

Chapter 7

Processing, Packaging, and Transporting Fresh Foods Safely

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Once food has been harvested and processed, it is usually packaged and moved to the location of sale or to the purchaser. Maintaining a safe food product means protecting it from contamination, assuring proper temperatures, and preventing damage. This chapter will help you identify the critical control points in transportation that are important to food safety. Planning ahead so that your product arrives in excellent condition establishes a good reputation and improves sales.

The following topics are covered:

- 1. Packaging and Labeling.** What information should be on your label? Could your customer identify the product if recalled? Are delivery records available to help tracing for recall? Does the packing material offer adequate protection against damage and contaminants?
- 2. Food Temperatures.** Do you know the proper temperatures to keep the food safe? How can the temperature be maintained? Do you keep records?
- 3. Means of Transportation.** Do you keep the vehicle clean? Does it also carry loads of possible contaminants? In what condition is the vehicle—is it reliable for timely delivery?

Why should you be concerned?

No one wants to be the cause of illness. Contaminants often have no odor or color and therefore are hard to detect. They can put your customer's health at risk. Bacteria and other microorganisms are present all around us, and controlling their growth means controlling temperature, contamination sources, and time for growth. Food safety risks decrease with the use of some simple, proven practices. Liability is certainly a concern, and using good food safety practices offers some protection.

How will this chapter help you protect your product quality?

This chapter is a guide to help you better understand and identify the conditions under which

foods can deteriorate and/or become unsafe during packaging and transportation. Easy-to-understand assessment tables help identify situations and practices that are safe as well as ones that should be addressed promptly. Additional information on how to safeguard particular foods may be obtained from your local county Extension office.

PART 1—Packaging and Labeling

Packaging includes both materials that protect food from physical damage and those which are a barrier against contamination. Labels are often required by law and if designed well, can also be a marketing tool

What information should be on your label?

Signs are a kind of label that describe fresh fruits and vegetables at an open-air market. They should do more than indicate price. Let your customer know a little about your growing practices and the unique qualities of the food. This is also an opportunity to remind people of good practices like thorough washing or proper refrigeration of your produce.

Labels on specific items sold within the state are governed by the state of Kansas. **The Kansas Department of Health and Environment (KDHE)** regulates processed or cooked foods such as dried food mixes, canned foods, and baked goods. Those engaging in this type of food processing should contact KDHE at (785) 296-5600 for necessary requirements and licensing.

The Kansas Department of Agriculture (KDAg) regulates labeling of meats, dairy products, and eggs. Contact KDAg at (785) 296-3511 for questions on meats, and (785) 296-3786 for questions on dairy products. Products that cross state lines come under the **U.S. Food and Drug Administration (FDA)**. Current labeling information can be obtained by contacting the K-State Value-Added Support Facilities at the Department of Animal Sciences and Industry, Call Hall, Kansas State University, (785) 532-1668.

Are you protecting your product from contamination and damage?

It is wise to prevent unnecessary contamination. If using an open truck bed to haul unprotected produce, line it and cover the food with clean washable covers. New, unused containers are the lowest risk; however, if containers are reusable, clean, sanitize, and air-dry them before use. Use new disposable paper or plastic liners in reused boxes. Softer fruits (tomatoes, peaches) benefit from packing materials that offer protection from bruising. Check with the local newspaper for newsprint roll ends—it's usually low cost or free, and is a good packing material. Under no conditions should buckets, bags, or other containers that have held hazardous chemicals be used for food contact. Any reused containers should be clean and free from debris.

Hands must be washed before packaging foods. To reduce the risk of food contamination, be sure to sanitize any surface or counter top used in packaging or sorting. (See Sanitizing Solutions for directions) If the solution will be used over a period of time, label the container and leave the wiping cloth

in the sanitizer. This solution loses strength and should be made fresh every hour. Avoid mixing sanitizer with more bleach; if it is too strong, a residual can be left on the dry surface. The stronger solutions are disinfectants and are used when contamination is known to have occurred.

What might determine the type of packaging?

Packaging should be appropriate to the product. If the food is high in moisture or will be exposed to wet conditions, a water resistant or waterproof wrapping is needed. Produce with soft, creviced surfaces, like raspberries, can be difficult for the consumer to wash clean; therefore such foods should be loosely covered to exclude dust and dirt during transportation.

When temperature requirements must be met, packages should withstand the necessary temperatures without deteriorating. Packing materials can provide insulation to help hold temperature. Fresh fruits and vegetables might need air circulation so that good quality can be maintained.

Consider the distance to be traveled and the protection provided to the product in deciding the type of packaging. Rigid, protective containers and cushioning become more important as the distance of transport increases.

Sanitizing Solutions

First, wash surface with hot soapy water and rinse.

For hard, nonporous surfaces:

1. Mix 1 tablespoon liquid laundry bleach with 1 gallon water.
2. Apply solution to hard surface or immerse for 60 seconds.
3. Allow to air dry, no rinsing. Do not rinse.

For porous surfaces, like wooden cutting boards:

1. Mix 3 tablespoons liquid laundry bleach with 1 gallon water.
2. Apply to surface or immerse.
3. Keep surface wet for 2 minutes.
4. Rinse with water and let dry. Do not dry off.

Disinfecting Solution (*use when contamination has occurred*)

1. First, remove loose dirt.
2. Mix 3/4 cup liquid laundry bleach with 1 gallon water.
3. Apply to surface, and keep surface wet for 2 minutes.
4. Rinse with water and let dry.

Where do you get your materials and how should they be stored?

New containers, plastic film, bags, etc. should be packaged and stored so that they remain clean. Refuse to accept packing materials with stains—you have no idea what kind of contamination may have occurred. Keep packaging from being contaminated in storage by keeping it elevated above the floor at least four inches and reclosing boxes or bags of opened materials. If chemicals are stored in the same area, keep them at the lowest level and separate from your food packaging. Control mice and insects as well. The reuse of egg cartons should be discussed with KDAg. See Chapter 2, Production of Eggs and Home-raised, Home Butchered Broilers and Turkeys for more details.

Does your label meet requirements?

A label must first be legible and fixed in place. Signs for fresh products displayed in bulk at open-air markets are a type of label. Labels are an advertising opportunity to at least inform your customer about the product and your business; they may also need to meet a legal requirement. Health codes will differ from one county and state to another; it is best to check with the local health department for their requirements. You may be

referred to the state agency. An important part of labeling is a code that allows for the food to be traced in case of an investigation. In addition, you should document your coded products and where they go. This information will be needed for your financial records, and also allows tracking and recalls should they be necessary.

The following are examples of items to include in your label:

- Name of product
- Business name and address, phone number, email, website
- Storage requirements (temperature requirements)
- Weight or volume, if appropriate
- Date of production or use by date
- Ingredients in descending order, if appropriate
- Production code for recall purposes
- Price

Assessment 1—Packaging and Labeling

Use the table below to rate your risks. For each question, indicate your risk level in the right-hand column. Although some choices may not correspond exactly to your situation, choose the response that best fits. Refer to Part 1 above if you need more information to complete the table. Transfer medium-high and high risks to the Action Checklist at the end of the chapter on Page 7-7.

	LOW	LOW-MEDIUM	MED-HIGH	HIGH	YOUR RISK
Packaging and food containers	All packaging is new, clean, and stored properly.	Reused containers are properly sanitized and all stored properly.	Reused containers are properly sanitized; storage is subject to contamination.	Reused containers not cleaned; storage subject to contamination.	<input type="radio"/> Low <input type="radio"/> Low-Med <input type="radio"/> Med-High <input type="radio"/> High
Labeling	All labels approved by appropriate agency; codes and records allow recall.	Although not required, labels include necessary information.	Labels not required & include only minimal information.	No labels used or illegible.	<input type="radio"/> Low <input type="radio"/> Low-Med <input type="radio"/> Med-High <input type="radio"/> High
Hand washing	Hands always washed before handling harvested foods.		Hands sometimes washed before handling foods.	Rarely or never wash hands before handling foods.	<input type="radio"/> Low <input type="radio"/> Med-High <input type="radio"/> High

Responding to risks

Your goal is to lower your risks. Turn to the Action Checklist on Page 7-7 to record the medium-high and high-risk practices you have identified. Use the recommendations in this section to help plan and schedule actions to reduce your risks.

PART 2—Safe Food Temperatures for Transportation

All foods are better protected if temperature is controlled. Canned goods and dry products such as herbs or grain meals and flours, retain quality better at moderate temperatures than at high temperatures. Raw fruits and vegetables that have not been cut up or otherwise altered do not require refrigeration and can be transported without special measures when outside temperatures are above freezing. Fresh produce quality is generally prolonged by cool conditions. All meat, dairy products, poultry and eggs must be kept cold at refrigeration temperatures (below 40°F) until received by the customer. Frozen foods must be held at no higher than 0°F. In general, foods that have been processed and contain moisture are considered potentially hazardous and are more at risk to contamination from bacteria or fungi.

Foods that are cooked or processed for sale fall under the regulations of KDHE, and involve obtaining a food service license. KDAg regulations allow the sale of some farm-grown products from the farmstead, but limit advertising and require the buyer to come to the farm for purchase. Be sure to contact those agencies with your questions.

How can microbes make food unsafe?

Pathogenic bacteria need several conditions in order to grow in foods: adequate pH, oxygen (or lack thereof) moisture, temperature, and time to reproduce. Pickling foods changes the pH to an unacceptable level for many bacteria. Replacing oxygen with a vacuum or another gas stops the growth of most types of bacteria; however, the bacteria that causes botulism grows in the absence of oxygen. One way we can stop bacterial growth is by removing moisture, such as when herbs are dried. Another way to control growth is with temperature. Most pathogens are killed or can't grow if the food is either quite hot (at least 140°F) or cold (below 40°F). The third growth control, time, relates to foods kept at temperatures between 40°F and 140°F. We can still control growth by limiting the time food is held in this temperature range to no more than two hours.

Another consideration is the number of microbes present. Most pathogens cause illness only after a minimum number of organisms have been produced. That number can range from one organism (like *Cryptosporidium*), to many thousands (like *Streptococci*). If the food has been contaminated with only a few organisms, it takes longer to reach the numbers necessary to cause illness. When many organisms are present, it takes less time to reach this dangerous number. Anything that decreases the amount of bacteria therefore increases the food's safety factor. Preventing contamination

by microbes makes food safer. Consider a cantaloupe melon; as long as the rind is undamaged, the interior is uncontaminated and the melon is not potentially hazardous. When the melon is cut open, it becomes potentially hazardous because the interior is exposed to bacterial contamination. Therefore, once cut open, the melon temperature must be kept below 40°F to control bacterial growth.

Highly processed foods are at a greater risk to become contaminated. In general, the more a food is handled and altered, the greater care must be observed to control contamination. Processing removes natural barriers to contamination, making these foods potentially hazardous. Therefore the natural competition that normally limits bacterial growth is altered. Heating (cooking) vegetables not only breaks down cell walls, but also kills microorganisms on the food. Should a disease-causing bacteria then contaminate the food, it can multiply unhindered by barriers or competition, and become dangerous more quickly. This is why keeping cooked foods safe, involves controlling both time and temperatures. Remember that cooking foods for sale requires a KDHE food service license.

FAT TOM TABLE

Factors necessary for bacterial growth
Control these, and you control bacteria

F ood	all organisms need a source of energy
T emperature	“Danger zone” for foods is 40°F–140°F
A cidit y	pathogens grow in pH ranging from 4.6 to 9.0; very acid (sour) foods discourage bacterial growth
T ime	bacteria can double in number every 15 to 20 minutes
O xygen	the presence or absence of oxygen limits most bacteria
M oisture	as water becomes unavailable, bacteria cease to grow

What potentially hazardous food temperatures are safe?

You may think you can judge temperature by feel or by seeing steam, but the only sure indicator is a thermometer inserted in the food. As mentioned before, foods that have been heat treated or physically altered, are potentially hazardous and must be kept hot (at least 140°F) or cold (below 40°F). It is a good idea to document food temperatures, with date and time on a log sheet. Record food temperatures before transporting and whenever more than one person is involved in handling temperature sensitive foods. There is no other way to know the food temperature history.

How can you maintain proper temperatures in potentially hazardous foods?

During transportation, it is necessary to have some means to maintain the appropriate temperature. Although insulated containers slow heat movement, remember that two-hour time limit for foods in the danger zone between 40°F and 140°F. Any time transportation takes more than two hours,

mechanical “hot carts” or refrigerators are best to safely transport food. If using mechanical refrigeration, be sure there is a thermometer in the unit so that you can monitor and record air temperature around the food, and know the unit is working. There are units that operate on current from the vehicle battery.

Sometimes crushed ice is used to maintain cold temperatures. In this case, the crushed ice should be in an insulated, lidded cooler, with a drain in the bottom for discharge of melt water. The food should be bagged or in a container to prevent direct contact with the ice. Health codes forbid the holding and display of ready to eat foods submerged in ice water. Temperature sensitive foods should be surrounded by ice. If the food is ready to eat and will not be cooked, it should be inside a covered container bedded in ice.



ASSESSMENT 2—Safe Food Temperatures for Transportation

Use the table below to rate your risks related to safe food temperatures during transportation. For each question, indicate your risk level in the right-hand column. Although some choices may not correspond exactly to your situation, choose the response that best fits. Refer to Part 2 above if you need more information.

	LOW POTENTIAL	LOW-MED POTENTIAL	MED-HIGH POTENTIAL	HIGH POTENTIAL	YOUR RISK
Thermometer use	Thermometers available and used daily as appropriate.	Thermometers available, used occasionally.		No thermometers in use.	<input type="radio"/> Low <input type="radio"/> Low-Med <input type="radio"/> High
Records of temperatures	Temperatures recorded and logs kept showing safe temperatures.	Temperatures occasionally recorded, logs show safe temperatures.		No records of temperatures— or—unsafe temperatures recorded.	<input type="radio"/> Low <input type="radio"/> Low-Med <input type="radio"/> High
Temperature maintenance of potentially hazardous foods	Powered hot carts or refrigeration used during transportation.	Transportation time less than 2 hrs. and rely on ice or insulation properly used.	Transportation time more than 2 hrs. and rely on ice or insulation properly used.	Transportation time more than 2 hrs. without ice or insulation.	<input type="radio"/> Low <input type="radio"/> Low-Med <input type="radio"/> Med-High <input type="radio"/> High
Cooked or heat processed foods	Have food service license from KDHE and meet requirements.		Have food service license from KDHE, but do not meet requirements.	No food service license from KDHE.	<input type="radio"/> Low <input type="radio"/> Med-High <input type="radio"/> High

Responding to risks

To protect your produce from possible contamination, you should minimize your risks by adopting actions and practices that result in lower risks. Turn to the Action Checklist on Page 7-7 to record the medium-high and high-risk practices you have identified. Use the recommendations in this section to help plan actions to reduce your risks.

PART 3—Means of Transportation

Whether using a family vehicle on an occasional basis or a business-owned vehicle on a routine route transporting the food, following a few simple guidelines will improve food safety. You should consider what other uses have been made of the vehicle. Is it clean? Is the vehicle suitable and reliable?

What non-food items have been in the vehicle?

The dedicated use of a vehicle for food transportation is the safest situation. There have been instances where a truck carried hazardous waste or live animals just prior to transporting a load of produce—resulting in food contamination. Anyone who has ever cleaned out a horse trailer understands that

it is impossible to completely remove the animal waste. Liquid chemical spills are another example of permanent contamination. Even spills of dry chemicals may leave residues. As a general rule, transport food products in a vehicle that has not been used to carry animals, chemicals, trash, or anything else that could contaminate the food.

Is the vehicle clean? Is it suitable?

Even a dedicated vehicle gets dirty. Food debris must be cleaned out before it deteriorates. Not only is cleaning easier if accomplished soon, but microbes and insects do not get a chance to breed there. Surfaces should be smooth, non-porous, and washable. Wooden flooring and sideboards are difficult to clean, making them unsuitable for direct contact with some food products. Rough wood surfaces should be lined or otherwise kept separated from the food, not only for cleanliness but also to keep splinters out of the food. Perishable foods should be transported in a reliable vehicle so that losses will not be suffered in the event of a break-down.

Assessment 3—Means of Transportation

Use the table below to rate your risks related to means of safe food transportation. For each question, indicate your risk level in the right-hand column. Although some choices may not correspond exactly to your situation, choose the response that best fits. Refer to Part 3 above if you need more information.

	LOW	LOW-MEDIUM	MED-HIGH	HIGH	YOUR RISK
Previous use of vehicle	Vehicle is dedicated to food transport.	Vehicle occasionally carries dry non-foods, but no potential contaminants.		Previous loads unknown—or—also carries contaminants.	<input type="radio"/> Low <input type="radio"/> Low-Med <input type="radio"/> High
Cleanliness and suitability of vehicle	Vehicle is swept and washed as necessary; construction is easily cleanable.	Vehicle appears clean even though construction is not smooth.	Some visible dirt and food debris, appears recent.	Much old food debris and dirt, insects observed.	<input type="radio"/> Low <input type="radio"/> Low-Med <input type="radio"/> Med-High <input type="radio"/> High

Responding to risks

Your goal is to lower your risks. Turn to the Action Checklist on Page 7-7 to record the medium-high and high-risk practices you have identified. Use the information above to help plan actions to reduce your risks.

ACTION CHECKLIST

When you finish the assessment tables, go back over the questions to ensure that every high and medium-high risk you identified is recorded in the checklist below. For each risk, write down the improvements you plan to make. Use recommendations from this chapter and from resources elsewhere. Pick a target date that will keep you on schedule for making the changes. You do not have to do everything at once, but try to eliminate the most serious risks as soon as you can. Often it helps to start with inexpensive actions.

Action Checklist

PACKAGING AND TRANSPORTATION FOR FRESH FOOD

<i>Write all high and medium-high waste-making potentials and risks below.</i>	<i>What can you do to cut waste or reduce the risk?</i>	<i>Set a target date for action.</i>
<i>Sample:</i> No thermometers available to check food temperatures.	Purchase food thermometers and begin recording temperature, date, and time.	Before next market day on April 8.

For More Information

K-State Research and Extension bulletins are listed below.

What's on a Food Label? L-883 (rev), 2000.

Thermometer Calibration Guide. MF2440, 2000.

E. coli O157-H7 and Foodborne Illness. MF2138, 1995.

Salmonella and Eggs. MF2139, 1995.

Microorganisms and Foodborne Illness. MF2269, 1997.

Web sites:

<http://www.oznet.ksu.edu/> Kansas State University Research and Extension; most publications are available through this site.

<http://www.foodsafety.ufl.edu/index.html> The National Food Safety Database

<http://www.kdhe.state.ks.us/bch/> The Kansas Department of Health and Environment, Bureau of Consumer Health

<http://www.ink.org/public/kda/> The Kansas Department of Agriculture; links to Meat & Poultry and to Dairy

*Kansas HomeFood*A*Syst Helps Ensure Your Safety*

This *Kansas Food*A*Syst* handbook covers a variety of topics to help you examine and address your most important food safety and environmental concerns. See the complete list of chapters in the table of contents at the beginning of this handbook. The end of each chapter lists resources and other useful information. For more information about topics covered in *Food*A*Syst*, or for information about laws and regulations specific to your area, contact your local environmental health or county K-State Research and Extension office.

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