



MODERN DAIRY FARMING PRACTICES & MILK QUALITY: MYTHS & FACTS

SUMMARY

Today's consumers can choose from a wide variety of cow's milks and milk products. Some consumers believe that specific dairy products such as organic milk and raw (unpasteurized) milk are healthier options than regular milk and pasteurized milk, respectively. These myths stem in part from failure to understand modern conventional dairy farming practices and the health importance of milk pasteurization.

Modern conventional dairy farmers use industry-accepted best management practices to ensure that dairy cows are comfortable and healthy, that the environment is protected, and that milk is safe and of high quality. To be labeled as "USDA organic," organic farmers must follow specific USDA regulations. Both production systems – conventional and organic – result in high-quality, nutritious, and safe milk.

Proper animal care and environmental practices, as well as dairy food safety and quality, are priorities for all dairy farmers, whether they produce regular or organic milk. Conventional dairy farmers, with the help of animal scientists and veterinarians, strive to provide dairy cows with comfortable living conditions, nutritious diets, and good medical care.

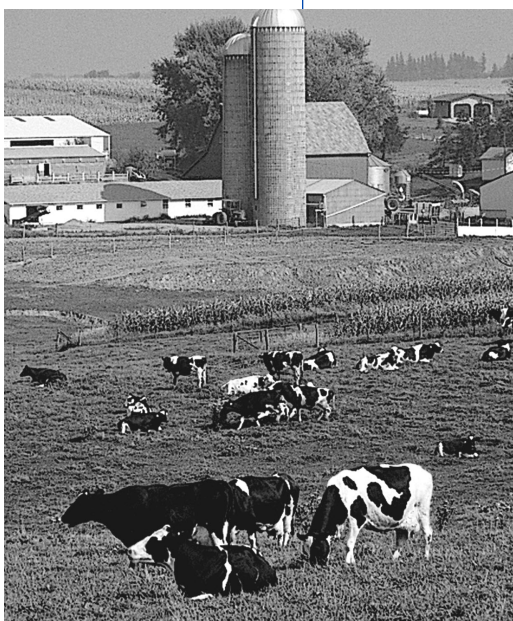
Dairy farmers are good stewards of the environment. This means following practices to reduce and manage waste, and to conserve and/or protect the quality of land, water, and air. In addition, environmental practices on all dairy farms are tightly

regulated by both federal and state government agencies.

Although some people believe that raw (unpasteurized) milk, either conventionally or organically produced, is a healthy alternative to pasteurized milk, consuming raw milk and milk products has been linked to outbreaks of foodborne illness. The pasteurization of milk and restriction of raw milk sales is supported by numerous state and federal government agencies, and health professional and scientific organizations.

Concern about antibiotics, pesticide residues, and hormones is given as a reason for buying organic milk and milk products. However, dairy farmers and state and federal government agencies take measures to prevent all milk from containing illegal antibiotic residues or unsafe levels of pesticide residues. Minuscule amounts of hormones are naturally present in all milk and milk products, including organic milk and milk products. Some dairy farmers may choose to supplement their cows with additional bovine somatotropin (rbST) to increase milk production. This product has been reviewed and approved by the Food and Drug Administration. Milk from cows treated with rbST is the same as milk from non-rbST treated cows.

As a result of strict government regulations and dairy farmers' commitment to providing quality milk, the public can be assured that all pasteurized milk and milk products are safe and nutritious. The many milk and other dairy food options available to today's consumers can help them meet their specific lifestyles, personal preferences, and the 2005 Dietary Guidelines' recommendation to consume 3 servings of milk, cheese, or yogurt a day.



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INTRODUCTION

Today's consumers can choose from a variety of cow's milks, both conventionally produced and organically produced. Recently, demand for organic foods, including milk and other dairy products, has increased (1-3). Growth in the organic food market is attributed to perceived benefits to the environment and animal welfare, and the perception that organic foods are safer and more nutritious than conventionally produced foods (1-4). According to a report, *Shopping for Health 2005*, by the Food Marketing Institute and Prevention magazine (1), more than 80% of consumers who purchase organic products do so because of their perceived nutritional value.

However, organically produced foods, including milk and other dairy products, are not more nutritious or safer than conventionally produced products (3,5-7). According to a statement from the American Dietetic Association (5), "both organic and conventional farming supply nutritionally comparable foods." The U.S. Department of Agriculture (USDA) makes no claims that organically produced food is safer or more nutritious than conventionally produced food (6). A scientific status summary issued by the Institute of Food Technology states that it is premature to conclude that either organic or conventional food systems are superior to the other with respect to safety or nutritional composition (3).

All cow's milk in the U.S, whether conventionally produced or organically produced, must adhere to strict government standards of quality and sanitation. All milk contains the same unique package of nutrients. The difference between conventionally produced and organically produced cow's milk is how it is produced on the farm (4,8-10).



Regular and organic milk and milk products are equally safe and nutritious. The difference between these products is how they are produced on the farm.

Conventional dairy producers use industry-accepted best management practices to ensure that dairy cows are healthy by providing them with comfortable living conditions, nutritious diets, and good medical care. They also protect the environment by implementing practices that conserve natural resources and minimize the quantity of waste generated. Organic dairy foods must additionally meet the requirements of USDA's National Organic Program (9,10). Since October 2002, USDA has allowed organic food manufacturers to label their products with a "USDA organic" seal if products are produced according to specific criteria (9,10). Milk bearing the "USDA organic" seal comes from dairy farms that meet all of the following criteria: cows are exclusively given feed grown without the use of pesticides or commercial fertilizers; cows are given periodic (unspecified) access to pasture and direct sunlight; cows are not treated with supplemental hormones; and cows have not been given certain medications to treat illness (9,10).

Although both production systems result in high quality, nutritious milk, some consumers believe that organically produced milk is superior to conventionally produced milk. To help educate health professionals about conventional dairy farming and allay myths or skepticism regarding this type of dairy farming, this Digest reviews typical practices on modern conventional dairy farms. Practices related to proper animal care and safeguarding the environment, as well as efforts to protect the safety and quality of cow's milk and other dairy products, are discussed.

MODERN CONVENTIONAL DAIRY FARMING

Proper animal care and environmental practices, as well as dairy food safety and quality, are priorities for all dairy farmers, whether they produce regular or organic milk.

Proper Animal Care

Recognizing that proper animal care leads to the production of high quality milk, dairy farmers routinely employ many animal care practices such as providing cows with comfortable living conditions, nutritious diets, and good medical care (11,12). Dairy farmers, with the help of animal scientists and veterinarians, are continually making improvements related to housing, stall surfaces, bedding, ventilation and cooling, and formulation and delivery of feed rations, which enhance the welfare and reproductive and lactation performance of cows (13).

Shelter and Diet. One of the criteria for being labeled as “USDA organic” is that milk must come from cows that are allowed access to pasture and direct sunlight (9,10). On most modern conventional dairy farms, cows are allowed access to pasture and direct sunlight as well as provided with housing. It is important to appreciate that dairy cows are very adaptable, and as long as they are given a healthy environment, they will grow and produce high quality milk. Many of today's modern dairy farms use “free-stall” housing, which is an open, curtain sided barn designed to maximize cow comfort, and that allows cows to eat and sleep whenever and wherever they choose, and move on their own from their pens and fields to and from the milking parlor (11,13-15). Dairy farmers select stall surface and flooring material in barns to improve cow comfort, which in turn increases milk production (15-19). For example, the selection of rubber and other

America's dairy farmers are committed to providing consumers with safe, high-quality milk and other dairy products. Proper care of their animals and protection of the environment are priorities for all dairy farmers. Visit www.dairyfarmingtoday.org for more information.

non-slip surface material for stall floors makes it easier for cows to move around (16,17). In particular, comfortable bedding in free-stalls increases the length of time cows spend lying down, which increases their milk production (18,19). Waterbeds, sand beds, sawdust bedding, or mattresses made of rubber, foam, or a combination of the two improve cow comfort (15,18,19).

To assure healthy air quality and avoid heat stress in dairy cows, most modern dairy farms use shades and advanced ventilation systems (13,15). On warm days, farmers use fans, foggers, misters, or sprinklers to effectively cool cows and improve milk production and reproductive efficiency (13). The health and performance effects of heat stress on dairy cows have been quantified (15).

Proper nutrition is critical to enable modern, high-producing dairy cows to meet their genetic potential for milk production (20). In fact, increases in milk production per cow over the past 100 years can be attributed in large part to improvements in nutrition. Dairy farmers use professional animal nutritionists to develop scientifically formulated, balanced, and nutritious diets to support milk production, while optimizing nutrient management programs and minimizing pollution. Diets for cows include hay, grains, protein sources (e.g., soy) and vitamins and minerals (21). It is important to continually assess cows' nutrient intakes and their body condition scores as environmental factors such as different weather conditions can influence their nutrient requirements (13).

In addition to improving milk production, nutrition impacts animal health and well-being (20). Cows that are fed properly have fewer metabolic diseases and better immune function. Also, cows' diets can influence the environment and efficient use of the earth's natural resources. Because feeding excess nitrogen and phosphorus to

cows contributes to air and water pollution (22), modifications in cows' diets are made to find the right balance of nutrients to increase milk production while minimizing environmental pollution (20). With respect to using the earth's resources efficiently, proper nutrition leads to higher milk production which is associated with a greater proportion of feed nutrients being converted to milk (20). Advances in nutrition have been and will continue to improve the productivity of dairy cows, as well as the dairy industry's role as stewards of the environment (20).

Many dairy farmers implement best management practices to provide comfortable, safe, and hygienic conditions for both mother and calf during the birthing process and afterwards (14,15,23). This means providing clean, dry bedding, strategic vaccination protocols, hourly monitoring of maternity pens, prompt feeding of colostrum (the mother's first milk after giving birth) to newborn calves, and removal of calves from housing for adult animals to calf hutches to minimize calf injury.

Health and Medical Attention. Dairy farmers depend on healthy cows for their livelihood. Adopting appropriate farm management practices such as milking hygiene, environmental sanitation, and regular veterinary care (e.g., periodic check-ups, prompt treatment of illness) of cows helps to assure the well-being of dairy cows and reduce their risk of infections such as clinical mastitis (4,11,12,15). During the past 25 years there has been a major shift from treatment to prevention of disease in cows and, as a result of new technologies, subclinical conditions can now be identified (15). Veterinarians have contributed to the development of on-farm data management systems and computer software that allow for early detection of health problems and the tailoring of disease prevention and treatment to individual herd needs (15).



Conventional dairy farmers give antimicrobial drugs (i.e., antibiotics) to cows for a short period of time to treat certain conditions such as clinical mastitis (15,24). Dairy farmers keep meticulous records of these treatments (4).

Concern related to the presence of antibiotics in conventionally produced milk available for consumer consumption is unfounded (12,15,24). When antibiotics are given to a cow, her milk is diverted from the rest of the milk produced on the dairy farm until it tests free of antibiotics (12). Every tanker load of milk, whether it is from a conventional farm or an organic farm, is strictly tested for antibiotics (24). In the extremely rare event that any milk tests positive, the milk is disposed of immediately, never reaching the public (24). Further, dairy farmers are financially liable if antibiotics are found in the milk (12,24). As a result of stringent government regulations (24), neither conventionally produced milk nor organically produced milk contains illegal antibiotic residues.

Environmental Practices

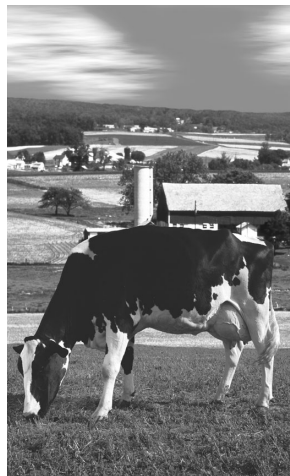
Today's dairy farmers, whether they produce regular or organic milk, are good stewards of the environment. They employ practices designed to reduce and manage waste, and conserve and/or protect the quality of land, water, and air. In addition, environmental practices on all dairy farms are tightly regulated by both federal and state government agencies. For example, the Environmental Protection Agency (EPA) has regulations for the proper storage and disposal of certain fuels, oils, paints, and degreasers used to run and maintain farm equipment (25). Dairy farmers comply and often exceed these requirements in an effort to provide a healthy, safe work environment for their animals, workers, families, and communities. Also, dairy farmers, in cooperation with experts such as state and federal government departments of natural resources, Cooperative Extension Service, and land grant universities, continually enhance natural resources under their stewardship.

Managing Waste (Manure).

Management of manure is a complex environmental issue on farms of all sizes as manure can have both positive and negative environmental consequences (26). Dairy farmers on both conventional and organic farms effectively recycle manure nutrients as a fertilizer to replenish soils so crops grow better, while avoiding pollution (27-29). Manure supplies plant nutrients, improves soil tilth, aeration, and water-holding capacity of the soil, and promotes the growth of beneficial organisms in the soil (28). Engineers and other experts help dairy farmers design manure handling systems, from how animals are fed and housed, to manure handling and storage, transportation, land application of manure, land management, and record keeping (27,28).

Detailed nutrient management and manure application planning computer programs are available to dairy farmers to help them optimize the nutrient value of the manure spread on crop fields by taking into consideration the types of soil on the farm, the terrain of the fields, soil moisture levels, and the amount of nutrients needed by future crops (27,28,30-32). These programs recommend ways to collect, store, process or treat, transport, and spread manure to minimize environmental risks. Dairy farmers have access to tools to help them implement best management practices related to reducing nitrogen losses (33). Although nitrogen is an essential nutrient for crops and animals, too much of it in manure, cow rations, or fertilizer can increase losses to water and air.

As a result of new technologies, plans to manage manure and make best use of its nutrients are continually being updated (27). On some dairy farms, new biogas recovery systems such as methane digesters are being used to convert manure into methane-rich biogas, a renewable fuel that can be used to generate electricity, thereby



saving energy for the farm and nearby community (34). Biogas recovery systems on dairy farms can also provide other environmental benefits such as reducing odors and green house gas emissions, and improving water and air quality (34).

Protecting Water and Air Quality.

Dairy farmers take measures to conserve and protect the quality of water and to protect air quality (27). Installation of water meters helps dairy farmers monitor water use and determine if further conservation efforts are needed (27). Using manure to fertilize the soil helps to conserve water by increasing the water-holding capacity of the soil, resulting in reduced groundwater needed to grow crops (28). Dairy farmers are committed to conserving water and ensuring that proper practices are used to comply with the EPA's Clean Water Act (35). Comprehensive nutrient management plans available to dairy farmers focus on reducing risk to water quality (30,32,33).

Dairy farmers protect air quality by following proper manure management practices and maintaining clean facilities (28,36-38). For example, dairy farmers can reduce odors from animal housing and manure storage areas by using biofilters to filter odors, manipulating cows' diets to eliminate excess protein and thereby reduce atmospheric emissions of nitrogen-containing compounds, and covering manure storage areas with impermeable covers to prevent the release of odors (36-38). Many dairy farmers voluntarily participate in university, government, and industry research efforts to help better measure and monitor air quality for a healthy and clean environment (39). Also, university researchers and industry manufacturers continually work with dairy farmers to identify new ways to control odors (37,38).

Dairy Food Safety and Quality

Strict government standards ensure that all pasteurized milk, whether regular or organic, is safe and nutritious. Throughout the years, dairy farmers and processors have worked closely with the FDA and state regulatory officials to establish safety regulations and practices including the Pasteurized Milk Ordinance or PMO (24) and the Hazard Analysis and Critical Control Point (HACCP) system (40,41). As a result, American milk and dairy products are among the safest and most highly regulated foods in the world. The federal PMO is one of the most effective tools to protect the safety of milk, evidenced by the fact that less than 1% of outbreaks of foodborne illness in the U.S. involve dairy products (24). These outbreaks are the result of raw (unpasteurized) milk and milk products. Milk is routinely sampled and tested by state regulatory authorities according to procedures outlined in the PMO. In addition, the FDA and the EPA monitor compliance with the provisions of the PMO on a nationwide basis (24). The HACCP system is a structured and scientific process used throughout the food industry to help ensure food safety (40,41).

The Importance of Pasteurization.

Although some people believe that raw (unpasteurized) milk, either conventionally or organically produced, is a healthy alternative to pasteurized milk, consuming raw milk and raw milk products can be harmful to health (12,15,24,42-44). In a recent report, the FDA and the Centers for Disease Control and Prevention (CDC) reminded consumers that raw milk may contain a wide variety of harmful bacteria, including *Salmonella*, *E. coli* O157:H7, *Listeria*, *Campylocacter*, and *Brucella* that may cause illness and possibly death (42). Raw milk-related illnesses can be especially severe for pregnant women, the elderly, infants, young children, and people with weakened immune systems (42).



Health-related dangers of consuming raw (unpasteurized) milk and milk products have led the dairy industry, the Food and Drug Administration, and the Centers for Disease Control and Prevention, among other health and scientific organizations, to support the pasteurization of milk and restriction of raw milk sales.

Because of the dangers associated with consuming raw milk or raw milk products, federal law prohibits the retail sale of raw milk across state lines and many states have banned the sale of raw (unpasteurized) milk (24). Pasteurization involves heating raw milk to a minimum of 145° F for 30 minutes or to 161° F or more for 15 seconds, followed by rapid cooling (24). The pasteurization of milk and restriction of raw milk sales is supported by the dairy industry, the FDA, the CDC, and other government agencies, as well as many health and scientific organizations (42). The 2005 Dietary Guidelines for Americans recommend that consumers avoid raw (unpasteurized) milk or any products made from unpasteurized milk (45). Although proponents of drinking raw milk often claim that raw milk is more nutritious than pasteurized milk, research has shown that there is no significant difference in the nutritional value of pasteurized and unpasteurized milk (42). The benefits of pasteurization, which is recognized worldwide as the single most effective safety measure for dairy products, are irrefutable.

Antibiotics, Pesticide Residues, and Hormones.

Consumers cite concerns about antibiotics, pesticides residues, and hormones in milk as key motivators for buying organic milk and milk products (46). However, dairy farmers and state and federal government agencies take measures to prevent all milk from containing illegal antibiotic residues or unsafe pesticide residues. As mentioned above, every tanker load of milk is strictly tested for antibiotics, and in the rare event that a tanker tests positive, the milk is disposed of immediately, never reaching the public (24). According to the FDA's most recent (2003) National Milk Drug Residue Data Base, less than one-tenth of 1% of all milk produced annually tested positive for animal drug residues, including antibiotics (47).

CONCLUSION

As a result of strict government regulations and dairy farmers' commitment to providing quality milk, the public can be assured that all pasteurized milk and milk products are wholesome, nutritious, and safe. Today, a wide variety of milks (e.g., low-fat, fat-free, flavored, lactose-free) and other dairy products (e.g., cheese, yogurt), either conventionally produced or organically produced, are available to meet consumers' different lifestyles and personal preferences. These options also make it easier for the public to meet the 2005 Dietary Guidelines' recommendation to consume 3 servings of milk, cheese, or yogurt a day (45). **D**

A range of controls by federal and state governments and applied by dairy farmers helps to ensure that milk remains safe from pesticide residues. Government pesticide monitoring programs indicate that when pesticide residues have been detected in milk and milk products, they are well below tolerance levels and are primarily low-level residues of unavoidable environmental contaminants (48,49).

Hormones are naturally present in many foods of either plant or animal origin, including milk. Although miniscule amounts of hormones occur naturally in both organically and conventionally produced milk and milk products (50), there is no evidence that these levels are harmful to health. Some dairy farmers choose to supplement their cows with additional bovine somatotropin, known as rbST or rBGH, to increase milk production (51-54). Somatotropin is a naturally occurring protein hormone that regulates growth and lactation and is produced in both animals and man; rbST is a synthesized version of this naturally occurring hormone (51-53).

While some milk and milk products are labeled as being "from cows not treated with rbST," there is no basis for claims or perceptions that this milk is safer or more healthful than milk from rbST-treated cows (51,54). FDA's guidelines on labeling indicate that there is no significant difference in milk from rbST-treated and non-rbST-treated cows (55). Since FDA approved the use of rbST in lactating cows in 1993 (51), its safety has continued to be monitored and subsequently supported by leading independent national and international health organizations (52-54,56-58).

The wide variety of milks and other dairy products – including low-fat, fat-free, or flavored milk – helps consumers meet the 2005 Dietary Guidelines' recommendation to consume 3 servings of milk, cheese, or yogurt a day.



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RELATED RESOURCES

- Dairy Farming Today. www.dairyfarmingtoday.org
- National Dairy Council. Ensuring dairy quality and safety from farm to refrigerator. *Dairy Council Digest* 73(2), 2002.
- National Dairy Council. Dairy food safety. www.nationaldairycouncil.org (under Nutrition & Product Information)

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