Dairy cows are amazing animals. They can turn grass and grains into milk! Heifers are female dairy cattle and after two years, they give birth to their own calves. Once a heifer gives birth, it is called a cow. All female dairy cows must have a calf to produce milk. The gestation (pregnancy) period for cows is nine months. Newborn calves weigh about 80-100 pounds. Male dairy cattle are called bulls and do not produce milk.

Milk provides your body with calcium, which is needed for healthy bones and teeth. Calcium also helps our muscles and nerves work properly, and helps blood to clot. Milk products also provide us with carbohydrates, protein and Vitamin D. You should have 3 servings of nonfat or low fat milk and milk products each day. One serving of dairy is equal to 1 cup of milk, yogurt or ice cream and 1-2 ounces of cheese.

Dairy Breeds

Dairy cows come in many colors. The black and white cows are called Holsteins. You’ll find mostly Holsteins here in the United States. Some other breeds include Jersey, Brown Swiss, Guernsey, Ayrshire and Milking Shorthorn. They can be tan, brownish gray, golden brown, reddish-brown or shades of these colors with patches. Some breeds produce a lot of milk and some breeds produce milk richer in protein or fat. Farmers consider this when choosing a breed of dairy cows. Farmers improve their herd through genetics and select cows that produce more milk or have a higher content of protein or fat in their milk.
Cows and Their Diet

As fed, a 1,500 pound dairy cow will eat 100 pounds of feed each day. This includes corn silage, hay, ground corn, soybean meal and vitamins/minerals. Dairy cows also drink 25-50 gallons of water each day. Animals eat to meet their energy (calorie) needs—they do not overeat. Young animals that are actively growing have greater requirements for protein than older animals.
Do A Double Take
Dairy cattle are called ruminants because they have multiple compartments in their digestive system. Ruminant animals first chew their food to soften it, swallow it, and then return it to their mouth for continued chewing. This is called chewing the cud. After chewing the cud, it is swallowed a second time, broken down further, and digested. Cows will spend up to eight hours a day chewing their cud. Cows have a four-compartment stomach. The four digestive compartments of a cow’s stomach are the rumen, reticulum, omasum and abomasum.

Human Nutrition
Together, milk, cheese, and yogurt provide nine essential nutrients, including calcium, potassium, phosphorus, protein, vitamins A, D and B12, riboflavin and niacin. Beyond building stronger bones, three daily servings of low-fat or fat-free dairy foods improve overall diet quality and reduce the risk of various chronic diseases.

Strong Bones
What would happen to bones if they didn’t get calcium? Try this to find out:
- Remove the bones after 2 days and try to bend the tip of each bone. What happens?
- Wait 2 or 3 more days and try to bend the bones in the middle. Try to cut them with scissors. Which one is softer?

The acid in vinegar dissolves calcium. The bone in the vinegar becomes brittle because it lost calcium. Keep your bones strong with plenty of calcium.

Each year, U.S. dairy farmers provide milk to make more than 1 billion pounds of butter, 7 billion pounds of cheese and 1 billion gallons of ice cream.
Automatic Milking Systems:
On today’s dairy farms, cows are usually milked 2 or 3 times a day with special milking machines. Farmers use automated equipment to milk the cows and take extra steps to keep the milk clean and safe. The Automatic Milking Systems have electronic cow identification, cleaning and milking devices, and computer controlled sensors to detect abnormalities of the Automatic Milking System, cow and milk. Bucket, robotic, stanchion, parlor and rotary milking are all different systems that are used on dairy farms.

Bucket milking is a system in which the milk coming from the cow is drawn into a bucket or pail and manually transferred to a collection area or the milk house.

Robotic milking involves machines that collect a large amount of data on each individual cow including their basic milk, health, and reproduction data and much more. Once the cow is in the station, the trough will automatically dispense feed, minerals, supplements, and liquids to suit each cow. As the trough swings clear at the end of milking, this encourages the cow to walk forward and leave. The teats are automatically cleaned and brushed and the milk is removed and moved from the arm through the rest of the system. The robotic arm also measures the color, temperature, conductivity, fat, lactose, levels of somatic cells and protein levels in the milk for each cow. This whole process is done with the robots and no human contact. However, the dairy farmer monitors the computer records closely in order to spot any changes in the cow’s behavior or production that might indicate she needs special attention.

Stanchion barn milking is housing for dairy cows, where cows are milked in stalls or stanchions. Dairy farms that milk by stanchion technology usually have small herd sizes.

Parlor milking is a milking system where cows enter a raised milking platform and leave after they are milked. Dairy farms with large herd sizes use parlor technology.

Rotary parlor milking is ideal for large or expanding herds. Milking stalls are on a rotating circular platform. Continuous cow flow lets the operator work without any interruptions, concentrating on essential milking tasks. Platform entry, pre-milking work routines, milking unit attachment and cow exit from the rotary parlor are the same every time. The rotary turns at a constant speed, adapted for the specific herd, until the job is finished. The cows are able to enter and exit without assistance.

Ultra High Temperature (UHT) Milk:
Ultra Pasteurized means milk pasteurized above 280 degrees Fahrenheit and held only 2 seconds, to preserve taste and nutrition. It is an extended shelf-life product that under proper refrigeration will have codes up to 90 days, without preservatives. The milk is safe and maintains the protein, calcium and the other important nutrients in milk.

Cow Tracking Devices:
The past 25 years have brought a greater emphasis on disease prevention, feed intake, milk output, pregnancy checks, illness and much more. Veterinarians play an important role in dairy cow health by helping farmers implement on-farm management systems and cow tracking devices. These technologies allow farmers to tailor disease prevention and treatment for individual animal needs. Feed intake monitoring is important because it indicates health concerns by identifying changes in eating behavior, allows for earlier detection of disease and can help predict future rumination activity. Tracking milk output is also important. The cows wear a necklace to record how many steps they take, and then when it enters the barn it records the milk production, which allows the dairy farmer to monitor individual cow needs closely.
Safety & Quality

There are many steps dairy farmers follow to produce high-quality, wholesome and safe milk. These critical steps start with the cow and end at your table. The steps include:

Healthy cows- By adopting best management practices, such as milking sanitation and regular veterinary care, dairy farmers increase the well-being of their cow herd by reducing the risk of disease and infection.

Strict, on-farm milking procedures- Today, human hands never touch the milk as it travels from cow to consumer. The people milking the cows wear gloves to prevent any transfer of possible pathogens from cow to cow. A sanitizing solution is put on each cow’s teats to reduce the presence of any bacteria, thus reducing the possibility of its transfer to the milk. The cow’s teats are then dried and the milking unit attached. After only five to ten minutes, the cow is done being milked and the equipment is removed. The cow’s teats are cleaned again with a sanitizer containing skin conditioners. Following milking, equipment is washed and sanitized.

Quick cooling of milk and immediate transportation to the manufacturer- Milk collected from dairy cows is cooled to 45°F or less within two hours of the completion of milking in order to reduce the possibility of any bacteria growth. The practice of quick cooling assures the most wholesome milk reaches the consumer.

Testing for antibiotics- Veterinarians help dairy farmers administer antibiotics effectively when they are needed to treat and cure an illness. When antibiotics are used, the treated cow’s milk is discarded and does not enter the human food system. Antibiotics are not used routinely for dairy cows or added to their feed or water to promote growth. Dairy farmers follow strict rules regarding the use of antibiotics. Every tanker load of milk is tested for commonly used antibiotics at the processing facility, and, in the rare event that a tanker tests positive, the milk is destroyed immediately and never reaches the consumer.

Pasteurization- Pasteurization involves the heating of raw milk to a minimum of 145°F for 30 minutes or to 161°F for 15 seconds, followed by rapid cooling. This step is very important for the continued production of safe milk. The Food and Drug Administration (FDA) and the Centers for Disease Control (CDC) recommend drinking only pasteurized milk.

Processing and distribution- It takes about two days for milk to go from the farm to the retail store. Milk is transported from the farm in insulated stainless steel tanker trucks, which keep the milk cold and follow sanitation standards. These bulk tankers are sealed to prevent tampering or contamination by an outside source. When milk is received at the processor, it must again be checked to ensure it has been kept at or below 40°F during distribution and has been delivered within 48 hours after the cow is milked. Once the milk passes inspection, it is pumped into large insulated vats. The milk is then pasteurized, homogenized, and packaged before it is distributed to various retail stores, schools and households.

Did you know about 97% of all U.S. dairy farms are family-owned and operated? There are about 51,000 dairy farms in the United States. Dairy farmers work hard each day to provide safe, wholesome, nutrient-rich milk to the public, while caring for their animals, land and communities. Dairy farmers make positive contributions to rural America. In order to keep a dairy running, every member of the family is involved. Farm kids are learning hard work, dedication and family loyalty. This helps prepare them to come back to the farm to continue the legacy of their family.
Many dairy products can be found in the grocery store. These include milk, flavored milk, ice cream, cheese, butter, yogurt, cream cheese, sour cream, cottage cheese and buttermilk.

**Ice Cream**

Ice cream is a popular dessert item. Illinois ranks fourth in ice cream production. The average American consumes 24 pounds of ice cream a year. Milk and cream are the essential ingredients for making ice cream. In fact, it takes 12 pounds of whole milk to make 1 gallon of ice cream.

Most Americans prefer vanilla over any other flavor. Take a class vote to find out the favorite ice cream flavor in your class. Create a graph showing the results.

**Cheese**

Cheese is another nutritious food made from milk. People crave cheese more than any other food, so it is not surprising the average American eats over 31 pounds of cheese each year. That’s easy to do, considering cheese can be found in many of our favorite foods, such as pizza. Also, there are many different varieties of cheese – something for everyone’s taste preference.

**Yogurt**

The two main ingredients in yogurt are milk and bacterial cultures. And that’s a good thing! Milk strengthens our teeth and bones, while the cultures can help us fight infection and boost our immune system. There are many different varieties and flavors of yogurt. When you are at the grocery store, check them out! Yogurt is a fun way to add calcium to your diet.
Most dairy farmers live and work on their farms. Dairy farmers protect the land, water and air not only for their animals, but also for their families and surrounding community, as well as for future generations. Water conservation, manure management, and improving air quality are a few ways they protect their farm.

**Water Conservation**

Many conservation technologies are in place to conserve water. For example, water used to clean the milking parlor is reused to clean alleyways and then to irrigate fields. Modern dairy farms use a heat exchanger to partially cool the milk. As cold well water flows past the milk in a separate tube, some of the heat transfers from the milk to the water. This water is collected and used again as drinking water for cows. Using manure to meet crop nutrient requirements can also improve soil’s productivity and water-holding capacity. Application of manure to crop land increases the water-holding capacity of soil by 20 percent so less groundwater is needed to grow crops. In addition to dairy farmers’ personal commitment, farms must abide by clean water laws.

**Manure Management**

Dairy farmers know that natural manure replenishes the soil so crops grow better. High-tech manure management takes advantage of this natural fertilizer while avoiding pollution. Using manure also reduces the amount of commercial fertilizers needed. Engineers and other experts help dairy farmers design manure handling systems, from storage to transportation to land application. These experts take into account animal feeding and housing methods, different crop types, and manure application techniques. Manure is spread on crop fields according to detailed nutrient management plans. These plans take into account the types of soil on the farm, the terrain of the fields, soil moisture levels and the amount of nutrients the next crop on that field will need. New methane digester technology on some dairy farms converts manure into methane-rich biogas, a renewable fuel that can be used to generate electricity. Farms with this technology may generate more than enough electricity to run their operations, and they can offer the excess energy back to the local utility company. Manure solids may also be processed and used as comfortable bedding for cows.

**Improving Air Quality**

Dairy farmers improve air quality by following proper manure storage practices and by maintaining clean facilities. Government regulations are also in place to protect air quality. In some states, larger farms are required to maintain an odor management plan, which helps to identify potential odor sources, determine control strategies to reduce these odors, and establish criteria for implementing these strategies. To maintain a healthy and clean environment, many dairy farmers voluntarily participate in research efforts done by university researchers and industry manufacturers to help measure and monitor air quality more accurately.

On average, each cow produces enough milk to fill 125 glasses. That’s about 8 gallons per day!
For More Information…
Check Out These Websites

- prairiefarms.com
- midwestdairy.com
- stdairycouncil.org
- nationaldairycouncil.org
- holsteinusa.com
- usjersey.com
- brownswissusa.com
- usguernsey.com
- milkingshorthorn.com
- wiu.edu/users/mfjpc/dairy.htm
- usayrshire.com
- dairygood.org
- moomilk.com
- fueluptoplay60.com
- milkdelivers.org
- fofarms.com
- hilmarcheese.com
- milklife.com
- operationdairy.com
- usguernsey.com
- fueluptoplay60.com
- milkdelivers.org
- fofarms.com
- hilmarcheese.com
- milklife.com
- operationdairy.com
- wiu.edu/users/mfjpc/dairy.htm

Dairy Career Corner

Phil Cardoso, DVM, PhD
Assistant Professor, Dairy Research and Extension
University of Illinois
Urbana, IL

Describe what your position as a ruminant nutritionist entails.
My position entails understanding the feeds dairy cows have available to them, and how those cows utilize and transform the feeds into the products that will be consumed by humans. For example: If we feed soybean meal to cows, we would expect the cows to convert that into protein. Feeding cows needs to be affordable to the farmer, so I am always checking the prices to make sure the farmers and the cows are happy. Lastly, I teach students about animal and ruminant nutrition in order to prepare them for a future career in this field.

How involved are you with dairy?
My research and all classes I teach revolve around dairy cows and dairy breeds. A few examples of those breeds include Holstein and Jersey. I make sure my research and Extension programs are relevant and helpful to the farmer.

What is your favorite part of your job?
My favorite part is changing people’s lives by teaching them the importance of the dairy cow. I help students understand how to feed a cow properly and I feel a sense of pride when my students can talk about lessons learned from my research and teaching. Teaching animal science can be challenging. Each person learns differently, so the content must be taught in many different styles in order for the students to fully understand. Once the students have a good understanding, they can teach farmers about proper dairy nutrition.

Rock ‘n Roll Ice Cream

Try this simple recipe to make your own homemade ice cream!

1. Put students into small groups of 2 or 3.

2. In an empty and clean quart-size Ziploc® bag, mix 1 pint of half & half with ½ cup sugar. Add a little vanilla or fruit if you like.

3. Seal the quart-size Ziploc bag, secure it with duct tape, and then place it inside of an empty and clean gallon-size Ziploc bag.

4. Pack ice around the quart-size bag. Then sprinkle about 2 tablespoons of rock salt on the ice. Finally, fill the rest of the gallon-size bag with ice.

5. Seal the gallon-size bag and secure it with duct tape.

6. Have students toss the bag back and forth to each other to mix the ingredients. You may want to put a tarp on the floor for this. After about 10 minutes of tossing the bag, you will have made ice cream in the small bag!

7. Remove the small bag and rinse it with water before opening. If you don’t, you may end up with salt in your ice cream.

8. Enjoy!

Locate the code on your carton or container, enter it and click Find It. You’ll instantly know which dairy your milk came from! The same goes for your yogurt, chocolate milk, coffee cream, cottage cheese, ice cream and more!
Michelle Hasheider-Burianek
Dairy Farmer
Okawville, IL

Tell us about your dairy farm and how you got involved.
Our dairy farm was started by my grandfather. My dad and his three brothers all have a part of the farm, performing various jobs. I have been involved in the dairy farm since I was born. As the years went on, I helped milk, feed calves, do herd checks, make breeding decisions, and so on. I was also heavily involved in showing cows at county and state shows. I went to college and received a Bachelor's degree in Animal Science which helped to further my knowledge within the field. I am now involved with most all decisions with the dairy.

Tell us about your farm and the technology being used.
We currently milk cows with two robots which has been a major change for our farm! While the amount of labor required to take good care of animals and a dairy is still quite substantial, the robots do give you more flexibility to do things than what milking in a parlor does. In addition, we have put in an entirely new system for handling our manure responsibly and getting it to our field where it is a natural fertilizer.

Where do you see the dairy industry headed in the future?
I am excited to see what the future holds for dairy. The shift to healthier foods, less soda, less processed food, etc. should only benefit the dairy industry. I also see automation and robots as one way small dairies and family dairies can continue to provide healthy, wholesome milk and dairy products. In the United States, 97% of all dairies are family-owned. I am very happy to have grown up on a family farm. I hope to see the family farm continue to be strong in the future, as it is an important part of agriculture as well as a great way to learn and grow.

Jeffrey T. Fieldsend
Plant Manager
Muller-Pinehurst/Prairie Farms Dairy
Rockford, IL

What does your job entail?
As plant manager of Muller-Pinehurst, I oversee everything from the time the milk arrives at our dairy in tanker trucks to the time it is delivered to the customers usually in less than 48 hours. I make sure the product lives up to our high standards of quality long after it reaches the consumer. I also ensure we have the proper employees in place to complete every step of the process properly. The milk arrives at our dairy and is tested by our milk receivers. If the milk passes our test, it is unloaded into a milk silo where it is cooled. The milk is then drawn from the silo to our pasteurizer department. The milk is pasteurized to kill any bacteria, and then run through a separator to turn the milk into the proper butterfat level. Then, the milk is homogenized to keep the cream from separating from the milk. Our production department schedules how much of each product is needed for the day. We make a lot of different products including; whole milk, 2% milk, 1% milk, skim milk, strawberry milk, chocolate milk, buttermilk, shake mix and various ice creams and fruit drinks. Once the products are made, they are placed in milk cases and transferred to one of our coolers where an order picker fills orders and loads the products onto the proper trucks. Even after the products are delivered to our customers, our lab keeps checking samples of the products to make sure they last as long as they should.

How did you become involved in agriculture?
I began working at Muller-Pinehurst in 1985. My father drove a truck here for 30 years. I started out working in a cooler, pulling stacks of milk, and then moved to the relief department where I learned all the different jobs. I then moved to the blow mold department where I ran a machine that makes plastic gallon milk jugs. I worked in the blow mold department for over 10 years before getting promoted to night supervisor. From there, after a lot of training, I became head of quality control. In 2013, I was promoted to plant manager.

What new and exciting things are happening in the dairy industry now?
Now more than ever, consumers have more and more choices when it comes to dairy products, from strawberry milk to whole chocolate, to 2% chocolate, to 1% chocolate to now skim chocolate. We now carry Greek yogurt and fitness related drinks. Even with all the various choices, one thing remains the same. There is nothing better than an ice cold glass of milk!