Food Safety Supplement

# Choice Plus

NFSMI

USDA

# Choice Plus

## Food Safety Supplement

Produced by the
National Food Service Management Institute
through a cooperative agreement with
United States Department of Agriculture,
Food and Nutrition Service
NFSMI Item Number: EX61-02

The U. S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

This project has been funded at least in part with Federal funds from the U.S. Department of Agriculture, Food and Nutrition Service through a grant agreement with The University of Mississippi. The contents of this publication do not necessarily reflect the views or policies of the U.S. Department of Agriculture, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

The University of Mississippi complies with all applicable laws regarding affirmative action and equal opportunity in all its activities and programs and does not discriminate against anyone protected by law because of age, color, disability, national origin, race, religion, sex, or status as a veteran or disabled veteran.

National Food Service Management Institute, 2003.

# Contents

Introduction ..... Page 1
Safeguards ..... Page 3
After Delivery ..... Page 8
Safety Language ..... Page 11
Food Dating ..... Page 13
References ..... Page 15
Appendix 1 Manufacturer HACCP Qualification Standards ..... Page 17
Appendix 2 Manufacturer Audit Survey ..... Page 18
Appendix 3 Dry Storage Life of Unopened Containers ..... Page 19
Appendix 4 Approximate Storage Life in Days of Refrigerated Foods ..... Page 28
Appendix 5 Frozen Food Storage ..... Page 33

# Safe Food from Farm to Table

Government, industry, academia, consumers, and the media have focused increased attention on food safety and the reduction of foodborne illness in recent years. An outbreak of foodborne illness at a fast food restaurant involving *E. Coli* O157:H7 in 1994 received national media coverage and provided the impetus for governmental changes. In 1996, the United States Department of Agriculture (USDA) published the Pathogen Reduction and Hazard Analysis and Critical Control Points (HACCP) rule that requires all plants that slaughter and process meat and poultry to implement HACCP systems. Government agencies that share food safety regulatory responsibilities and other key groups in the farm-to-table continuum worked together to encourage HACCP-type systems designed to improve food safety[1].

Factors that impacted the close attention to foodborne pathogens include:

- Growing knowledge of pathogens, their role in causing disease, and how they are transmitted through food.
- Identification of emerging pathogens such as *E. Coli* O157:H7 and Shigatoxin that were not known even 20 years ago.
- Changes in population, with growing numbers of groups such as the elderly and immune-compromised who are more susceptible to foodborne diseases.
- Opportunities for bigger outbreaks with changes such as increased concentration in the food industry, more convenience foods prepared in advance, food service workers less skilled in food preparation, and increases in imported foods[2].

Based on data from the Centers for Disease Control and Prevention (CDC), the Council for Agricultural Science and Technology (CAST) estimates that annually six to 33 million Americans become ill and that foodborne illness contributes to the deaths of perhaps

[1]USDA/FSIS. *The Importance of Farm-to-Table HACCP in Improving Food Safety.* Retrieved November 19, 2002, from http://www.fsis.usda.gov/OA/speeches/

[2]USDA/FSIS. *A Farm-To-Table Food Safety Strategy*. Retrieved November 19, 2002, from http://

9,000 persons each year. The economic impact of foodborne illness, in terms of medical care, lost wages and associated costs, is $5.6 to $9.4 billion per year. A large percentage of foodborne illnesses is preventable. The number of persons affected and cost associated with such illnesses can be reduced. Recognition of the preventable nature of foodborne illness is a major motivation for the President's Food Safety Initiative[3].

Recognizing that food safety is not simply a responsibility of the Federal government, the initiative works with consumers, producers, industry, states, tribes, universities, and the public. The goal is to seek ways to improve food safety through government and private sector action, including public-private partnerships. The initiative identified major issues in a number of key areas:

- Surveillance,
- Research,
- Risk assessment,
- Inspections,
- Coordination, and
- Education.

Each sector in the food system must do what it can to improve food safety practices based on what is currently known.

This food safety supplement provides information on how to apply food safety to food purchasing. This information will help School Food Authorities (SFAs) understand how the USDA's Food Safety and Inspection Service (FSIS) and United States Department of Health and Human Services' (USDHHS) Food and Drug Administration (FDA) work together with other Federal agencies to safeguard the food supply.

[3]USDA/FSIS. *A Farm-To-Table Food Safety Strategy*, Retrieved November 19, 2002, from http://www.fsis.usda.gov/OA/speeches/1999/cw_afbf.htm

# Regulations Protect the Consuming Public

Food safety begins with the preparation of the soil, the seeds that are used, and everything placed on or around the plant while it is growing, harvested, and stored. With meat, poultry, and fish, food safety includes everything the animals are fed, medications they are given, diseases they may contract, how they are slaughtered, and everything involved in processing the carcass. Beyond production and processing, how plant or animal food is stored and delivered to the retail stores or public eating establishments and how food is handled once there are all part of assuring food is safe.

Food supplies in the United States are the safest in the world. To learn about how our Federal, state, and local agencies provide a food safety system, go to http://www.foodsafety.gov and click on Federal & State Gov't Agencies. Under the heading Food Safety Network select from the first paragraph: *Food Safety A Team Approach* or *The U.S. Food Safety System Country Report*.

Several laws cover the food safety activities of USDA, USDHHS, and other Federal agencies. Some of the major laws related to food safety are:

- Federal Food, Drug, and Cosmetic Act (FFDCA),
- Federal Meat Inspection Act (FMIA),
- Poultry Products Inspection Act (PPIA),
- Egg Products Inspection Act (EPIA),
- Food Quality Protection Act (FQPA),
- Public Health Services Act (PHSA),
- Agricultural Marketing Act (AMA),
- Safe Drinking Water Act (SDWA),
- National Environmental Protection Act (NEPA),
- Federal Insecticide and Rodenticide Act (FIRA), and
- Sanitary Food Transportation Act (SFTA).

For a summary of each law and explanation of its general purpose, go to http://www.foodsafety.gov. and click on Federal & State Gov't Agencies. Under the heading The Food Safety Network select *The U.S. Food Safety System Country Report.* Select: Table of Contents, then Annex I: References. Scroll down the page to select a specific law.

Food irradiation and inspection of precut produce have an impact on food safety and purchasing. SFAs may want to investigate the purchase of irradiated food as part of their food safety practices since irradiation reduces pathogens in food. Increasing numbers of food products are irradiated for various

reasons. To make informed decisions when writing food specifications (descriptions), the SFA should review the resources available on the subject of irradiation. The increase in the use of precut or minimally processed fruits and vegetables has been rapid. Several highly publicized outbreaks of foodborne illnesses have been linked to produce, so SFAs may be interested in non-traditional ways of ensuring the safety of produce. It has been difficult for laws and regulations to keep pace with the growth of the industry. The sanitation of the plant in which the produce is processed is important to the safety of fruits and vegetables a school purchases. SFAs should evaluate processing plants when possible. For plants located long distances from the SFA the use of the USDA's Agricultural Marketing Service (AMS), Qualified Through Verification (QTV), or Plant Systems Audits (PSA) may prove helpful. See below for more information.

## Food Irradiation

Irradiated food products have been exposed to radiant energy – such as gamma rays, electron beams, or x-rays – in amounts approved by the FDA. Irradiation destroys pathogens but is never a substitute for Good Manufacturing Practices (GMPs). The FDA has approved a variety of foods for irradiation in the United States. The irradiation of wheat flour was approved in 1963 to control mold. In 1986 fruit and vegetable irradiation was approved for insect control and to increase shelf life. Irradiation of herbs and spices was approved in 1986 for the purpose of sterilization. Various categories of meat and poultry are irradiated, beginning in 1986 and continuing to the present. Establishments that use irradiation must meet the same sanitation and processing standards required for all meat and poultry plants. USDA/FSIS oversees the irradiation of raw meat and poultry.

Food irradiation can reduce the risk of foodborne illness by destroying harmful bacteria, parasites, insects, and fungi. Irradiation does not destroy all pathogens, but it does reduce their number. A distinctive logo developed for use on food packaging identifies the product as irradiated. This symbol is called the "radura" and is used internationally.

For additional information on irradiation see USDA/FSIS consumer publication online at http://www.fsis.usda.gov/oa/topics/irrmenu.htm.

## Inspection of Precut Produce

In 1999 USDA/AMS began the QTV service for producers of minimally processed fruits and vegetables. The first step is to review and assess a firm's HACCP food safety QTV plan. If the plan meets QTV program requirements, AMS conducts onsite audits to evaluate the firm's implementation of its plan.

Plants producing precut or value-added produce that meet the requirements of the QTV program are authorized to display the QTV label. These plants have an ongoing

contract with AMS for inspection. SFAs interested in purchasing minimally processed fruits and vegetables produced by a firm with QTV inspection should: (1) conduct a market analysis to determine if the minimally processed fruits and vegetables purchased are available with the QTV seal, (2) add language to the purchasing documents requiring that the QTV seal appear on all containers of minimally processed fruits and vegetables; to be clear about this new requirement "QTV inspection required" should be added to the appropriate specifications/descriptions, and (3) train all receiving personnel to inspect minimally processed fruits and vegetables for the QTV seal.

AMS offers two other services that can benefit an SFA purchasing from a precutter that does not use the QTV program. One is a plant survey, performed once a year, that assesses a processor's compliance with GMPs. The second service is a PSA. This determines sanitation conditions at the time of the audit.

The QTV program, plant surveys, and PSAs are voluntary services. The plants pay fees for the services. For additional information go to http://www.ams.usda.gov, and

1) under programs select: Fruit and Vegetable,
2) select: Processed Product Grading and Quality Certification,
3) select: Qualified Through Verification, or
4) select: Plant Systems Audit.

Conversion of all this technical information to practical application can be more difficult. Some suggestions include distributor evaluation and audits of manufacturers.

## Distributor Evaluation

A breakdown in communication between SFAs and the business community can cause confusion. Both schools and their business partners must make an effort to understand each other. SFAs can better understand their potential food distributor if they visit the warehouse facilities and review operations. The review should cover the following areas:

- Accounting practices
- Delivery equipment and truck loading procedures (including truck loading software)
- Financial history
- Food safety procedures
- Performance at pre-bid conferences
- Physical facilities
- Product line
- Security
- Service levels

Some SFA purchasing agents[4] review the distributor after awarding the contract. Others claim that responsible purchasers should know something about the potential distributor before making a contract recommendation. Many states do not have laws that require routine inspection of distributor facilities. An

[4]The term SFA purchasing agent is used to mean school district purchasing agent or staff, child nutrition purchasing agent or staff, school purchaser, or any person with purchasing responsibility.

SFA has a responsibility to determine that purchases are coming from a clean and safe storage facility.

SFA purchasing agents should conduct onsite visits of all distributors. Below are food safety and security questions that should be answered during each visit:

- Describe the receiving/loading area. Can product be received/loaded in bad weather without damage to packaging? Is this area refrigerated? If the receiving/ loading area is not refrigerated, observe the receiving/gathering/loading of refrigerated/frozen product and note how quickly it is moved to the appropriate refrigerated/frozen storage. In newer distribution facilities with refrigerated receiving/loading areas rapid movement to the refrigerated/frozen area is not as critical to food quality and safety.
- Floor cleanliness: Rate as acceptable or unacceptable.
- Cold storage cleanliness/orderliness: Rate as acceptable or unacceptable.
- Record the temperature of each dry, refrigerated, and frozen storage area.
- Pest Control: rate as acceptable or unacceptable.
- Does the distributor have one-, two-, or three-compartment delivery vehicles? If distributor uses two-compartment delivery vehicles with sections for dry and frozen foods, how are chilled products handled (such as eggs, fresh produce, or chilled meat)?
    1) Chilled items placed in the frozen compartment with a thermal blanket cover,
    2) Chilled items placed in the dry compartment next to the freezer with a window for cool air flow, or
    3) Other - describe:
- Are the trucks clean? Yes or no.
- Manufacturer HACCP qualification standards - What steps are taken to ensure manufacturer's compliance with safe food handling procedures?
    1) Does distributor use a standard questionnaire? (See Appendix 1 of this supplement for a sample questionnaire. Attach a copy of the distributor's questionnaire to the record of this evaluation.)
    2) Does distributor use a different approach to ensure manufacturer compliance with safe food handling procedures? If yes, please describe.
- Describe the procedure used by the distributor to control access to food storage, receiving, and loading areas. This will involve observing such things as employee name badges, door locks, entrance of people without name badges, policies related to access to trucks after food is loaded, access to trucks if the driver is away ( for lunch or other breaks).
- Describe the employee background checks conducted during the employment process.

For a form to use during distributor evaluation see Appendix 1 of the 2nd edition of *First Choice: A Purchasing Systems Manual for School Food Service*. Go to http://www.nfsmi.org/Information/2003resourceguide.htm#first-choice to view an online copy or for information on purchasing a copy.

## Audits of Manufacturers

Some food service establishments in the private sector conduct onsite audits of manufacturers as well as distributors. While not intended to replace USDA inspection, these audits raise the level of attention to food safety by all providers along the food service chain. Appendix 2 provides a sample manufacturer audit. Food safety audits are usually outside the staffing limits of single SFAs. A large school purchasing cooperative may have the resources to conduct a food safety audit, since cooperatives can purchase more of a single product than many large private sector food service operations. Audits of manufacturers is a private sector trend. Trends in purchasing often move back and forth from public to private sector establishments. It is a good idea to follow the trends in both groups.

# Food Safety after Delivery

To assure food safety after delivery, school food service staff must know how to receive and store the product and to prepare each food that requires further cooking or heating. The information on those factors that food manufacturers provide impacts the quality and safety of their products. The placement of the information varies by manufacturer. It may be on the label, it is often on a separate sheet of paper in the box, or it may be necessary to call the manufacturer and request a copy. If instructions are on the box, do the employees take the product out of the box for storage? Develop a filing system for preparation and handling instructions. Make a file copy of the instructions before discarding the box. File the instructions from inside the boxes and those obtained from manufacturers. Consult the instruction file each time the item is served. Listed below are the items that should be included in manufacturer's instructions.

- Storage requirement - dry, refrigerated, or frozen (Some instructions will show the actual temperature at which the product should be stored.)
- Length of time the product can be stored
- Thawing instructions for frozen products
- Equipment to use for heating or cooking
- Length of time the product should be cooked, recommended internal temperature, and recommended procedure for checking internal temperature
- Special instructions to follow during the cooking process
- Maximum length of time product can be held after cooking
- Special holding instructions – such as dry or moist heat

Training employees to use the manufacturer's instructions is very important.

## Food Recalls

Food product recalls can be a serious concern for school food service programs. Some reasons for recalls are serious, while others are less worrisome. The following information answers some questions about the recall process:

**What is a food recall?**
A food recall is a voluntary action by a manufacturer or distributor to protect the public from products that could cause health problems or death.

**Who regulates food products?**
USDA/FSIS inspects meat, poultry, and egg products. FSIS is responsible for ensuring

that these products are safe, wholesome, and accurately labeled. FSIS has jurisdiction over egg products until they are pasteurized. After eggs are pasteurized, they could become ingredients in other products and would generally come under FDA inspection. If the eggs used in a further processed product are not pasteurized, that product would come under FSIS inspection. All other food products, other than those regulated by FSIS, fall under the regulatory authority of the FDA.

Neither the USDHHS nor the USDA has authority to require a recall without obtaining a court order. In practice, the FDA or FSIS use their persuasive powers to convince company officials that a recall is needed. The action is sometimes viewed as an alternative to an agency seizure or detention action to remove or otherwise correct adulterated or misbranded products.

**Are all recalls considered critical?**
Not necessarily. When FDA or FSIS asks a company to recall a product, the recall is categorized into one of the following classifications:

**Class I Recall:** Used in situations where there is a reasonable probability that use of or exposure to a product will cause serious adverse health consequences or death.
**Class II Recall:** Used in situations where a remote possibility of adverse health consequences could occur from eating a food.
**Class III Recall:** Employed when use of or exposure to the product will not cause adverse health consequences.

**Who classifies the recall?**
If a recall is to be made, the government agency, not the company, classifies the recall. After being notified of a product defect, FDA and FSIS will evaluate its potential seriousness. FDA's guidelines state that an ad hoc committee of FDA scientists evaluate the health hazards presented by a product being considered for recall, taking at least these factors into account:

- Whether use of the product has caused disease or injuries
- Whether any existing conditions could contribute to a clinical situation that could expose humans or animals to a health hazard
- Degree of hazard to various population segments likely to be exposed to the product, particularly to those people at greatest risk
- Seriousness of the health hazard to which populations at risk would be exposed
- Likelihood that a hazard will occur
- Assessment of the consequences (immediate and long-term)

FSIS has a standing Recall Committee that works with the company to coordinate the recall. The committee evaluates all available information and classifies the recall based on the relative health risk.

Legal responsibility for product safety and wholesomeness rests with the officers and employees of a food manufacturing company. Having a system in place that assures the smoothest possible handling of any recall is in

the best interest of both the company and consumers.

USDA/FSIS maintains a Website related to recalls of meat and poultry products. For additional information on recalls, see the FSIS Recall Information Center Website at http://www.fsis.usda.gov.

USDA/FSIS also provides the Meat and Poultry Hotline, a resource for consumers. The hotline offers a wide variety of information in taped recordings, as well as one-on-one consultation with a specialist.
To contact the Meat and Poultry Hotline:
Toll free: 1-888-674-6854
Washington, DC area: 301-504-6316
TTY: 1-800-256-7072
Email: mphotline.fsis@usda.gov

For information on recalls of all other foods, contact FDA's Center for Food Safety and Applied Nutrition's Outreach and Information Center: 1-888-SAFE FOOD (1-888-723-3366).

*FDA Enforcement Report*, a weekly publication, issues general information about all new recalls being monitored. The publication is available by subscription from the Superintendent of Documents, Government Printing Office. For price and ordering information, contact the Government Printing Office, Washington, DC 20402, telephone 202-512-1800 or fax 202-512-2233. The latest issues of the *FDA Enforcement Report* are available on FDA's Website at http://www.fda.gov/opacom/Enforce.html. Go to http://www.fda.gov and select Safety Alerts for a list of current recalls.

## The Food Service Role in Food Recalls

Each SFA should have a procedure for managing products already purchased and donated foods in inventory in the event of a food recall. For assistance in developing procedures, the publication *Responding to a Food Recall* published by the National Food Service Management Institute (NFSMI) may prove helpful. Go to http://www.nfsmi.org and select Resource Guide to view an online copy or for information on purchasing a copy.

# Invitation for Bids; Request for Proposals

Invitation for Bids (IFB) and Request for Proposals (RFP) must include language that spells out food safety requirements. For additional information on IFB/RFPs see Chapter 10 of the 2nd edition of *First Choice: A Purchasing Systems Manual for School Food Service.* Most schools use a boiler plate (basic format) that doesn't include food safety issues; however, the food safety requirements can be added as a special instructions section of the IFB/RFP documents. Below is recommended language:

- The school district reserves the right to inspect potential vendor's receiving, storage, and staging areas and delivery vehicles.
- All frozen, chilled, and dry foods shall be maintained at the appropriate temperature during receiving, storage, staging, and delivery. All foods delivered shall be free from evidence of temperature abuse.
- Potential vendors must maintain clean, pest-free storage areas and delivery vehicles.
- The school district reserves the right to request information about potential vendor's pest control in food storage areas and delivery vehicles. All chemicals used shall be certified as safe for use around food.
- In accordance with Federal law **all** food containers shall contain the name and address of the manufacturer/processor or the distributor.
- The potential vendor shall provide the school district with its procedures that assure it purchases food only from those manufacturers which comply with all Federal/state food safety laws and regulations.
- Product protection guarantees**:** For product safety, school districts have "automatic" product protection recourse against suppliers. The supplier whose name and address appear on the package is the responsible party. Contractors are expected to take immediate action to correct any situation in which product integrity is violated.
- The potential vendor shall follow procedures of a First In First Out (FIFO) stock rotation system.
- Dented cans, boxes with leaks, or other damaged product shall not be delivered to the school district.
- If requested, vendors shall supply instructions on how to read the code date on delivered products.
- Distributors must receive and deliver products to schools in accordance with the

Sanitary Food Transportation Act of 1990. Go to http://www.fda.gov/opacom/laws/sftact.htm

- Ice used to cool food shall be made from water safe for drinking and shall not be in contact with food containers that could absorb melting water.
- The Child Nutrition Reauthorization Act of 1998 requires schools and institutions participating in the National School Lunch and School Breakfast Programs in the contiguous United States to use school food service funds, to the maximum extent practicable, to buy “domestic commodity or product.” Domestic commodity or product is defined as food products that are either substantially produced or processed in the United States. The term “substantially” means that over 51 percent of the final product consists of agricultural commodities that were grown domestically.

# Dates on Food Products

The labels on most retail food products, especially short shelf-life products, contain phrases like “Best if used by . . .” and “Sell by . . .” Some institutional foods also have these dates. Except for infant formula and some baby food, Federal law does not require product dating. Where a calendar date is shown, immediately adjacent to the date must be a phrase explaining the meaning of that date. What do all of these dates mean?

**“Open dating”** (using a calendar date as opposed to a code) is a date stamped on a product’s package to help the store determine how long to display the product for sale. Open dating can also help the purchaser to know the time limit to purchase or use the product to ensure best quality. It is not a safety date.

The **“best if used by . . .”** date is the estimated date on which product quality is generally acceptable. It is not a purchase or safety date.

Stores use the **“sell by . . .”** dates for stock rotation. The “sell by” date also encourages purchaser to allow time for storage before the end of shelf life. It is not a safety date.

A **“use by . . . ”**date is the recommended last date at which the product will be at peak quality. The manufacturer of the product determines this date. It is not a safety date.

**“Closed or coded dates”** are packing numbers for the manufacturer’s use. Usually these appear on shelf-stable products such as cans and boxes of food. Cans must exhibit a packing code to enable tracking of the product in interstate commerce. These codes appear as a series of letters and/or numbers and might refer to the date or time of manufacture. The code is not meant for the consumer to interpret as “use by” dates. There is no book which tells how to translate the codes into dates.

The information that the purchaser wants most is the “sell by” or “use by” dates on precut packaged items, such as fresh-cut salad mix. An open date is an indication of freshness but cannot guarantee that a food product is not spoiled if it is improperly handled. An open date cannot prevent failures during or after processing or improper practices in the distribution chain. If a food is temperature-abused, an open date is meaningless and, in fact, can provide a false sense of security.

The school food service staff should be trained to recognize the date code from the other numbers on the package. In case of a

recall, this is the number used to identify the product. The code may contain information on the shift, production line, and perhaps the batch in which the product was produced. This code can be printed on the label, or it might be stamped on the cardboard box or bag.

Why don't manufacturers/processors standardize the dates on their products? The Food Processors Institute says the quality and safety of the product depends on how the purchaser handles the product after it is purchased. Time and temperature are the major environmental factors which have an impact on food quality and food safety. Here are some examples:

1) School A purchases a dry mix with a recommended shelf life of 90 days when stored at 70 degrees Fahrenheit. The school stores the mix for 60 days at 90 degrees Fahrenheit. Is the mix safe to use or will it produce an inferior quality product? Yes and no – the dry mix is probably safe but will probably produce an inferior product.

2) School B purchases shredded lettuce dated 3/8/2002. When the lettuce arrives, it sits in the kitchen one hour until the staff makes room for it in the cooler. The recommended storage temperature is 35 degrees Fahrenheit. The average shelf life is 14 days from date of pack. The school uses the lettuce on 3/21/2002. Is the food safe to use or will it produce an inferior quality product? That depends on the temperature of the lettuce before it was placed in the refrigerator or walk-in cooler.

These examples illustrate the food safety partnership between the food industry and SFAs. Industry cannot do it alone. Schools cannot do it alone. Why is there no standard way of dating food products? The diversity of products, storage conditions, transportation methods, and the shelf life of products makes a standard date practically impossible.

Appendices 3 through 5 provide estimated shelf life for products at various storage temperatures. The time periods are only estimates, as many environmental factors in addition to temperature affect the shelf life of a product. All estimates are for unopened food products. Opened food products have a much shorter shelf life. Estimating the shelf life of a food product is a costly, time consuming, and complicated technical process. For information on the product shelf life of a specific brand, ask the manufacturer directly. The World Wide Web is a useful tool. Use the "contact us" tab on the brand's or manufacturer's Web page.

A device called a time temperature integrator (TTI) could provide better consumer information in the future. TTIs are small indicators placed on individual food packages to measure the temperature history of a product. Three major manufacturers produce TTIs. All use changes in color to indicate the temperature of a food product over time. Precut produce for the institutional market first employed TTIs. Reliable TTIs that are very sensitive to time and temperature abuse have been manufactured since 1991. Yet no companies place these devices on precut produce. The cost of TTIs is most often cited as the reason they are not used.

One of the best resources on food safety is available on the World Wide Web at http://www.foodsafety.gov. This Website has information on almost any subject that a SFA would have about food safety.

# References


Denny, Cleve B. (1987). *Successfully Managing Product Recalls and Withdrawals* (Bulletin 34L). Washington, DC: National Food Processors Association.

Fialkow, Gail. (n.d.) *Canned Good Shelf Life and Stamped Code Decoder*. Retrieved April 18, 2002, from http://www.y2kkitchen.com/html/can-can-code-decoder.html.

Garlitz, Carol J., Boor, K. and York, G. K. (1990). *Freezer Storage: Quality for Now and Later*. University of California Cooperative Extension Service Publication 21472.

Garlitz, Carol J., Boor, K. and York, G. K. (1990). *Cupboard Storage: Quality for Now and Later*. University of California Cooperative Extension Service Publication 21473.

Garlitz, Carol J., Boor, K. and York, G. K. (1990). *Refrigerator Storage: Quality for Now and Later*. University of California Cooperative Extension Service Publication 21474.

How Fresh. (1995, October). *Consumer Reports,* p. 635.

Labuza, Theodore P. *(*2000). The Search for Shelf Life. *Food Testing Analysis 6 (2)*: 26-36.

Labuza, Theodore P., and Szybist, Lynn M. (1999). *Current Practices and Regulations Regarding Open Dating of Food Products*. St. Paul, Minnesota: The Retail Food Industry Center, The University of Minnesota.

National Food Service Management Institute. (2000). *Inventory Management for Child Nutrition Programs.* University, MS: Author.

Partnering with Suppliers. (2002). *Food Safety Illustrated.* National Restaurant Association, Vol. 2.

Penner, Karen P. (1990). *Cupboard Approximate Storage Times.* Manhattan, KS: Kansas State University.

Penner, Karen P. (1990)*. Refrigerator/Freezer Approximate Storage Times*. Manhattan, KS: Kansas State University.

Serve Safe Course Book. (1999). Chicago: National Restaurant Association Educational Foundation.

TM 38-400/NAVSUP PUB 572/AFMAN 23-210 MCO 4450.14/DLAM 4145.12. *Joint Service Manual for Storage and Materials Handling* (Section IV, Subsistence. 5-17). In *Perishable Subsistence, Chilled and Frozen Storage*. (n.d.) Washington, DC: Department of Defense.

USDA/AMS. (1998) *Best if Used by Date for Commodities*. (Based on DOD 4145.19R1). Washington, DC.

USDA/AMS. (2000). *Processed Products Branch Plant Surveys.* Washington, DC: Government Printing Office.

USDA/AMS. (2000). *Processed Products Branch Plant Systems Audit (PSA) Program.* Washington, DC: Government Printing Office.

USDA/AMS. (1999). *Qualified Through Verification (QTV) Program for the Fresh-cut Produce Industry* (1st ed.). Washington, DC: Government Printing Office.

# References


USDA/FDA. (1997). *HACCP Principles and Application Guidelines*. In National Advisory Committee on Microbiological Criteria for Foods. Retrieved December 28, 2000, from http://vm.cfsan.fda.gov/~comm/nacmcfp.html

USDA/FDA. *U. S. Food Safety System Country Report*. Washington, D. C., March 3, 2000. Retrieved February 12, 2002, from http://www.foodsafety.gov/~fsg/fssyst2.html

USDA/FNS with the National Food Service Management Institute. (2002). *First Choice: A Purchasing Systems Manual for School Food Service* (2nd ed.). University, MS: National Food Service Management Institute.

USDA/FNS/CND. Garnett, Stanley C. (2001). *Buy American Provisions.* (Memo to All State Directors, All State Agencies, Regional Directors SNP.)

USDA/FNS.CN. (2002). *Issue: Do Egg Products Need a Cross-Utilization Letter or Not?* Labeling Internal Policy Form.

USDA/FNS*. Food Buying Guide for Child Nutrition Programs.* (2001). U.S. Department of Agriculture Food and Nutrition Service. Retrieved November 19, 2002 from http://schoolmeals.nal.usda.gov/FBG/buyingguide.html

USDA/FSIS. *A Farm-To-Table Food Safety Strategy.* Retrieved November 19, 2002, from http://www.fsis.usda.gov/OA/speeches/1999/cw_afbf.htm

USDA/FSIS. *The Importance of Farm-to-Table HACCP in Improving Food Safety.* Retrieved November 19, 2002, from http://www.fsis.usda.gov/OA/speeches/1997/haccpedu.htm

USDA/FSIS. (2001). *Focus on: Food Product Dating.* Retrieved August 26, 2002, from http://www.fsis.usda.gov/OA/pubs/dating.htm

USDA/FSIS. (2000). *Food Recalls, Food Safety Focus.* Retrieved October 4, 2002, from http://www.fsis.usda.gov/OA/pubs/recallfocus.htm

USDA/FSIS. *Irradiation of Raw Meat and Poultry - Questions and Answers*. Retrieved April 26, 2001, from http://www.fsis.usda.gov/OA/pubs/qa_irrad.htm

USDHHS/FDA. (1998). *Food Safety: A Team Approach* (FDA Backgrounder). Retrieved January 8, 2003, from http://www.fda.gov/opacom/backgrounders/bckindex.html

USDHHS/FDA. (1999). *HACCP: A State-of-the-Art Approach to Food Safety* (FDA Backgrounder). Retrieved January 8, 2003, from http://www.fda.gov/opacom/backgrounders/bckindex.html

USDHHS/PHS/FDA. *Food Code, 2001*. Retrieved January 8, 2003, from http://www.cfsan.fda.gov/~dms/foodcode.html

# Manufacturer HACCP Qualification Standards

Manufacturer_____Date_____

Address_____

To manufacturers (current/potential vendors): The companies providing food and supplies to our operation are expected to demonstrate effective production and distribution methods and continual improvement. Documentation regarding your firm's HACCP program is incorporated into our Quality Assurance program. Please answer the following questions and provide the appropriate material documenting your company's quality assurance plan and program to achieve each requirement.

1. Who developed the HACCP/Quality Assurance program?
   Who validated the program as effective?
   Who are the members of the HACCP/QA team?
   What are the qualifications of the HACCP/QA team members?
   How often do they meet?
   Describe the pre-ship verification program.
2. Has each employee who works with food been taught the hazards associated with the task he/she performs and how to maintain the necessary controls?
   Attach material to support the answer provided.
3. What are suppliers required to do to assure ingredient HACCP controls?

4. Please describe recall and emergency action programs.

5. Describe the responsibilities of Quality Assurance/Quality Control Department.

# Appendix 2

# Manufacturer Audit Survey

Type of supplies:

Name:
Address:
Phone:
Fax:
Email:

1. Where is the plant that produces the product located?
2. What other types of products are produced at this facility?
3. What food safety system does the facility use? Is it based on HACCP principles?
4. Does the company operate under an ISO9000 (International Organization for Standardization) quality system, and is it certified?
5. What type of analytic testing does the company do on a regular basis? Microbiology, chemical and physical? Does the company do its own testing or use outside laboratories?
6. Are the onsite and contract laboratories accredited to an independent laboratory standard?
7. Does the production facility have a pest control contract? What types of pest control procedures are in place?
8. Does the facility have its own sanitation crew or use an outside contract company for sanitation?
9. Are there specifications for raw and finished products?
10. Are there written operating procedures for all production?
11. Are there written personal hygiene standards?
12. How are employees trained for food handling, sanitation, and good manufacturing procedures?

## Dry Storage Life of Unopened Containers

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage temperature and conditions may impact storage life.

| **Item** | **Package** | Approximate storage life in **months** | | |
|---|---|---|---|---|
| | | **40 °F** | **70 °F** | **90 °F** |
| Apples, regular pack[a, b] | Can | 48 | 24 | 12 |
| Apple juice[a] | Can | 36 | 18 | 9 |
| Applesauce[b] | Can | 48 | 24 | 12 |
| Apricots[a, b] | Can | 48 | 24 | 12 |
| Bacon, imitation, (bacon bits imitation)[c] | — | — | 4 | — |
| Bakery mixes[a, b] | Bag/carton | 12 | 6 | 3 |
| Baking powder[a] | Can | 24 | 12 | 6 |
| Baking soda[a] | Carton | Indefinite | Indefinite | Indefinite |
| Beans, dry [a, b, e] | Bag/carton | 24 | 12 | 9 |
| Beans, black[j] | Can | — | 12 | — |
| Beans, green[a] | Can | 36 | 18 | 9 |
| Beans, kidney[a] | Can | 72 | 36 | 18 |
| Beans, lima[a] | Can | 72 | 36 | 18 |
| Beans, pinto[a, b] | Can | 72 | 36 | 18 |
| Beans, salad three-bean[a] | Jar | 48 | 24 | 12 |
| Beans, wax[a] | Can | 36 | 18 | 9 |
| Beans, white with pork in sweet sauce[a] | Can | 72 | 36 | 18 |
| Beans, vegetarian[b] | Can | 48 | 24 | 12 |
| Beans, with pork in tomato sauce[a] | Can | 48 | 24 | 12 |
| Beans, refried[a, b] | Can | 72 | 36 | 18 |
| Beef chunks with natural juice[a, b] | Can | 60 | 36 | 18 |
| Beets, gulf states[a] | Can | 36 | 18 | 9 |

# Appendix 3

## Dry Storage Life of Unopened Containers

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage temperature and conditions may impact storage life.

| **Item** | **Package** | Approximate storage life in **months** | | |
|---|---|---|---|---|
| | | **40 ºF** | **70 ºF** | **90 ºF** |
| Beets, except gulf states[a] | Can | 48 | 24 | 12 |
| Berries, black[a] | Can | 36 | 18 | 9 |
| Beverage sweetened w/aspartame[g] | — | — | 2 to 3 | — |
| Bouillon cubes or granules[c] | — | — | 24 | — |
| Bread crumbs[c, j] | — | — | 6 | — |
| Carrots[i] | Can | 60 | 30 | 15 |
| Carrots, mature topped[i] | Bag | — | 7-30 days | — |
| Catsup[a] | Can | 36 | 18 | 9 |
| Cereal, quick cooking[a] | Bag/carton | 24 | 12 | 6 |
| Cereal, ready to eat[a] | Package | 24 | 12 | 6 |
| Cherries[b] | Can | 36 | 18 | 9 |
| Cherries, maraschino[a] | Jar | 36 | 18 | 9 |
| Chili con carne without beans[a] | Can | 60 | 36 | 18 |
| Chocolate, cooking semisweet chips[a] | Package | 36 | 18 | 9 |
| Chocolate, cooking unsweetened[c] | Package | — | 18 | — |
| Cocoa, natural[a] | Can | 72 | 36 | 18 |
| Coconut, prepared unsweetened[a] | Bag | 24 | 6 | 1 |
| Coconut, prepared sweetened[a] | Container | 24 | 6 | 1 |
| Coffee[j] | Can | — | 24 | — |
| Coffee, not vacumn packed[j] | Bag | — | 2 weeks | — |
| Cookies[a] | Carton | 6 | 4 | 2 |
| Corn, cream and whole kernel[a] | Can | 72 | 36 | 18 |

## Dry Storage Life of Unopened Containers

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage temperature and conditions may impact storage life.

| **Item** | **Package** | Approximate storage life in **months** | | |
|---|---|---|---|---|
| | | **at 40 °F** | **at 70 °F** | **at 90 °F** |
| Corn chips[a] | Package | 1 | ½ | ¼ |
| Corn meal[a, b] | Package | 24 | 12 | 6 |
| Corn syrup[j] | — | — | 12 | — |
| Cornstarch[c] | — | — | 18 | — |
| Corned beef[j] | Can | — | Indefinite | — |
| Crackers, graham[a] | Carton | 4 | 2 | 1 |
| Crackers, other than graham[a] | Carton | 12 | 6 | 3 |
| Cranberry sauce[a] | Can | 36 | 18 | 9 |
| Cream of tartar[a] | Can | 8 | 6 | 4 |
| Cream of wheat (cereal, uncooked) [c, j] | — | — | 6 | — |
| Fig nuggets[b] | — | 12 | — | — |
| Figs, whole dried[b] | — | 36 | 18 | 9 |
| Flavoring, imitation vanilla[c, g, j] | Bottle | — | 24 | — |
| Flavoring, other flavors[a] | Bottle | 24 | 18 | 6 |
| Flour, white or whole wheat[b] | — | 24 | 12 | 6 |
| Food coloring, liquid[a] | Bottle | — | Indefinite | — |
| Fruit cocktail[a] | Can | 48 | 24 | 12 |
| Gelatin, all flavors[a] | Can | 72 | 36 | 18 |
| Gelatin, all flavors[a] | Package | 36 | 18 | 9 |
| Granola bars[k] | — | — | 6 to 8 | — |
| Grape juice[a] | Can | 24 | 12 | 6 |
| Grapefruit juice[a] | Can | 48 | 24 | 12 |

## Dry Storage Life of Unopened Containers

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage temperature and conditions may impact storage life.

| **Item** | **Package** | Approximate storage life in **months** | | |
|---|---|---|---|---|
| | | **at 40 °F** | **at 70 °F** | **at 90 °F** |
| Grapefruit-orange juice blend[a] | Can | 48 | 24 | 12 |
| Grits, corn[b] | — | 24 | 12 | 6 |
| Gravy mix[c] | — | — | 6 to 12 | — |
| Ham chunks[a] | Can | 72 | 36 | 18 |
| Hominy grits[a] | Container | 24 | 12 | 6 |
| Honey, extracted[a, b] | Jar | 48 | 24 | 12 |
| Jam, fruit[a] | Jar/can | 36 | 18 | 9 |
| Jelly, fruit[a] | Jar/can | 36 | 18 | 9 |
| Marshmallows[c] | — | — | 2 to 3 | — |
| Marshmallow creme[c] | — | — | 3 to 4 | — |
| Macaroni [a, b, l] | Carton | 72 | 36 | 18 |
| Mayonnaise[j] | — | — | 2 | — |
| Milk, evaporated[a] | Can | 24 | 12 | 6 |
| Milk, condensed[c] | — | — | 12 | — |
| Milk, nonfat dry[b] | — | 24 | 12 | 3 |
| Milk, non-dairy cream[j] | — | — | 9 | — |
| Mixed fruit[b] | Can | 48 | 24 | 12 |
| Mushrooms[k] | Can | — | 48 | — |
| Mustard, prepared[a] | Can/jar | 36 | 18 | 9 |
| Noodles, chow mein[a] | Can | 8 | 4 | 2 |
| Noodles, egg[a, l] | Carton | 72 | 36 | 18 |
| Nuts, vacuum[c] | Can | — | 3 | — |

## Dry Storage Life of Unopened Containers

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage temperature and conditions may impact storage life.

| **Item** | **Package** | Approximate storage life in **months** | | |
|---|---|---|---|---|
| | | **at 40 °F** | **at 70 °F** | **at 90 °F** |
| Oatmeal, instant[k] | — | — | 18 | — |
| Oats, rolled quick[b] | — | 24 | 12 | 6 |
| Oil, vegetable[b] | — | 24 | 12 | 6 |
| Oil, salad dressing[b] | — | 24 | 12 | 6 |
| Olives, green[a] | Jar | 48 | 24 | 12 |
| Olives, ripe[a] | Can | 48 | 24 | 12 |
| Onions, Bermuda, dry[i] | — | — | 7-30 days | — |
| Orange juice[a] | Can | 72 | 36 | 18 |
| Peaches[a, b] | Can | 48 | 24 | 12 |
| Peanut butter[a, b] | Can/jar | 36 | 18 | 9 |
| Peanut granules[b] | — | 60 | 24 | 12 |
| Peanuts, roasted[b] | — | 60 | 24 | 12 |
| Pears[a, b] | Can | 36 | 18 | 9 |
| Peas, blackeye[a, b] | Can | 72 | 36 | 18 |
| Peas, green[a, b] | Can | 72 | 36 | 18 |
| Peas and carrots[a] | Can | 60 | 30 | 15 |
| Pickles, cucumber cured[a] | Jar | 48 | 24 | 12 |
| Pickles, cucumber cured[a] | Can | 24 | 12 | 6 |
| Pickles, relish[a] | Jar | 48 | 24 | 12 |
| Pickles, relish[a] | Can | 24 | 12 | 6 |
| Pie filling, fruit[a] | Can | 60 | 36 | 18 |
| Pie shells, graham cracker[a] | Container | 8 | 4 | 2 |

## Dry Storage Life of Unopened Containers

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage temperature and conditions may impact storage life.

| **Item** | **Package** | Approximate storage life in **months** | | |
|---|---|---|---|---|
| | | **at 40 °F** | **at 70 °F** | **at 90 °F** |
| Pimento[a] | Can | 48 | 24 | 12 |
| Pineapple slices[a, b] | Can | 48 | 24 | 12 |
| Pineapple juice[a] | Can | 48 | 24 | 12 |
| Plums[b] | Can | 36 | 18 | 9 |
| Plum/prune puree[b] | Can | — | 9 | — |
| Pop Tart-like pastries[k] | — | — | 6 to 9 | — |
| Pork w/ natural juice[b] | Can | 60 | 36 | 18 |
| Poultry[b] | Can | 60 | 36 | 18 |
| Potato chips[a] | Package | 1 | 2 weeks | 1 week |
| Potato sticks[a] | Can | 48 | 24 | 12 |
| Potatoes, sweet, fresh[c] | Bag/box | — | 1- 2 weeks | — |
| Potatoes, sweet, instant dehydrated[a] | Can | 60 | 36 | 18 |
| Potatoes, sweet[a, b] | Can | 48 | 24 | 12 |
| Potatoes, white[a] | Can | 60 | 30 | 15 |
| Potatoes, white, dehydrated granules[b] | Can | 12 | 6 | 3 |
| Potatoes, white, dehydrated slices[b] | Poly bag | 12 | 6 | 3 |
| Potatoes, white, fresh[i] | — | — | 7-30 days | |
| Prunes, pitted, dried[b] | — | 18 | 9 | 5 |
| Pudding mixes[c] | — | — | 12 | — |
| Pumpkin[k] | Can | — | 24 | — |
| Raisins, dried[a, b] | Carton | 18 | 9 | 5 |
| Ravioli w/meat sauce[a] | Can | 48 | 24 | 12 |

## Dry Storage Life of Unopened Containers

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage temperature and conditions may impact storage life.

| **Item** | **Package** | Approximate storage life in **months** | | |
|---|---|---|---|---|
| | | **at 40 °F** | **at 70 °F** | **at 90 °F** |
| Rice, flavored or herb[c, j] | — | — | 6 | — |
| Rice, instant [a, l] | Carton | 36 | 18 | 9 |
| Rice, milled [a, b, l] | Bag | 48 | 24 | 12 |
| Rice mixes[c] | — | — | 6 | — |
| Rice, parboiled [a, b, l] | Box/bag | 30 | 20 | 10 |
| Salad dressing, pourable[a] | Bottle | 7 | 5 | 2 |
| Salad dressing, reduced calorie[b] | — | 8 | 5 | 2 |
| Salad oil[a] | Can | 24 | 12 | 6 |
| Salmon[b] | Can | 72 | 36 | 18 |
| Salsa[b] | Can | 48 | 24 | 12 |
| Salt, celery, garlic, onion[a] | Container | 72 | 36 | 18 |
| Salt, table [a, j, m] | Bag | Indefinite | Indefinite | Indefinite |
| Sauces, hot, soy, worcestershire[a] | Bottle | 60 | 30 | 15 |
| Sauce mixes[c] | — | — | 6 to 12 | — |
| Sauerkraut[a] | Can | 36 | 18 | 9 |
| Seasoning: spaghetti, taco[a] | Can | 36 | 18 | 9 |
| Shortening, deep fry/cooking, liquid[a] | Can | 48 | 24 | 12 |
| Shortening, general purpose[a, b] | Can | 48 | 24 | 12 |
| Soup, dehydrated[i] | — | — | 18 to 36 | — |
| Soup, condensed[a, n] | Can | 72 | 36 | 18 |
| Soup, ready to serve[a] | Can | 48 | 24 | 12 |
| Soup and gravy base, beef flavored[a] | Can/jar | 60 | 30 | 15 |

## Dry Storage Life of Unopened Containers

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage temperature and conditions may impact storage life.

| **Item** | **Package** | Approximate storage life in **months** | | |
|---|---|---|---|---|
| | | **at 40 °F** | **at 70 °F** | **at 90 °F** |
| Soup and gravy base, beef flavored[a] | Envelope | 24 | 12 | 6 |
| Soup and gravy base, chicken flavored[a] | Can/jar | 60 | 30 | 12 |
| Soup and gravy base, chicken flavored[a] | Envelope | 24 | 12 | 6 |
| Soup and gravy base, ham flavored[a] | Can/jar | 50 | 30 | 15 |
| Soup and gravy base, ham flavored[a] | Envelope | 24 | 12 | 6 |
| Spaghetti [a, b, l] | Carton | 72 | 36 | 18 |
| Spices, seasonings, herbs[a] | Can | 48 | 24 | 12 |
| Starch, corn[a] | Carton | 96 | 48 | 24 |
| Sugar, brown[a] | Carton/bag | 36 | 18 | 4 |
| Sugar, confectioners[a] | Carton/bag | 36 | 18 | 6 |
| Sugar, granulated[c, g, j] | Carton/bag | — | 24 | — |
| Sugar, artificial sweeteners[g] | — | — | 24 | — |
| Taco seasoning mix[k] | — | — | 18 | — |
| Taco shells, corn[a] | Container | 12 | 6 | 3 |
| Tea bags[c, g, j] | — | — | 18 | — |
| Tomato juice[a] | Can | 36 | 18 | 9 |
| Tomato paste[a, b] | Can | 36 | 18 | 9 |
| Tomato puree[a, b] | Can | 48 | 24 | 12 |
| Tomatoes[a, b] | Can | 48 | 24 | 12 |
| Tuna, oil pack[a, b] | Can | 72 | 36 | 18 |
| Vegetable juice[a] | Can | 36 | 18 | 9 |
| Vinegar, liquid[a] | Bottle | 60 | 30 | 15 |

# Dry Storage Life of Unopened Containers

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage temperature and conditions may impact storage life.

| **Item** | **Package** | Approximate storage life in **months** | | |
|---|---|---|---|---|
| | | **at 40 °F** | **at 70 °F** | **at 90 °F** |
| Whipped topping, dry[c] | — | — | 12 | — |
| Yeast, active dry[a] | Can | 6 | 1 | 1 week |

[a]TM 38-400/NAVSUP PUB 572/AFMAN 23-210 MCO 4450.14/DLAM 4145.12. *Joint Service Manual for Storage and Materials Handling* (Section IV, Subsistence. 5-17). In *Perishable Subsistence, Chilled and Frozen Storage*. (n.d.). Washington, DC: Department of Defense.
[b]USDA/AMS (1998). *Best if Used by Date for Commodities*. (Based on DOD 4145.19-R-1). Washington, DC.
[c]Penner, Karen P. (1990). *Cupboard Approximate Storage Times*. Manhattan, KS: Kansas State University.
[d]Penner, Karen P. (1990). *Refrigerator/Freezer Approximate Storage Times*. Manhattan, KS: Kansas State University.
[e]Will harden at high temperature, mold at low temperature.
[f]Garlitz, Carol J., Boor, K., and York, G. K. (1990). *Freezer Storage: Quality for Now and Later*. University of California Cooperative Extension Service Publication 21472.
[g]Garlitz, Carol J., Boor, K., and York, G. K. (1990). *Cupboard Storage: Quality for Now and Later*. University of California Cooperative Extension Service Publication 21473.
[h]Garlitz, Carol J., Boor, K., and York, G. K. (1990). *Refrigerator Storage: Quality for Now and Later.* University of California Cooperative Extension Service Publication 21474.
[i]National Food Service Management Institute. (2000). *Inventory Management for Child Nutrition Programs.* University, MS: Author.
[j]Serve Safe Course Book. (1999). Chicago: National Restaurant Association Educational Foundation.
[k]Fialkow, Gail. (n.d.) Canned Good Shelf Life and Stamped Code Decoder. Retrieved April 18, 2002, from http://www.y2kkitchen.com/html/can-can-code-decoder.html.
[l] Highly susceptible to damage by moisture.
[m]Humidity above 90% will cause caking. (Caked salt is useable.)
[n]Cream-style soups break down when frozen but are not spoiled.
[o]The length of time apples can be held successfully in cold storage at 32 to 35 ºF will vary with the variety and with the district or state where grown, as well as with their condition when harvested. Controlled atmosphere can extend storage life an additional 2 to 4 months.
[p]Temperature below 56 to 58 ºF causes chill injury.
[q]Chill damage will result if stored at lower temperature than indicated.
[r]This item keeps better unwashed.
[s]Keeping time in dry storage (above 55 ºF) is less than 3 months.
[t]Imperfect seals will reduce shelf life.
[u]If stored at 30 to 31 ºF immediately after harvest the shelf life is as follows: Anjou - 4 to 6 month, Bartlett and Comice - 2 to 3 months, Bosc - 3 to 4 months. If Anjou, Bartlett, Comice and Bosc Pears are stored in polyethylene liners, the shelf life can be extended an additional 1 to 2 months.
[v]Chill injury if stored below 50 ºF.
[w]Cold sensitive below 50 ºF.

# Appendix 4

## Approximate Storage Life in Days of Refrigerated Foods

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage

| Item | 32-35 ºF | 35-45 ºF | 45-55 ºF | Remarks |
|---|---|---|---|---|
| Apples, red Delicious, Washington[d, h, o] | — | 7 - 21 | — | |
| Bacon, slab sliced[d, h] | — | 7 | — | |
| Bananas, green[a, p] | — | — | — | 7-10 @ 56 ºF |
| Bananas, ripe[a, p] | — | — | — | 3-4 @ 56-58 ºF |
| Beef, ground[d, j] | — | 1 - 2 | — | |
| Berries, strawberries[d] | — | 1 - 2 | — | |
| Berries, blueberries[d] | — | 1 - 2 | — | |
| Bologna[d] | — | 3 - 5 | — | |
| Broccoli[d] | — | 3 - 5 | — | |
| Brussel sprouts[a] | 21 - 35 | — | — | |
| Butter[h] | — | 7 - 14 | — | |
| Cabbage, early[d] | — | 3 - 5 | — | |
| Cabbage, late[d] | — | 3 - 5 | — | |
| Cantaloupe, hard ripe[d, h, q] | — | 7 | — | |
| Cantaloupe, full slip[d, h] | — | 7 | — | |
| Carrots, mature topped[a, r] | 120 -150 | — | — | |
| Catsup, foil pouch[a, s] | — | 365 | 270 | |
| Cauliflower[d, r] | — | 7 | — | |
| Celery[d, h] | — | 7 - 14 | — | |
| Cheese, Cheddar[a, b] | 365 | — | — | |
| Cheese, Cheddar, shredded[a, b] | 180 | — | — | |
| Cheese, Cheddar, reduced fat loaves[b] | 150 | — | — | |
| Cheese, Cheddar, reduced fat shredded[b] | 150 | — | — | |

## Approximate Storage Life in Days of Refrigerated Foods

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage

| Item | 32 - 35 ºF | 35 - 45 ºF | 45 - 55 ºF | Remarks |
|---|---|---|---|---|
| Cheese, cottage[h] | — | 5 | — | |
| Cheese, Cream[i] | — | 7 | — | |
| Cheese, Mozzarella, loaves[b] | — | — | — | 365 @ 20 ºF |
| Cheese, Mozzarella, lite & shredded[b] | — | — | — | 150 @ 20 ºF |
| Cheese, process American, loaves[b] | 365 | — | — | |
| Cheese, process American, sliced[a, b, i] | 180 | — | — | |
| Cheese, process, American, shredded[b] | 150 | — | — | |
| Cheese, Parmesan[h] | — | 60 | — | |
| Cheese, blend, slices[b] | 210 | — | — | |
| Cheese, blend, loaves[b] | 270 | — | — | |
| Cucumbers[d] | — | 7 | — | |
| Dip, sour cream, commercially made[d] | — | 14 | — | |
| Dressing, French[a] | — | — | 90 | |
| Eggs, fresh in shell[h] | — | 14 - 21 | — | |
| Frankfurters, bulk pack[h] | — | 4 - 5 | — | |
| Grapes[h] | — | 3 - 5 | — | |
| Ham, boneless, cooked[d, h, i] | — | 7 | — | |
| Ham, smoked[d, i] | — | 7 | — | |
| Honeydew melon[h] | — | 7 | — | |
| Jams, jellies, preserves, cup[a, s] | — | — | 180 | |
| Jams, jellies, preserves, foil pouch[a, s] | — | — | 365 | |
| Lettuce, Iceberg, wrapped[a] | 21 - 42 | — | — | |
| Lettuce, Iceberg, naked[a] | 14 - 21 | — | — | |

# Appendix 4

## Approximate Storage Life in Days of Refrigerated Foods

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage

| Item | 32 - 35 ºF | 35 - 45 ºF | 45 - 55 ºF | Remarks |
|---|---|---|---|---|
| Lettuce, Iceberg, table ready[a] | 5 -7 | — | — | |
| Lettuce, Romaine[h] | 5 -7 | — | — | |
| Lemons[h] | — | 3 - 5 | — | |
| Margarine[a] | 90 | 60 | — | |
| Milk, buttermilk[d, t] | — | 7 - 14 | — | |
| Milk, chocolate flavored[a, t] | 10 | — | — | |
| Milk, cream, light or half & half, UHT processed[d] | — | 21 - 28 | — | |
| Milk, cream heavy or whipping[d] | — | 7 | — | |
| Milk, fluid pasteurized[i, t] | — | 5 - 7 | — | |
| Milk, ice cream or shake mix[a, t] | 10 | — | — | |
| Onions, green[a] | 10 | — | — | |
| Oranges, CA,AZ[h] | — | 3 - 5 | — | |
| Oranges, FL, TX[h] | — | 3 - 5 | — | |
| Oranges, Temple, tangelo[h] | — | 3 - 5 | — | |
| Orange juice[d] | — | 7 | — | |
| Parsley [a] | 30 - 60 | — | — | |
| Pears[a, h, u] | — | 3 - 5 | — | |
| Peppers, sweet[d] | — | 7 | — | |
| Plums[h] | — | 3 - 5 | — | |
| Potatoes, sweet[a, v] | — | — | — | 90-120 days @ 50-60 ºF |
| Radishes, poly bag[h] | — | 7 - 14 | — | |
| Salad dressing, all[a] | 180 | 120 | 90 | |
| Sour cream[h] | — | 14 - 21 | —- | |

## Approximate Storage Life in Days of Refrigerated Foods

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage

| Item | 32 - 35 ºF | 35 - 45 ºF | 45 - 55 ºF | Remarks |
|---|---|---|---|---|
| Spinach[h] | — | 3 - 5 | — | |
| Squash, Fall, Winter, Hubbard[a, w] | — | —- | 180 | |
| Squash, Summer [a] | — | — | 10 - 14 | |
| Tangerines[h] | — | 3 - 5 | —- | |
| Tomatoes, mature green[a] | — | — | — | 14 -21 days @ 55 - 60 ºF |
| Tomatoes, pink[d] | — | 3 - 5 | — | |
| Tomatoes, firm ripe[h] | — | 1 - 2 | — | |
| Tomatoes, full color[h] | — | 1 - 2 | — | |
| Watermelon[d, h] | — | 7 | — | |
| Whipped topping, aerosol can[d] | — | 21 | — | |
| Whipped topping prepared from mix[d, h] | — | 3 | — | |
| Whipped topping purchased frozen & thawed[d, h] | — | 14 | — | |
| Yogurt, plain or fruit flavored[h] | — | 7 - 10 | — | |

[a]TM 38-400/NAVSUP PUB 572/AFMAN 23-210 MCO 4450.14/DLAM 4145.12. *Joint Service Manual for Storage and Materials Handling* (Section IV, Subsistence. 5-17). In *Perishable Subsistence, Chilled and Frozen Storage*. (n.d.). Washington, DC: Department of Defense.
[b]USDA/AMS (1998). *Best if Used by Date for Commodities*. (Based on DOD 4145.19-R-1). Washington, DC.
[c]Penner, Karen P. (1990). *Cupboard Approximate Storage Times*. Manhattan, KS: Kansas State University.
[d]Penner, Karen P. (1990). *Refrigerator/Freezer Approximate Storage Times*. Manhattan, KS: Kansas State University.
[e]Will harden at high temperature, mold at low temperature.
[f]Garlitz, Carol J., Boor, K., and York, G. K. (1990). *Freezer Storage: Quality for Now and Later.* University of California Cooperative Extension Service Publication 21472.
[g]Garlitz, Carol J., Boor, K., and York, G. K. (1990). *Cupboard Storage: Quality for Now and Later.* University of California Cooperative Extension Service Publication 21473.

[h]Garlitz, Carol J., Boor, K., and York, G. K. (1990). *Refrigerator Storage: Quality for Now and Later.* University of California Cooperative Extension Service Publication 21474.
[i]National Food Service Management Institute. (2000). *Inventory Management for Child Nutrition Programs.* University, MS: Author.
[j]Serve Safe Course Book. (1999). Chicago: National Restaurant Association Educational Foundation.
[k]Fialkow, Gail. (n.d.) *Canned Good Shelf Life and Stamped Code Decoder*. Retrieved April 18, 2002, from http://www.y2kkitchen.com/html/can-can-code-decoder.html.
[l]Highly susceptible to damage by moisture.
[m]Humidity above 90% will cause caking. (Caked salt is useable.)
[n]Cream-style soups break down when frozen but are not spoiled.
[o]The length of time apples can be held successfully in cold storage at 32 to 35 ºF will vary with the variety and with the district or state where grown, as well as with their condition when harvested. Controlled atmosphere can extend storage life an additional 2 to 4 months.
[p]Temperature below 56 to 58 ºF causes chill injury.
[q]Chill damage will result if stored at lower temperature than indicated.
[r]This item keeps better unwashed.
[s]Keeping time in dry storage (above 55 ºF) is less than 3 months.
[t]Imperfect seals will reduce shelf life.
[u]If stored at 30 to 31 ºF immediately after harvest the shelf life is as follows: Anjou - 4 to 6 month, Bartlett and Comice - 2 to 3 months, Bosc - 3 to 4 months. If Anjou, Bartlett, Comice and Bosc Pears are stored in polyethylene liners, the shelf life can be extended an additional 1 to 2 months.
[v]Chill injury if stored below 50 ºF.
[w]Cold sensitive below 50 ºF.

# Frozen Food Storage

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage temperature and conditions may impact storage life.

**Approximate storage life in months from date of pack to consumption**

| | |
|---|---|
| Apple slices[d] | 8 to 12 |
| Apple juice concentrate[d, f] | 12 |
| Apricots[f] | 12 |
| Bacon, slab sliced non-vacuum pack[j] | 1/2 |
| Beans, green[d] | 8 to 12 |
| Beans, lima[d] | 8 to 12 |
| Beef, ground bulk[d, j] | 3 to 4 |
| Beef, ground patties[b, i] | 4 |
| Beef, roast[j] | 6 to 9 |
| Blackberries[d] | 8 to 12 |
| Blackberry/Raspberry puree[b] | 18 |
| Blueberries[d] | 8 to 12 |
| Bologna[j] | 2 weeks |
| Bread dough[d, f] | 1 |
| Bread, baked yeast[d] | 2 |
| Broccoli[f] | 8 |
| Brussel sprouts[f] | 8 |
| Burritos[a] | 9 |
| Butter[f] | 6 to 9 |
| Cakes, all types frosted[d] | 1 |
| Cakes, all types unfrosted[f] | 1 |
| Carrots[d] | 8 to 12 |
| Cauliflower[d] | 8 to 12 |
| Cherries, dark and sweet pitted[f] | 12 |
| Cheese, pizza blend, shredded[d] | 6 to 8 |
| Chicken nuggets or patties[f, i] | 3 |
| Chicken, cooked, diced[f] | 3 |
| Chicken parts, cooked, breaded[f] | 3 |
| Chicken leg quarters[b] | 8 |
| Chicken, cut up[b] | 8 |
| Cookie dough[d] | 3 |
| Corn[f] | 8 |
| Corn on the cob[f] | 8 |
| Egg roll[a] | 6 |
| Eggs, whole including table grade[a, b, d, f, i] | 12 |
| Egg whites[a, d, f] | 12 |
| Egg yolks, sugar or salt added [a, d, f] | 12 |
| Enchiladas[a] | 9 |
| Fish fillets- lean: cod, haddock, flounder[j] | 3 to 6 |
| Fish sticks and portions[f] | 12 |
| Frankfurters, bulk pack[j] | 2 weeks |
| Grape juice concentrate[d, f] | 12 |
| Grapefruit juice concentrate[d, f] | 12 |
| Grapefruit - orange concentrate[d, f] | 12 |
| Grapefruit sections[d] | 4 to 6 |
| Greens, leafy[f] | 8 |
| Hams[j] | 2 weeks |
| Ice cream or sherbet[f] | 2 |
| Ice cream, novelties[f] | 2 |
| Lemonade, concentrated[a] | 24 |
| Margarine [d, f] | 12 |
| Okra[f] | 8 |
| Onion rings, french fried and raw[f] | 8 |
| Orange juice concentrate[d, f] | 12 |
| Orange juice single service carton[b] | 9 |
| Peaches[f] | 12 |
| Peaches, individual cup[f] | 12 |
| Peas, black eyed[f] | 8 |
| Peas, green[f] | 8 |
| Peas and carrots[f] | 8 |
| Pepperoni[a] | 12 |
| Peppers[f] | 8 |
| Pies, fruit filled, unbaked[d] | 2 to 4 |
| Pies, fruit filled, baked[c] | 6 to 8 |
| Pineapple juice concentrate[d, f] | 12 |
| Pizza[a] | 6 |
| Pizza shells[a] | 6 |
| Pork, barbecued[a] | 12 |
| Pork cutlets, boneless restructured[a] | 9 |
| Pork chops[d] | 3 to 4 |

# Appendix 5

## Frozen Food Storage

The information in this chart is intended as guidelines. Harvesting techniques, manufacturing processes, transportation and distribution conditions, the nature of the food, and storage temperature and conditions may impact storage life.

**Approximate storage life in months from date of pack to consumption**

| | |
|---|---|
| Pork, diced or sliced[a] | 9 |
| Pork, ground[j] | 2 |
| Potatoes, french fries[f] | 8 |
| Potatoes, hash browns[f] | 8 |
| Ravioli[a] | 6 |
| Salmon nuggets[b] | 6 |
| Sausage, pork, bulk style[b] | 3 |
| Sausage, pork patties[d] | 1 to 2 |
| Sausage, precooked, polish or Italian[a] | 9 |
| Sausage, pork and beef, precooked[a] | 9 |
| Sausage, smoked[d] | 1 to 2 |
| Spinach, chopped[f] | 8 |
| Squash, summer and fall[f] | 8 |
| Strawberries[d] | 8 to 12 |
| Succotash[f] | 8 |
| Tortillas, corn or wheat[a] | 12 |
| Turkey, boneless, cooked[f] | 3 |
| Turkey, boneless, raw[a, d] | 6 |
| Turkey, ground[b] | 3 |
| Turkey, whole ready to cook[a, b] | 9 |
| Vegetables, mixed[f] | 8 |
| Waffles[d] | 1 |

[a]TM 38-400/NAVSUP PUB 572/AFMAN 23-210 MCO 4450.14/DLAM 4145.12. *Joint Service Manual for Storage and Materials Handling* (Section IV, Subsistence. 5-17). In *Perishable Subsistence, Chilled and Frozen Storage*. (n.d.). Washington, DC: Department of Defense.
[b]USDA/AMS (1998). *Best if Used by Date for Commodities*. (Based on DOD 4145.19-R-1). Washington, DC.
[c]Penner, Karen P. (1990). *Cupboard Approximate Storage Times*. Manhattan, KS: Kansas State University.
[d]Penner, Karen P. (1990). *Refrigerator/Freezer Approximate Storage Times*. Manhattan, KS: Kansas State University.
[e]Will harden at high temperature, mold at low temperature.
[f]Garlitz, Carol J., Boor, K., and York, G. K. (1990). *Freezer Storage: Quality for Now and Later.* University of California Cooperative Extension Service Publication 21472.
[g]Garlitz, Carol J., Boor, K., and York, G. K. (1990). *Cupboard Storage: Quality for Now and Later.* University of California Cooperative Extension Service Publication 21473.
[h]Garlitz, Carol J., Boor, K., and York, G. K. (1990). *Refrigerator Storage: Quality for Now and Later*. University of California Cooperative Extension Service Publication 21474.
[i]National Food Service Management Institute. (2000). *Inventory Management for Child Nutrition Programs.* University, MS: Author.
[j]Serve Safe Course Book. (1999). Chicago: National Restaurant Association Educational Foundation.
[k]Fialkow, Gail. (n.d.) *Canned Good Shelf Life and Stamped Code Decoder*. Retrieved April 18, 2002, from http://www.y2kkitchen.com/html/can-can-code-decoder.html.
[l]Highly susceptible to damage by moisture.
[m]Humidity above 90% will cause caking. (Caked salt is useable.)
[n]Cream-style soups break down when frozen but are not spoiled.
[o]The length of time apples can be held successfully in cold storage at 32 to 35 ºF will vary with the variety and with the district or state where grown, as well as with their condition when harvested. Controlled atmosphere can extend storage life an additional 2 to 4 months.

[p]Temperature below 56 to 58 ºF causes chill injury.
[q]Chill damage will result if stored at lower temperature than indicated.
[r]This item keeps better unwashed.
[s]Keeping time in dry storage (above 55 ºF) is less than 3 months.
[t]Imperfect seals will reduce shelf life.
[u]If stored at 30 to 31 ºF immediately after harvest the shelf life is as follows: Anjou - 4 to 6 month, Bartlett and Comice - 2 to 3 months, Bosc - 3 to 4 months. If Anjou, Bartlett, Comice and Bosc Pears are stored in polyethylene liners, the shelf life can be extended an additional 1 to 2 months.
[v]Chill injury if stored below 50 ºF.
[w]Cold sensitive below 50 ºF.