

### Dairy Overview

In the United States there are more than 40,000 dairy farms total, covering every single state in the nation. On these farms, there are a total of 9.3 million cows who produce 215 billion pounds of milk every year.

As the number of people in the U.S. and in the world continues to expand, dairy farmers who care for these cows have needed to supply more milk for a growing population.

These dairy farmers have used selective breeding, nutrition, technology and constant care to increase the amount of milk a cow can produce. This has resulted in the U.S. dairy industry producing 50 percent more milk than in the 1940s, with 62 percent fewer cows.

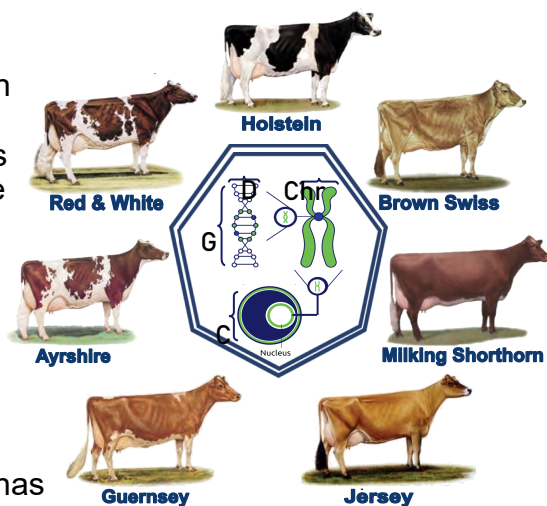
### Selective Breeding in Dairy Cows

*How do you think genetic selection played a role in the amount of milk today's dairy cow produces?*

Just like in dogs and cats, there are different breeds of dairy cows. The seven different breeds are the Holstein, Brown Swiss, Jersey, Guernsey, Ayrshire, Milking Shorthorn and Red and White Holstein. Each breed descends from a different region of the world, and each breed has its own unique characteristics and qualities.

Dairy farmers have built on those unique characteristics to improve the cow's productivity and longevity (or length of life) through selective breeding.

This process has played an important role in enabling cows to increase the amount of milk they can give. In 1940, the average cow gave about 4,600 pounds (or about 537 gallons) of milk.



Today, the average cow gives about 21,800 pounds (or about 2,534 gallons) of milk. Much of that advancement has occurred through the process of genetic selection.

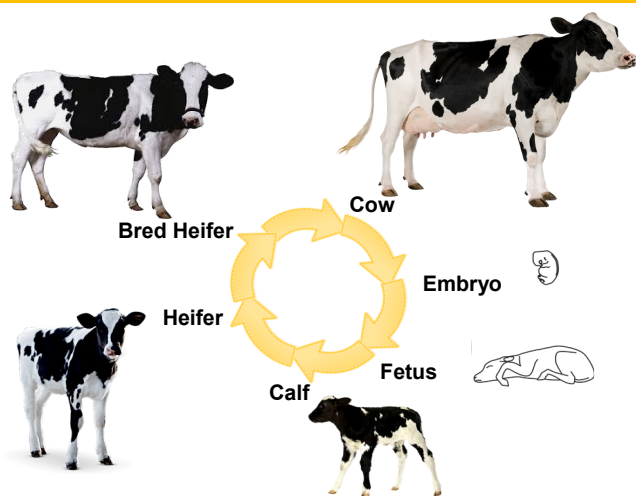
Average Cow's Annual Production	<u>1940</u>	<u>2017</u>
In Pounds	4,600 lbs.	22,941 lbs.
In Gallons	537 gal.	2,668 gal.

Most dairy farmers use artificial insemination to impregnate their cows. Artificial insemination is the process by which sperm is placed into the reproductive tract of a female for the purpose of impregnating the female by artificial means. Sperm from genetically superior bulls in each breed is collected. The semen is evaluated for specific genetic traits, and farmers select the bulls to breed their cows based on how well their genetic traits compliment the cow.

Using artificial insemination and selective breeding gives the farmer the ability to influence the genetic traits inherited by an offspring from a cow. Farmers look at a variety of genetic traits to make their breeding selections. They apply the basic principles of genetics, with dominant and recessive genes, to breed for offspring that can produce more milk and live longer than their ancestors could.

Many of the genetic traits used to select mates relate to how the animal appears – such as size and scale, strength, and cleanness of bone (which is an indicator of how fat the cow is). They can also breed for traits relating to the cow's milk production – how much milk she gives, how high the fat and protein of the milk is, and high of quality the milk is.

Some of the traits relate specifically to the longevity of the animal. For example, a cow that has difficulty walking could be mated to a bull that corrects her feet and leg problems. Other traits relate to physical characteristics, such as whether the cow has horns or not or whether a Holstein will be black and white or red and white.



### The Lifecycle of a Dairy Cow

*How do you think nutrition and technology have played a role in the amount of milk cow's can give today?*

Just like humans, dairy cows pass through different stages in life as they grow. Dairy farmers play an important role in each stage of the dairy cow's life, ensuring that she grows into a healthy and productive mature cow.

- ♦ **Embryo:** Like humans, the first step in the life cycle of a cow is the embryo, which is the organism that results from a successful mating of a male sperm and a female ovary. A cow's gestation cycle, the length of time a cow carries her offspring in her reproductive system, is about 9 months, the same length as a human's. After about eight weeks of development, the embryo becomes a fetus.
- ♦ **Fetus:** A fetus is what the offspring is called in between the embryonic stage and when it is born. Much of the development and growth of an unborn calf occurs in the fetus stage.
- ♦ **Calf:** A baby cow is called a calf. When a calf is first born, it is fed colostrum, the first milk the mother produces after the calf is born, that is filled with important antibodies for the calf. This colostrum plays an important role in strengthening the calf's immune system. A calf weighs about 80-100 pounds when it is born. Female calves will grow into cows someday. Male calves become bulls.
  - ♦ They typically produce offspring once every year.

- ♦ **Heifer:** Dairy cows are part of the bovine family and are considered ruminant animals. Ruminant animals have four stomach compartments that allow them to more readily digest plant-based foods than monogastric (simple stomached) animals like humans can. A calf is fed milk for the first two months of her life until her stomach fully develops. As she grows into a heifer, which is a cow that hasn't given birth yet, she is fed more plant-based foods, like hay and grass, to supply her nutrient needs.
- ♦ **Bred Heifer:** When the heifer is 14 months old, she is mated with a bull and becomes pregnant. At about two years of age, she has her first calf and becomes a cow.
- ♦ **Mature Cow:** Cows typically give milk for 10 months out of the year, with a two month break before each time she has a baby. Cows eat about 90 pounds of feed a day and drink about 40 gallons of water. An average cow weighs about 1,500 pounds and gives about 60 pounds of milk a day.

### Lesson Vocabulary Definitions:

- ♦ **Selective breeding:** the process of breeding plants and animals for particular genetic traits.
- ♦ **Artificial insemination:** the process by which sperm is placed into the reproductive tract of a female for the purpose of impregnating the female by artificial means.
- ♦ **Semen:** an organic fluid secreted by the male containing sperm.
- ♦ **Genetic Trait:** a specific trait or physical characteristic that is inherited by the offspring from the parents.
- ♦ **Embryo:** the organism that results from a successful mating of a male sperm and a female ovary.
- ♦ **Fetus:** the stage between an embryo and birth when much of the development and growth occurs.
- ♦ **Calf:** a baby cow.
- ♦ **Colostrum:** the first milk a mother produces after giving birth that is filled with important antibodies.
- ♦ **Heifer:** a young cow before she gives birth.
- ♦ **Ruminant:** a hoof-footed mammal with multiple stomachs or stomach compartments.