

# Section 1-3: Storage and Transportation

## Section Overview

Appropriate practices during product storage after manufacture, transportation and warehousing are often overlooked elements of a comprehensive food safety management system. This neglect is common at points in the food system where product changes custody from one organization to another, such as when a food product is changing hands from a manufacturer to a retailer.

However, it is critical that potential food safety issues be carefully addressed during storage and transportation. For example, a 1994 nationwide outbreak in the United States that caused an estimated 224,000 cases of *Salmonella enteritidis* gastroenteritis was most likely the result of contamination of pasteurized ice cream premix during transport in tanker trailers that had previously carried non-pasteurized liquid eggs containing *S. enteritidis*. (For a full report refer to Hennessy et al. 1996. A National Outbreak of *Salmonella enteritidis* Infections from Ice Cream. New England Journal of Medicine 334:1281-1286.)

This section will focus on the following topics:

- Storage
- Stock control
- Transportation
- Cleaning and disinfection of transport containers and conveyances

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# Learning Objectives

At the conclusion of this section, the learner will be able to:

- list desirable characteristics for food storage areas that are conducive to appropriate food safety management,
- explain different approaches to management of stock control in a storage facility,
- describe characteristics of conveyances and bulk containers which minimize the likelihood of food product contamination during transport, and
- list considerations for appropriate cleaning and disinfection of transport conveyances and bulk containers.

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# Storage

Warehouse facilities for storage of foods should be:

- well organized and allow for segregation of raw materials from finished products,
- inspected regularly,
- clean and dry,
- well illuminated, and
- protected from pests, condensation, dust, fumes and odors.



Product must be stored under optimal conditions in accordance with the product specifications. For example:

- Oils should be stored in conditions to prevent oxidation.
- Fresh fruit and vegetable storage should take into account requirements for controlled atmosphere, management of ripening conditions, refrigeration, ventilation, etc.

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Storage

## Stock Control

Stock control is vitally important to the total supply chain to ensure safety, quality and waste control. Effective stock control systems and accurate records should be implemented. Accurate record keeping is critical to ensure an effective traceability system.

Stock Control Approaches:

### 1. FIFO = First In, First Out

Internal system to ensure raw materials are used in the same sequence as they are received. This concept also can be applied to dispatch of finished products.

### 2. FEFO = First Expired, First Out

System to ensure dispatch of products which have the earliest expiration date first. This approach helps to control “freshness” of the finished products and helps to minimize waste in the supply chain.



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# Transportation

Food must be adequately protected during transport. The type of conveyances or containers required depends on the nature of the food and the conditions under which it has to be transported.

Where necessary, conveyances and bulk containers should be designed and constructed so that they:

- do not contaminate foods or packaging;
- can be effectively cleaned and, where necessary, disinfected;
- permit effective separation of different foods or foods from non-food items where necessary during transport;
- provide effective protection from contamination, including dust and fumes;
- can effectively maintain the temperature, humidity, atmosphere and other conditions necessary to protect food from harmful or undesirable microbial growth and deterioration likely to render it unsuitable for consumption; and
- allow any necessary temperature, humidity and other conditions to be checked.



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Transportation

## Cleaning and Disinfection of Transport Containers and Conveyances

Several foodborne illness outbreaks have been traced to cross-contamination of foods with microbial pathogens that occurred during transportation. Cross-contamination with chemical hazards also has occurred frequently during transportation.

For this reason, it is critical to ensure that transport containers and other conveyances be kept in an appropriate state of cleanliness, repair and condition. Vehicle and container inspection systems should be in place to ensure containers are clean, sanitary and in good repair prior to loading consignments of products

Where the same conveyance or container is used for transporting different foods, or non-foods, effective cleaning and, where necessary, disinfection should take place between loads.



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Transportation

## Cleaning and Disinfection of Transport Containers and Conveyances

Where appropriate, particularly in bulk transport, containers and conveyances should be designated and marked for food use only and be used only for that purpose.

Where temperature controlled vehicles and containers are used these should be capable of maintaining temperature (chill units on vehicles and containers are not designed to reduce temperature). Because of this, it is also imperative to ensure that foods for refrigerated transport are already at an appropriate temperature prior to loading. Consider the use of temperature data loggers to verify conditions of transport.



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