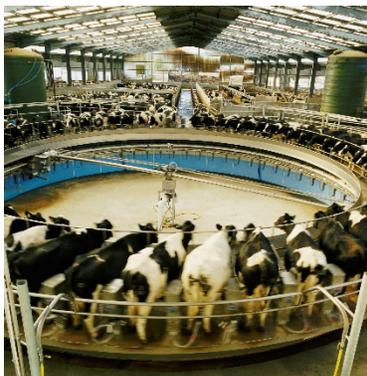


Advances in Dairy Farming

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California has been the nation's top producing agricultural state for many years. Produce farms that grow fruits, vegetables and nuts ship their products all across the country. Successful dairy farms have also made California the top milk producing state in the nation. Advances in technology and the agricultural sciences helped make this achievement possible.

Changes to milk production in this country didn't happen quickly. The first cows arrived with Christopher Columbus on his second voyage in 1493. For hundreds of years thereafter, access to milk depended on owning a cow. As the number of farms increased, other agricultural products were put on wagons and sold in town. Milk was especially perishable and spoiled easily when there was no way to keep it cool. It was risky to transport milk.

In the early 1900s, significant discoveries, inventions and new knowledge about safe milk handling brought big changes to milk production. The quality and safety of milk was improved when America learned about the pasteurization process developed by the French scientist Louis Pasteur. When the pasteurization process was applied to milk, it destroyed the harmful bacteria, germs and yeast in the milk. The process involves heating raw milk to 162° degrees for 16 seconds then cooling it immediately to 39°.

When controlled refrigeration methods and refrigerated trucks were invented, transporting perishable foods like milk to different markets became profitable. The importance of keeping milk cool had always been known, but the technology and the science was not in place until the early 20th century.

Today, refrigerated milk tankers with temperature controls keep milk at 40°F during transport. Refrigerated storage tanks are also used on dairy farms. After milking the cows, the raw milk is piped immediately into the refrigerated tank and kept at 40°F where it awaits pick-up by the tankers.

After picking up the raw milk, tankers take it to processing plants where the milk is pasteurized and homogenized. Homogenizing is a process that mixes and blends the cream in the milk. The amount of cream in milk determines the fat content. Processing plants make milks with different fat content (e.g., whole milk, low fat, reduced fat, nonfat milk, buttermilk). They also make cheese, yogurt, ice cream, butter, whey powder and many other milk products.

The changes made to milk at the processing plant do not affect the milk's nutrient value. All milks contain the same amount of calcium and minerals even if the fat content is different. Calcium is the nutrient needed for strong bones and teeth. It is especially important for growing children to get enough calcium in their diet.

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Science and technology have also improved the efficiency of work on a dairy farm and the milk production. Lactating cows need to be milked two or three times every day. Before milking machines were invented, the job was done by hand. It is hard work and takes time to squirt milk into a bucket. It's also easy to lose some in the process. When hand milking was replaced by milking machines that could do the job in five to seven minutes, more milk production was possible. Farms began to add more dairy cows. The use of a closed system helped eliminate waste and keep the milk safe from contamination. Each milking unit would collect milk from the cow and send it through pipes to the storage tank on the dairy for cooling before transport to the processing plant.

Dairy farms are in the business of producing milk, but the cows that produce the milk also produce another product, manure. Manure is the solid waste from farm animals. On a dairy farm, manure handling is important because there is a lot of it. Every dairy has a plan for waste management. Depending on a farmer's point of view, manure is either a problem or an asset. Today, cow manure can be sold to crop producers for fertilizer. It can also be used to produce renewable energy.

For years, decomposing cow manure on dairies was known to produce methane gas that is harmful to the atmosphere. Because dairies produce massive amounts of manure, the problem needed a solution. Today, dairy farms can use methane digester systems to convert cow manure into renewable energy. The bioenergy is then used to produce electricity that can be used on the farm or sold. Many conservation-minded dairy farmers in California and other states are now using methane digesters on their farms. Manure management was once a big problem for dairy farmers. Now it's a valuable asset.

Dairy farms of the future will always depend on cows for the milk they produce. But change is inevitable and will continue to come. New technologies, new machines and new ways to solve problems and maximize resources will make a difference.