milk through a series of industrial processes to change or preserve it.
Raw milk	Milk produced by a cow that has not yet been pasteurized to kill bacteria.
Solids-Not-Fat	The content of solid (non-water) components of milk that are not butterfat, such as protein.
Somatic cells	Somatic cells are white blood cells that destroy bacteria, fight infection and repair damaged tissue in the udder.
Sphincter muscle	While many animals have many sphincter muscles, in milk production this term refers to the muscle at the bottom of the cow's teat that opens to allow milk to flow out of the udder.
Supply management	A marketing system where producers control the production of a commodity.
Teat cistern	The internal part of the teat in which milk is held.
Udder cistern	The internal part of the udder in which milk is held once it has left the alveoli where it is produced.



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References from the previous 4-H Ontario Dairy Manual

- Dairy Farmers of Ontario
- Ontario Milk Producer Magazine
- OMAFRA Factsheet: Proper Milking Procedures.

Related Activities (See Activity Manual)

Types of Records	Business	All ages
Creating a Family Tree	Business	All ages
Improving Farm Management	Business	Senior members
Reading a DHI Report	Business	All ages
Who to Cull?	Business	All ages
Learning to Budget	Business	Junior members
Managing Employees	Business	Senior members
Managing Finances	Business	Senior members
Budgeting for a Calf	Business	All ages
Budgeting for Custom Raising Heifers	Business	Senior members
Farms Have Computers Too!	Business	Junior members
Computer Uses on the Farm	Business	All ages
Dairy Software Demonstration	Business	All ages
Exploring the Web	Business	All ages
Dream Dairy Farm in a Techno World	Business	All ages
Is Bigger Always Better?	Business	All ages
Farm Management Case Studies	Business	Senior members
Considering Succession Planning	Business	Senior members
Careers in Agriculture	Business	All ages

