

# Chapter 12:

## Equipment

### Learning Objectives

After completing this chapter, you will be able to:

- Identify ways to protect food from contamination through proper equipment use
- Link the importance of regular maintenance and repair of equipment to food safety
- Understand the importance of accurate thermometer use and calibration
- Understand the importance of maintaining an equipment repair and maintenance log
- Develop a food safety plan for your equipment including standard operating procedures and record templates



## Chapter 12: Equipment



### Inspection Reveals Broken Thermometer

*Each Tuesday Mike inspects all their market equipment and completes any necessary repairs. He tries to review their equipment repair and maintenance schedule regularly and implements any required actions.*

*Before loading the truck, Mike takes a few minutes to check the calibration of the metal stem thermometers he and his family use to record the temperature of their meat products for sale at the market. He discovers that one thermometer registers colder than the actual temperature. As the thermometer does not have a calibration nut, he throws it out and takes a replacement one from his inventory. He checks that it's calibrated accurately and records the thermometer temperatures in his records.*

*Mike gets the small freezer unit in the back of their pickup truck running before filling it up. When the freezer temperature reaches  $-18^{\circ}\text{C}$ , he fills it with his frozen meat products. An hour later he rechecks that the freezer temperature is still  $-18^{\circ}\text{C}$  and records that in the temperature log before transferring the freezer to battery power for the trip to the market. When Mike arrives at the market, he connects the freezer to generator power, rechecks the freezer temperature and notes it in the temperature log.*

*After setting up for the market, Mike washes the metal stemmed thermometers in hot soapy water and sanitizes them in a bleach solution. As he distributes the thermometers to each of his sales team, he reminds everyone to clean and sanitize them between each use.*



*Food can become contaminated from improperly handled or poorly maintained equipment.*

## Hazards

Equipment used at any farm direct marketing venue including Alberta Approved Farmers' Markets can be contaminated by:

- Chemical hazards from residues of lubricants, refrigerants or toxic chemicals if inappropriate metals such as cadmium or nickel are used to manufacture equipment
- Biological hazards from microbial contamination if equipment is not cleaned and sanitized properly between each use or is difficult to clean
- Physical hazards such as metal washers and nuts that may fall off equipment during cleaning or food preparation, pieces of metal from broken cutting blades or metal fragments from poorly maintained equipment

## Equipment Practices

Improperly handled or maintained equipment can contaminate your food products. You need to ensure that you and your staff have the necessary skills and training to operate and maintain the equipment. In addition, you need to implement an equipment repair and maintenance schedule and sanitation program to keep food safe.

The food safety issues linked to equipment that you need to consider are:

- Proper design and installation
- Appropriate maintenance and repair of market equipment, including tables, sampling utensils, display shelving, food storage containers, etc.
- Proper cleaning and sanitizing of equipment

## Equipment Design and Installation

Your equipment must be able to do the job and meet the necessary requirements. Using the wrong equipment, especially with potentially hazardous foods, may lead to time/temperature abuse and increase the risk of foodborne illness.

Equipment used to cook, heat, cool or freeze food must be designed to achieve the required temperatures as rapidly as possible and then maintain the desired temperatures. For example, cooking frozen meatballs in a crock pot at the market for sampling may result in contamination from pathogenic microorganisms. This is because the crock pot cannot adequately heat the product within the allowable timeframe. Crock pots may only be used to keep hot foods hot. Check with your regional health authority to make sure they are permitted in your market.

Choose equipment that is easy to clean and sanitize. Your equipment should also be easily accessible for maintenance and inspection. The design should prevent contamination by lubricants from motors, bearings, etc. All welded equipment **must** have smooth continuous joints.

Select equipment and utensils that are designed for food production and constructed of appropriate materials. Nickel and cadmium must not be used in food equipment since they are heavy metals that can leach into your food and cause foodborne illness.

Install your equipment in a manner that prevents contamination of food. Provide enough space around the equipment so that you have easy access for cleaning and maintenance. Ensure you have enough room so that adjacent floors, walls, ceilings and other surfaces can also be easily and effectively cleaned. Install your equipment at least 50 cm (20 in.) away from the wall and off the floor. For both sanitary and safety reasons, do not string electrical cords across the floor or work site.

*Equipment used to cook, heat, cool or freeze food must be designed to achieve the required temperatures as rapidly as possible and maintain them.*

*Equipment should be installed so that there is easy access for cleaning and maintenance of the equipment and the surrounding area.*



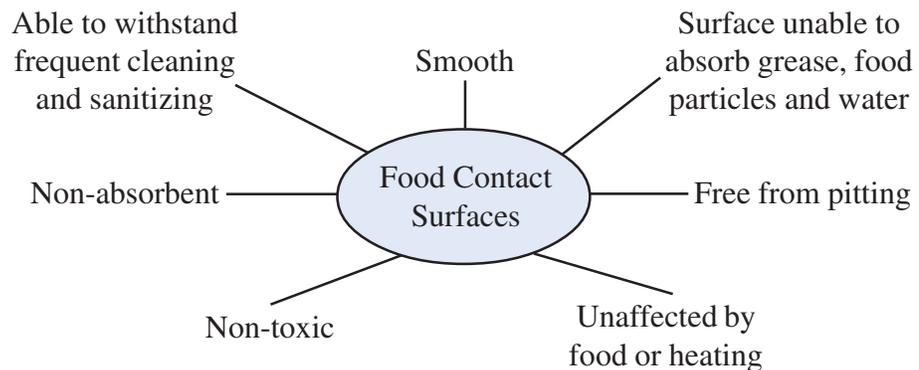
## Equipment Design Checklist

Check each piece of your equipment to determine if it meets the following conditions. Develop a plan to replace equipment that fails to meet the guidelines.

- Easy to clean and sanitize
- Constructed of approved materials
- Easily accessible for maintenance
- Meets requirements for cooking, heating, cooling or freezing food
- Installed to prevent potential contamination

### Food Contact Surface Considerations

Surfaces that contact food **must** meet the following conditions:



*Food contact surfaces must be smooth, non-absorbent, non-toxic and able to withstand frequent cleaning and sanitizing.*

Do not use copper, cast iron, lead glazed utensils, galvanized metal and preserved wood as the heavy metals or preservatives may move into the food. Wood is not generally acceptable as a food contact surface except for close-grained hardwoods in cutting boards, rolling pins or wooden paddles.

*Single service items should be used once and then discarded.*

Use single service items such as styrofoam containers, plastic utensils and portion cups once and properly dispose of them. When produced, styrofoam is considered clean and sanitary and safe to use. However, once used it cannot be properly cleaned and sanitized for re-use because the surface of styrofoam is not smooth and non-absorbent. This type of material definitely must not be reused.

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**Single service** – utensil designed to be used only once and then discarded.

Coating materials used on food contact surfaces must be non-toxic, resistant to chipping and cracking, and easy to clean. Approved food grade chemicals, lubricants, coatings and paints **must** be used on equipment in contact with food.



A complete list of approved materials can be found in *Reference Listing of Accepted Construction Materials, Packaging Materials and Non-Food Chemical Products* published on the CFIA website at [www.inspection.gc.ca/english/ppc/reference/cone.shtml](http://www.inspection.gc.ca/english/ppc/reference/cone.shtml)

### Preventive Maintenance

Maintain your equipment in good repair so that it functions as it should and prevents contamination of the food. Do not repair using string, wire, cardboard or other temporary materials. Replace damaged equipment and utensils. Keep metal surfaces free from rust, flaking paint or other loose surface coverings.

According to the Alberta Food Retail and Foodservices Code, all food contact surfaces *must* be maintained in a clean and sanitary manner. Your cutting boards and butcher blocks are subject to scratching and scoring. Resurface them when they no longer can be cleaned and sanitized effectively or discard if they cannot be resurfaced. Do not use wood or scored synthetic cutting boards with meat, fish, poultry or other potentially hazardous foods. You **must** clean and sanitize work surfaces, thermometers, utensils and equipment between each use.



The Alberta Food Retail and Foodservices Code can be found at [www.health.gov.ab.ca/professionals/](http://www.health.gov.ab.ca/professionals/) (Click on the first bullet, *Alberta Food and Foodservices Code*).

Splinters on tables, chipped cutting boards, cracked linings in insulated coolers, torn table cloths, loose nuts on equipment, etc. all increase the risk of contamination. It's very difficult to thoroughly clean and sanitize under tears, splinters, nuts and screws or in cracks, breaks and chips so these areas harbour disease causing microorganisms. Inspect your table, market supplies and equipment prior to the start of each market day. Repair or replace as required. Use only food grade materials in the repair and maintenance of all equipment and market supplies.

*All food contact surfaces and equipment must be maintained in a clean and sanitary manner.*

*Replace or resurface cutting boards and butcher blocks when they become scratched or scored and cannot be cleaned and sanitized effectively.*

Monitoring devices such as temperature gauges and scales should be calibrated according to the manufacturer's instructions. Scales used to weigh products sold by weight at the market *must* be calibrated and inspected.



For more information on scales and their inspection under the *Weights and Measures Act*, see Chapter 6: It's the Law.

Your equipment must be maintained in a clean and sanitary manner. Developing and following a written preventative maintenance program for your equipment will help ensure that this is an ongoing activity.

*Develop and implement a written preventative maintenance program.*

### Written Preventive Maintenance Program

A written program should include:

- List of all the equipment used
- Preventive maintenance schedule for each item
- Detailed maintenance activities for each item
- Person responsible for maintaining equipment
- Method of monitoring
- Verification activities
- Records to be kept
- Frequency and method of calibrating equipment

*Dirty or improperly cleaned equipment is one of the most common carriers of foodborne illness microorganisms.*

### Keep It Clean

Equipment (cutting boards, fry pans, meat slicers, insulated coolers, refrigeration units, etc.), materials (table top, table cloth, shelving, etc.), and utensils (knives, spatulas, serving dishes, etc.) that contact foods, especially potentially hazardous foods such as raw fish, meat, poultry and dairy, are considered to be contaminated by microorganisms. If the equipment then contacts another food product before it has been cleaned and sanitized, cross contamination may result. For this reason, you must thoroughly clean and sanitize all equipment including tables and freezers each day before market start up. In addition, clean utensils and equipment used during the market between each use.



For information on proper cleaning and sanitizing methods see Chapter 9: Sanitation.

## Preventing Cross Contamination Through Equipment

To prevent contamination of food, cover and keep garbage cans away from food preparation and storage areas. Equipment and utensils used to handle inedible material must not be used to handle food. Protect small equipment from contamination by keeping it inverted or covered in storage. Allow sufficient space to clean around and under equipment.

Locate equipment on your market table away from any source of contamination. Clean and sanitize food contact surfaces of equipment to be used throughout the market day. For example, a meat slicer or a butcher block table top used to prepare food samples should be cleaned and sanitized at the beginning of each market day and between each sample batch or a minimum of every four hours. Clean equipment surfaces that do not contact food often enough to prevent them from accumulating dust, food residues or other debris.

Equipment **must** be durable. It should be able to be disassembled for maintenance, cleaning and sanitizing. Disassembling the equipment regularly allows you to monitor and inspect for pests and other contaminants. Inspect all equipment for damage prior to each use. Repair equipment as recommended.

## Temperature Control Equipment

Microorganisms grow most rapidly between 4°C and 60°C, temperatures in the danger zone. Ensure that the equipment you use to heat or cool foods can do so quickly and maintain the required temperatures.

“Our walk-in freezer simplified the process of handling and storage as well as inventory control. We implement daily checks on our walk-in freezer to make sure the temperature and humidity are controlled at all times. Educating our customers about how we operate created great loyalty.” Greg Sawchuk, Muriel Creek Cattle Company

Freezers **must** be able to maintain a temperature of –18°C or less while refrigerators **must** operate between 0°C and 4°C. Overloading your appliances prevents adequate air circulation and causes temperatures to fluctuate. To ensure the unit is operating effectively, monitor the temperatures in several areas within each of your units to identify warm spots. Although the warmest area is usually near the door, you need to monitor the temperature throughout the entire unit.

Cooling and heating equipment such as freezers, refrigerator units, electric frying pans, griddles, toaster ovens, etc. **must** operate properly and be equipped with an accurate thermometer to ensure correct product temperature. Use and calibrate thermometers as recommended by the manufacturer. Use a hand held thermometer to verify that each small appliance you use achieves the temperature indicated. Keep calibration and temperature records for each piece of equipment.

### Using a Thermometer

Keeping food products, especially potentially hazardous products, at proper temperatures is crucial to preventing foodborne illness. You and your employees **must** closely monitor food temperatures and holding times. You cannot judge temperature by feel or sight!

Use a hand held, metal stemmed thermometer to monitor the temperature of food frequently throughout the market day. Do not use thermometers with a glass sensor or stem unless they are encased in a shatterproof sleeve that protects food from contamination should the thermometer break.

*Monitor operating temperatures of all equipment.*



Figure 12.1 **Types of Thermometers**

(1. Digital Instant-Read, 2. Thermocouple thermometer, 3. Dial Instant-Read bimetal coil thermometer)

To achieve an accurate reading, place the thermometer between two items in the freezer or refrigeration unit or lay it on top of products in a portable cooler. Avoid puncturing the food packaging or damaging the product with the thermometer. If the food item is not in a sealed container or wrapping, insert the stem of the thermometer into the thickest part of the food product to evaluate product temperature.

Clean and sanitize your thermometer before each use to prevent cross contamination. Verify the accuracy of the thermometer regularly. Calibrate the thermometer at least once every two weeks and whenever it has been dropped, bumped or jarred. Replace frequently if it cannot be calibrated.

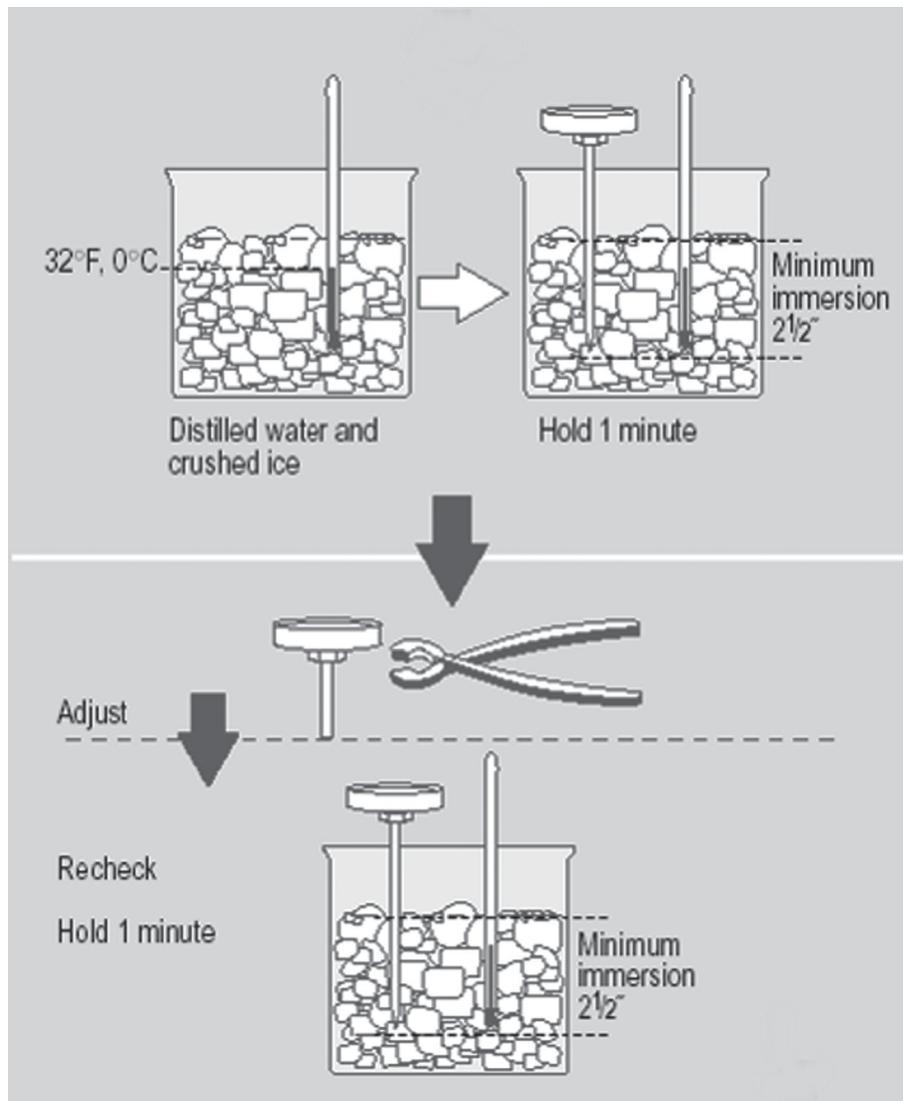
*Different types of thermometers can be used for monitoring temperatures of equipment or food.*

*A thermometer that can be calibrated should provide years of use and only be replaced when it can no longer be cleaned or calibrated.*

### Calibrating a Thermometer

Use this simple method to test the accuracy of a hand held thermometer.

- Step 1** Use a clean container that is as deep as the probe portion of the thermometer.
- Step 2** Pack the container with ice. Crushed or shaved ice is best as it minimizes the spaces between the ice chunks and provides more accurate results.
- Step 3** Fill the container with cold water to form a thick slurry. This mixture will maintain a temperature of 0°C as long as it is mostly ice with some water.
- Step 4** Insert the sensing tip of the thermometer to a depth of at least 6 cm (2.5 in.) into the ice/water mixture and allow the thermometer to rest for two to three minutes. Wait until the reading has stabilized (indicating arm should not be moving).
- Step 5** The temperature should read 0°C ( $\pm 0.5^\circ\text{C}$ ).
- Step 6** If the thermometer has a calibration nut near the dial, and the dial doesn't read 0°C, turn the nut until the needle is on 0. Less expensive thermometers do not have a calibration nut. If the dial reading is out by two degrees C or more, replace the thermometer.



Source: Kansas State University publication “Thermometer Calibration Guide”

Figure 12.2 **Thermometer Calibration Method for Cold Process**  
(for use on bimetal coil thermometers)



### Calibrating Thermometers

Now that you know how to calibrate a thermometer, this is a good time to check the accuracy of all your thermometers. Replace as required. Remember to record the readings and your activities in your logs.

## Keeping Records

Records enable you to monitor your activities. Your written records should include the following:

- Equipment inspection and maintenance records
- Equipment temperature records
- Thermometer calibration records; include corrective action steps if required
- Staff training



Examples of temperature logs can be found in Appendix F: Record Templates.

## Staff Training

Train your staff in the proper use of all equipment and the reasons why correct operation is important. They should know:

- What equipment to use for specific tasks
- How to operate the equipment correctly
- How to properly clean and sanitize equipment and utensils
- How to monitor temperatures to ensure that equipment is operating properly
- How and when to calibrate equipment
- How and when to perform required maintenance of equipment
- What to do in the case of equipment malfunction
- Record keeping requirements



## Food Safety Plan – Equipment

This section of your food safety plan should focus on how to properly use equipment and utensils, and what needs to be done to keep them in good condition and repair.

Your written program should include:

- Instructions on how to properly use the equipment and utensils
- How to inspect equipment to ensure that it is operating properly and temperature control is being maintained
- A list of all the equipment requiring regular maintenance, as well as when and what is to be done, why it must be done and by whom
- Instructions on how and when to inspect equipment for damage and buildup of food or other materials that could contaminate the food
- A list of equipment needing to be calibrated including when and how it is to be done and by whom
- What is to be done in the event that a problem occurs at any time with the equipment
- What information is to be recorded, when, where and by whom



Take the time to continue developing your food safety plan. Create a section in your binder for Equipment. Use the information in this chapter to build this component of your plan.

## Summary

Food may become contaminated or may not reach the market in a suitable condition unless effective control measures are taken when using equipment, utensils and materials. You can protect food from contamination by:

- Ensuring that equipment is designed and used for its intended purpose
- Ensuring all temperature control equipment operates properly and potentially hazardous foods in particular are not exposed to temperatures in the danger zone (between 4°C and 60°C)
- Calibrating and using accurate thermometers to monitor product temperatures
- Keeping equipment clean and in good repair

It is your responsibility as a farm direct marketer to ensure that food reaches the market safely and is not contaminated by improperly cleaned and sanitized equipment, inappropriately maintained equipment or uninformed staff.

### Market Manager Responsibilities

As an Alberta Approved Farmers' Market manager, you need to monitor market and vendor equipment at the market to ensure that food is handled safely.

- Are tables in good repair?
- Are tables cleaned and sanitized prior to market setup?
- Do vendors have a written maintenance program for their equipment?
- Does all equipment look clean and in good repair?
- Are equipment thermometers easy to read and accurate?
- Are vendors using thermometers to track correct product temperature?



## Food Safety Checklists

Use the Market Startup and Weekly Food Safety Checklists for Market Managers in Appendix M to help you monitor your market. Add any equipment issues that are missing for your market. Remember you and your vendors should be using the checklists every market day.

## What's Next

What role does the Happy Birthday song play in proper handwashing? Why should staff not eat, chew gum, smoke or spit at the market stall? Are gloves worn to protect hands from contamination? Should staff work the market when they have a cold or flu? Read Chapter 13: Personal Hygiene to discover the answers to these questions as well as how the personnel component of your food safety plan can protect your business.



## Resources

If you need more information or have food safety questions about this chapter contact:

Safe Food Systems  
Agri-Food Systems Branch, Food Safety Division  
Alberta Agriculture, Food & Rural Development  
Phone: (780) 427-4054. Dial 310-0000 first for toll free access.



## Chapter Review

Take a few minutes to review the chapter. Using the words below, fill in the appropriate blank.

Motors   Temperatures   Equipment   Dry   Clean   Pasteurized  
Use   Dirty   Activate   Calibrate   Durable   Tables   Applicators  
Oiled   Multiple   Single   Light Bulbs   Sanitary

1. To check the accuracy of an instrument is to \_\_\_\_\_.
2. \_\_\_\_\_ items must be discarded after use.
3. A farmers' market manager must ensure that \_\_\_\_\_ are in clean and in good repair. Vendors may use cloths to prevent contamination from those that are slightly damaged.
4. You will be certain that a refrigerator is functioning if the \_\_\_\_\_ are monitored.
5. All equipment must be maintained in a \_\_\_\_\_ and \_\_\_\_\_ manner.
6. \_\_\_\_\_ is one of the most common carriers of microorganisms.

## Answers to Chapter Review

- 1) Calibrate
- 2) Single use
- 3) Tables
- 4) Temperatures
- 5) Clean, sanitary
- 6) Dirty equipment

