THE DAIRY PRACTICES COUNCIL®

GUIDELINE FOR HANDLING DAIRY PRODUCTS FROM PROCESSING TO CONSUMER

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EXCEPTIONS FOR INDIVIDUAL STATES NOTED IN TEXT OR FOOTNOTES
Additional Guidelines may be ordered from:
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Guideline Preparation and Review Process

Guideline development within Dairy Practices Council (DPC) is unique and requires several levels of peer review. The first step in the process of guideline development starts with a Task Force subcommittee comprised of individuals from industry, regulatory and education interested in and knowledgeable about the subject to be addressed. Drafts, referred to as 'white copies,' are circulated until all members are satisfied with the text. The final white copy may then be distributed to the entire Task Force, DPC Executive Vice President and whoever the Task Force Director feels would add to the strength of the review. Following final white copy review and correction, the next step in the process requires a yellow cover draft that is circulated to the member Regulatory Agency representatives that are referred to as "Key Sanitarians." The Key Sanitarians may suggest changes and insert footnotes if their state standards and regulations differ from the text. After final review and editing the guideline is distributed in the distinctive DPC green cover to people worldwide. These guidelines represent the state of the knowledge at the time they are written.

Disclaimer

The DPC is not responsible for the use or application of the information provided in this Guideline. It is the responsibility of the user to ensure that the information addresses their needs and that any action taken complies with appropriate regulations and standards.

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INTRODUCTION

Proper handling of dairy products is the key to good keeping quality and flavor. While recommended temperatures and expected shelf-life varies depending on the product, prevention of post-pasteurization contamination, temperature control, code dating with proper rotation and freedom from light exposure will ensure good product shelf-life and are basic to distributing dairy products that are safe and pleasing to consumers. Proper handling entails attention to detail by all persons including processors, distributors, and consumers.

DEFINITIONS

GMP – Good Manufacturing Practices.

GUIDELINE CONTENT

Plants

Low temperatures and the absence of psychrotrophic bacteria are the most important factors that promote a good keeping quality of dairy products. Dairy products must be processed so that there is no contamination after pasteurization. Bacterial counts for fresh products should be much lower than required regulatory standards, and samples of all pasteurized dairy products, including cultured and frozen products, tested on the day of processing should be free of coliforms and have minimal psychrotrophic bacteria counts. Most regulations permit less than 10 coliform per ml, but with proper sanitization of equipment, proper pasteurization, no post pasteurization contamination, and adherence to Good Manufacturing Practices (GMP), products can be free from coliforms. Samples of fluid milk and other dairy products should be held at 45°F (7.2°C) or less until the code date. No detectable off-flavors should develop. To ensure proper sanitation, hot water sanitize at a discharge temperature of at least 170°F (76.7°C) for 5 minutes at the start of each production day on processing and filling equipment which comes in contact with pasteurized milk and dairy products. While various chemical solutions are commonly used to sanitize equipment, they are not as effective as the proper use of heat, and they may be more effectively used to cool equipment after hot water sanitizing.

Store all packaging materials in a place that is clean, dry, and free from pests. Extreme care should be used when packaging cheese to prevent contamination with yeasts and molds from hands, hair, clothing, and air (i.e., use processes and packaging materials that remove air, which reduces potential for contamination).

Check the bacterial quality of all ingredients which are added to pasteurized dairy products. This includes fruits, nuts, flavorings, or any other ingredients added post pasteurization.

Use code dates which can be supported by quality control records on all products. Date all containers on the top or side, including glass. Code date will vary depending on the type of product and time and temperature of pasteurization. The date on the package does not indicate when the product will spoil but is rather a “best if used by” date. Actual spoilage will be influenced by raw milk quality as well as the practices of not only processors, but also distributors and consumers.

Cheese in consumer packages will also have varying code dates depending on the type (e.g., fresh or aged, hard or soft) and on the wrapping material used to protect it. For instance, cheese wrapped in heat seal plastic film will have shorter code dates than vacuum packed cheese.

All size packages of fluid milk and dairy products should not exceed 40°F (4.5°C) when entering the cold room. In case of shut-downs or end of runs, do not leave partial stacks of packaged products in the filling area, move them to cold storage at once. In cases of prolonged shutdowns, drain and re-sanitize lines and filling equipment before production is resumed. Regularly check long shelf life products, including those cultured and frozen, under controlled conditions and include off-flavor testing. Hold samples at recommended temperatures until code dates have expired.[1]

Cold Storage Rooms

While regulations may allow slightly different minimum and maximum temperatures, a suggested ideal cold storage room temperature range for fluid and cultured dairy products is 34°F (1.1°C) to 38°F (2.2°C), with product temperatures 40°F (4.5°C) or lower when they enter the cold room, as air circulation alone cannot be expected to rapidly cool any packaged product. Avoid freezing fluid products.

General purpose thermometers, or, ideally, minimum/maximum thermometers should be employed in the warmest zones of cold rooms. Stack product to permit proper air circulation. Do not block air circulation ducts or blowers. To prevent escape of cold air, keep all cold room doors closed as much as possible. Use air curtains, canvas, or metal barriers at all openings.

Do not use bright lighting that will cause light-induced off-flavors in milk or other dairy products, especially in those products packaged in glass or translucent plastic containers.

Also, never leave any product, fluid, cultured or frozen, on the dock. Just a few minutes of sunlight can cause light-oxidized or, in extreme cases, lipid-oxidized ("old oil") flavor changes in all products. Temperature increases are very rapid when outdoor temperatures are 70°F (21.1°C) or above. High temperatures can cause compositional changes and allow the opportunity for bacterial growth.

Proper rotation is a must. Use some easily identifiable means to ensure that personnel responsible for cooler operation move out oldest product first. When feasible, schedule processing according to sales needs so product is as fresh as possible when shipped to consumers.

When loading trucks, keep loss of cold air from cooler and truck at a minimum. Use foam and canvas closures (loading dock door seals) for connecting truck bodies to cooler doors. This is considered essential for frozen products.

Wholesale or Retail Trucks

Essential for the maintenance of good product keeping quality and flavor, assure that truck drivers and all delivery personnel are aware of the need to minimize the exposure of dairy products to warm temperatures and to sunlight, which can cause light-induced off-flavors. Never transport

[1] For more detail on shelf-life of fluid dairy products, refer to DPC010, *Guidelines for Maintaining and Testing Fluid Milk Shelf-Life*, which covers plant handling of fluid products. For more details on plant sanitation and GMPs refer to DPC029*, Cleaning & Sanitizing in Fluid Milk Processing Plants.*

dairy products in open or unrefrigerated vehicles. Maintain temperatures below 40°F (4.5°C) for fluid products and below 0°F (-17.8°C) for frozen desserts. Manual and/or recording thermometer temperatures should be taken and recorded regularly. Establish a scheduled preventative maintenance plan for all truck mechanical refrigeration units.

Do not leave doors open while making deliveries and keep the refrigeration operational when unloading. Also, transport product immediately to its destination (i.e., do not leave product sitting on the delivery dock after removal from the truck). Deliver dairy products only when stores are open, or personnel are there to place dairy products directly into a cold room. Observe code dates on all products handled. Never pull product nearing expiration from a store and take it to another store or deliver it to schools. Any product that has left the delivery truck also should not be returned to the plant cold room or reused for any purpose. It must be disposed of for animal feed or otherwise discarded. Authorized returned products should not exceed 40°F (4.5°C) at the unloading dock. Refrigerate any returned product and notify person in charge of the cooler operation.

Retail Eating Establishments, Stores, and Schools

Milk and dairy products are highly perishable and require an adequate refrigerated storage space that is maintained at 40°F (4.5°C) or below to maximize shelf-life. Air measurement temperature may be substantially lower to maintain the appropriate product temperature. If possible, coolers should be designated as "for dairy products only," since containers and dairy products can absorb odors from any unclean conditions, meats with strong odors, or fruits and vegetables.

To assure consumers of product keeping quality until the code date, follow these good handling practices:

1. Check and record cooler temperatures.
2. Place dairy products in cold room or freezer immediately after delivery.
3. Fill dairy case in refrigerated zone only.
4. Rotate stock and observe code dates.
5. Never use fluorescent light in dairy case as the store's "night light". Screen containers from light during operating hours where possible.
6. Keep product temperatures below 40°F (4.5°C) and ≤ 0°F (-17.8°C) for frozen products.
7. Clean cold rooms routinely and also whenever a spill occurs.
8. Clean refrigeration units on coolers once every 6 months.

The maintenance of inventory control of dairy products should be delegated to responsible personnel. Plan to order dairy products so as to have an adequate stock and still give the consumer maximum time to use the product before the code date. In the case of fluid milk, do not put more milk in the dairy case than the sales volume will dictate. The use of code dates on dairy product packaging permits easy rotation. Observe code dates and sell the oldest first. Rotate stock daily. Proper stocking of the dairy case helps keep product at the appropriate temperatures. Upper shelves of open retail cases are usually warmer. Therefore, rotation of products stored on upper shelves is important. Don't stock product above the air curtain or on air return ducts in the display case. Single stack all quart or larger containers.

Sell-by, use by, code date, or expiration date may be interchangeable terms or mean something entirely different based on each state's regulations. Regardless, it is recommended that dairy products are not sold past the date on the package. In general, "Sell-by" date tells the store how

long to display the product for sale. "Best if used by (or before)" is the recommended time for best flavor or quality. It is not a purchase or safety date. "Use by" is the last date recommended for use of the product while at peak quality and is determined by the manufacturer.

Light exposure can be damaging to all dairy products in all types of containers. Fluorescent and other new kinds of lights, such as LED, can cause an off-flavor, especially in products packaged in translucent plastic and glass, use low level incandescent lights wherever possible. Depending on the container, light-induced flavor may develop in as little as a few hours. Paper containers and containers made from light-blocking materials may provide more protection, but, over time, light-induced off-flavors may also begin to develop. Milk served to consumers should be direct from dispensers or in individual containers. Be sure milk is below 40°F (4.5°C) when served to the customer. If an establishment lacks adequate refrigerated storage space, whenever possible, attempt to schedule milk deliveries as close to serving time as routing will allow.

It is suggested that retailers routinely inform consumers about how light and temperature affect the keeping quality of dairy products. An emphasis on good handling practices will aid in greater sales of all dairy foods, boosting overall sales volume. If dairy products become unacceptable, customers may choose to shop elsewhere or purchase alternative, non-dairy products.

Home

Consumers have the ultimate responsibility for maintaining continued quality of dairy products and other perishable foods. Many consumer complaints are caused by mishandling of products in stores or homes. To maintain maximum shelf life, keep refrigeration temperatures below 40°F (4.5°C), freezer temperatures at or below 0°F (-17.8°C), keep products tightly covered, rotate the products to use the oldest first, and minimize light exposure.

Refrigerated and frozen foods should be purchased last at the store. Keep them as cold as possible by packing together, in insulated material if possible. Promptly transport home and place in the refrigerator or freezer immediately.

To maintain shelf life, the home refrigerator should be set to maintain food at temperatures below 40°F (4.5°C). Many refrigerators, especially automatic defrost models, may be in the 45°F (7.2°C) range. Most refrigerators will be above this temperature during peak use periods. This sharply cuts shelf life of all perishable foods. For every 5°F (2.8°C) rise above 40°F (4.5°C), there may be about a 50 percent drop in shelf-life. A thermometer kept in water is recommended for home refrigerators. Do not overload the refrigerator since effective refrigeration requires freely circulated air to cool all foods evenly.

Milk that has been continuously refrigerated will often remain drinkable for about one week after the "sell by" date. All dairy products should be consumed by the code date on the package for best quality. If milk develops an off odor, flavor, or appearance, it should be discarded. Over time, even if chilled properly, foods will spoil. If they are past their date or if they look questionable at any time, discard them. Mold is a sign of spoilage that can grow under refrigeration temperatures. While not a major health threat, moldy foods should be discarded.

Keep all dairy products in tightly closed containers. This prevents contamination with bacteria from the air, other foods, and/or the absorption of odors. Clean the refrigerator regularly and wipe spills immediately to reduce the growth of bacteria and further prevent cross-contamination. Never return product to original container if served in a pitcher or dish. Cap or close all packages

immediately after use. Do not leave containers of dairy products on the shelf or table after a meal or during cooking/baking sessions. Be sure to tightly wrap any opened cheese products.

Maintain freezing compartments at 0°F (-17.8°C) or below, using appliance thermometers to check periodically. Dairy products such as milk, buttermilk, cheese, whipped cream, cream, butter, and ice cream will store well in the freezer for at least 3 months for best quality (1-2 months for yogurt). Freeze in airtight containers. Liquids will expand when frozen, so leave at least ½ inch headspace. Thaw any frozen dairy products in the refrigerator. Note that allowing ice cream to melt and refreeze will alter the original smoothness of this particular dairy product. Products that do not freeze well include processed cheese slices, cottage cheese, ricotta, dips, cream cheese, whipping cream, aerosol whipped cream cans, kefir (fermented milk), pudding, and sour cream.

Light exposure changes the taste of milk. As little as 20 minutes exposure to sunlight will cause an oxidation flavor which consumers will detect as a plastic or tallowy taste. Therefore, don't leave milk on the shelf, table or in a car. Light rays penetrate glass and plastic bottles easily. Paper containers provide protection to slow development of the off-flavor, but even opaque light-blocking materials do not completely prevent it.

REFERENCES

- Light-Oxidized Flavor Defect of Milk. Dairy Science Facts 2002. Cornell University http://foodscience.cornell.edu/cals/foodsci/extension/upload/CU-DFScience-Notes-Milk-Light-Induce-Defects-09-07.pdf

- FDA Consumer Health Information – Are you storing food safely? http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm093704.htm

- The FOOD KEEPER – A Consumer Guide to Food Quality & Safe Handling, http://www.fmi.org/consumer/foodkeeper/index.cfm?fuseaction=general in conjunction with Cornell University http://foodscience.cals.cornell.edu/

APPENDIX

None.

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