

# Teacher Fast Facts & Vocabulary Support



PROJECT Agriculture  
Project-Based Learning and  
Teaching Series

## Everyday Chemistry

Why is it important to know what we eat?



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# Everyday Chemistry

## Why is it important to know what we eat?

### Teacher Fast Facts and Vocabulary Support

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#### Background Fast Facts

The **Fast Facts** that follow can provide you with some additional background related to jobs in agriculture. These **Fast Facts** may support class or small group discussions you facilitate with students.



Milk and products made from milk have been part of people's diets for thousands of years. Milk and honey are the only substances whose only natural function is food.



The role of milk is to provide nourishment and protection for young mammals. Milk also has been a food source for humans since the dawn of history. Milk is a very complex food with over 100,000 molecular components. Therefore, only an approximate composition of milk is usually given. Milk is composed of water, carbohydrate, fat, protein, minerals and vitamins. It is important to remember that milk is secreted as a complex mixture of these components. The properties and importance of milk are greater and more complex than the sum of its components.

From: *An Overview of Milk*. **Biology of Lactation Course, McGill University.**



Canada's dairy products are diverse, and range from aged cheddar cheese to specialty cheeses, ice cream, and dairy drinks in addition to table milk, cream, and butter. In 2016, 14% of Canadian plants were owned by the three largest processors in the country – Saputo, Agropur, and Parmalat. These plants process approximately 75% of the milk produced in Canada.





The **Dairy Goodness** website provides descriptions of processes involved in making dairy products at [www.dairygoodness.ca](http://www.dairygoodness.ca).

The **Government of Canada** provides access to a range of Canadian dairy facts and statistics at [www.dairyinfo.gc.ca/indexe.php](http://www.dairyinfo.gc.ca/indexe.php).

Detailed information on the chemistry of milk can be found in a **University of Guelph** article on *Dairy Chemistry and Physics* at [www.foodsci.uoguelph.ca/dairyedu/chem.html](http://www.foodsci.uoguelph.ca/dairyedu/chem.html).

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🇨🇦 Fluid milk products, which include table milk and fresh cream, represent 28.9% of milk production or 97.8 million kg of butterfat, while manufactured dairy products such as butter, cheese, yogurt and ice cream represent 71.1% of production or 240.2 million kg of butterfat.

🇨🇦 Canada's dairy industry also relies on research and development. Scientists in Canada work on improving and developing new dairy technologies. For example, new products such as probiotic yogurts, ultra filtered milk, and dairy products containing Omega-3 fatty acids, are recognized dairy products available to consumers.

🇨🇦 Canadian dairy producers supply two main markets:

- The fluid milk market, which includes flavoured milks and creams
- The industrial milk market which uses milk to make products such as butter, cheese, yogurt, ice cream and milk powders.

🇨🇦 The Canadian cheese industry has developed extensive cheese making traditions and 667 varieties of cheese, including goat, ewe, and cow. Many of these cheeses are recognized the world over for their quality and taste. Out of these 667 distinct varieties of Canadian cheese:

- 477 varieties are produced in Quebec (71.5%)
- 125 varieties are produced in Ontario (18.7%)
- 65 varieties are produced in other Canadian provinces (9.8%)

🇨🇦 Organic milk production is steadily increasing in Canada. It reached 73.4 million litres in 2008-2009, which represents less than 1% of total dairy output. Locally produced and processed organic milk launched in Alberta grocery stores in November 2010.

Adapted from *The Canadian Dairy Industry at a Glance*. **Canadian Dairy Information Centre**, Government of Canada. [www.dairyinfo.gc.ca/index\\_e.php?s1=cdi-ilc](http://www.dairyinfo.gc.ca/index_e.php?s1=cdi-ilc)







## Vocabulary Support

The **Vocabulary** list provides a starting point for vocabulary that students will find in the student resources or potentially in class discussions. Definitions are embedded in sentences or provided in brackets beside the term.

Some of this vocabulary may be challenging for students. Vocabulary can be explored in advance to support learning of concepts and development of deeper understandings of content. Alternatively, some students may find vocabulary more relevant when explored in context. Add terms that students identify and define through their research to a vocabulary list.

**Agriculture** refers to the practices involved in growing crops and feeding and raising livestock for food and other products.

The main protein in milk is called **casein**.

A **chemical change** happens when two or more substances are mixed together to form something new.

When cream is **churned**, or mixed very hard, the fat separates from the milk mixture and forms a small ball.

These **curds**, or solids, are then used to make cheese.

The milk solids are made of carbohydrates and protein that are **dispersed**, or evenly spread out within the milk.

An **enzyme** is a protein that is produced by cells in the body.

The **fat**, also called milkfat or butterfat, tends to gather at the top of the milk, unless it has been homogenized.

A French scientist, Louis Pasteur, worked with **fermentable liquids**. These liquids are substances, such as milk, that allow bacteria to grow. The growth of bacteria causes fermentable liquids to spoil.

Lactose goes through **fermentation**, the process that converts sugar into an acid.

**Food production** means the process of taking raw ingredients, such as grains or milk, and changing them into food items like bread or yogurt.

When we add nutrients to food, we say that food has been enriched or **fortified**.

Milk is also **homogenized**, which means breaking up the fat into very small particles, so that the fat and milk can then be blended together in a smooth mixture.





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A **homogenizer** is a machine that forces the milk at high pressure through tiny holes. This process breaks up the milk fat globules into particles one-eighth their original size. When the milk fat particles are that tiny, they stay evenly suspended.

Today, milk is pasteurized using the **HTST** (High Temperature, Short Time) process. In most dairies, the milk is heated to at least 72°C for 16 seconds and then cooled to 4°C.

**Lactase** is the enzyme that breaks down lactose.

When lactose ferments, it makes an acid called **lactic acid**. This acid combines with the protein in milk to give yogurt its tangy taste and thicker texture. This acid is what causes milk to sour.

The sugar, or carbohydrate, in milk is called **lactose**.

People who do not have an adequate amount of the lactase enzyme are "**lactose intolerant**." This means that they have trouble digesting milk and dairy products.

The **milk solids** are made of carbohydrates and protein.

**Pasteurization** is the process of heating a food to a high temperature and then cooling it quickly.

A **recipe** is a set of directions with a list of ingredients for making or preparing food. A recipe can also refer to a formula or process to get to a desired result.

Milk and dairy products are one of the most **regulated**, or monitored by law and tested, foods that are made and provided for sale in stores.

When **rennet**, an enzyme found in animal's stomachs, or a lactic acid is added to milk, it curdles, or separates the solids from the liquids.

Another way to pasteurize milk is called **UHT** (Ultra High Temperature). In this process, the milk is heated to at least 138°C for 2 seconds. Then it is quickly cooled to 2°C.

The liquid that is left over when curds are drained is called **whey**.

