



# Food Safety Recommendations for Food Preservation Exhibits

Food safety is very important for food preservation exhibits at county fairs and the Kansas State Fair. The following practices, products, methods, and materials are categorized as being either acceptable or non-acceptable for fair exhibition.

For any fair entry, **always** read the rules in the fair book for details on what and how food preservation exhibits should be entered. Paying attention to details can reduce many judging issues.

## Home Canning: Ensuring Safe Canned Foods

Growth of the bacterium *Clostridium botulinum* in canned food may cause botulism — a deadly form of foodborne illness. These bacteria exist either as spores or as vegetative cells. The spores, which are comparable to plant seeds, can survive harmlessly in soil and water for many years.

When ideal conditions for growth exist, the spores produce vegetative cells that multiply rapidly and can produce a deadly toxin within 3 to 4 days of growth in an environment that consists of:

- a moist, low-acid food
- a temperature between 40°F and 120°F
- less than 2 percent oxygen

Botulinum spores are on most fresh food surfaces. Because they grow only in the absence of air, they are harmless on fresh foods.

## Food Acidity and Processing Methods

Whether food should be processed in a pressure canner or boiling-water canner depends on the acidity of the food. A key factor is measuring the pH level to determine if the food is considered a high acid food or low acid food. The pH scale ranges from 0-14. The lower the pH value the higher the acid content. In canning, a pH of 4.6 is the threshold for defining high versus low acid food.

Acid foods have a natural pH of 4.6 or below. Most fruits are in this category. These foods can be processed in a boiling water canner or steam canner.

Acidified foods are low acid foods with an added acid ingredient, such as vinegar, to lower the pH to 4.6 or below. An example is pickled cucumbers. These foods can be processed in a boiling water canner or steam canner.

Low acid foods have a pH above 4.6. This includes plain vegetables and all types of meat. These foods must be processed in a pressure canner.

Many varieties of tomatoes have pH values slightly above 4.6. Therefore, tomatoes must be acidified to a pH of 4.6 or lower with lemon juice, vinegar, or citric acid. Properly acidified tomatoes are acid foods and can be safely processed in a boiling-water canner or pressure canner. For more information on canning tomatoes, see "Preserve it Fresh, Preserve it Safe: Tomatoes" at <https://www.bookstore.ksre.ksu.edu/pubs/MF1185.PDF>

## Process Adjustments at High Elevations

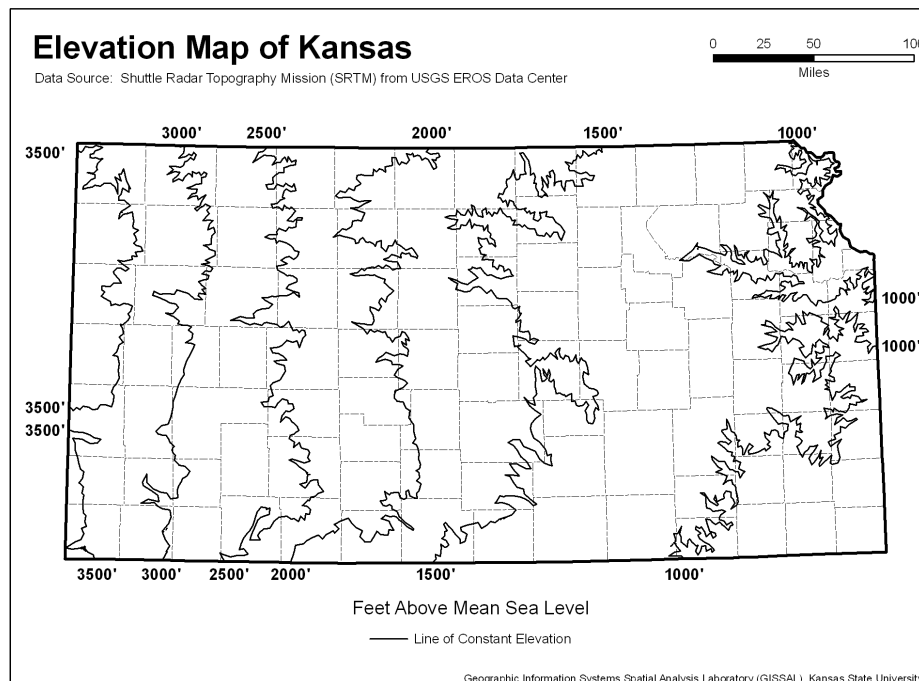
Reliable, tested recipes are written with processing instructions for sea level locations. Instructions to adjust for elevation are either within the recipe instructions or in the general information.

Using the process time for canning food at sea level may result in spoilage if you live at an elevation of 1,000 feet or more. Water boils at lower temperatures as elevation increases. Lower boiling temperatures are less effective for killing bacteria. An increase of the process time for water bath or steam canning or canner pressure for pressure canning compensates for lower boiling temperatures. If you do not know the elevation, contact your local extension office, refer to the map on page 2, or do an internet search for the elevation in your area.

## Acceptable Canning Methods

- Pressure canning is required for meat, poultry, seafood, and plain vegetables (low acid foods). See "How-to Guide to Pressure Canning" at <https://www.bookstore.ksre.ksu.edu/pubs/MF3242.pdf>.

- Boiling-water canner for acid foods, such as fruits, pickles, sauerkraut, jams, jellies, marmalades, fruit butter, and properly acidified tomatoes and figs (acidified to pH of 4.6 or lower with lemon juice, vinegar, or citric acid). Atmospheric steam canners can be used in place of a water bath canner for any acidic food with a total process time of 45 minutes or less. See "How-to Guide to Water Bath Canning and Steam Canning" at <https://www.bookstore.ksre.ksu.edu/pubs/MF3241.pdf>.



## Canning Equipment Recommended

- Mason-type, clear, threaded, home-canning jars.
- Use new, common brand, self-sealing lids (flat metal lid held in place by a metal screw band during processing); removal of screw bands is permitted before storage of canned goods. (For exhibit purposes, replace the screw band so the flat lid will remain sealed during transportation and judging.)
- Modern pressure canner with accurate dial gauge or weighted gauge. Pressure cookers not designed for pressure canning should not be used. If using an electric pressure canner, such as the Presto Precise® Digital Pressure Canner, indicate that appliance was used in the recipe.

## Electric Pressure Canners

Presto has developed an electric canner — the Presto Precise® Digital Pressure Canner. While traditional pressure canners sense and respond to pressure, the Presto Precise® Digital Pressure Canner senses and responds to temperature. This is the same technology used in commercial canning.

When used as a pressure canner at higher elevations, the Presto Precise® Digital Pressure Canner will automatically adjust to maintain process temperature. This appliance can also be used as a water bath canner. The time must be manually increased to adjust for elevation.

Always follow canner instructions when using the Presto Precise® Digital Pressure Canner. Use this appliance with tested recipes available from sources such

as the National Center for Home Food Preservation or your state Extension program. Indicate on the recipe that this appliance was used. Learn more at: [https://www.ncrfsma.org/files/page/files/fn2064\\_pressure\\_can\\_it\\_right\\_fillable\\_22.pdf](https://www.ncrfsma.org/files/page/files/fn2064_pressure_can_it_right_fillable_22.pdf)

## Acceptable Jar Seals

After cooling jars for 12 to 24 hours, remove screw bands and test seals with following options: Concave lid (curved down slightly in center); the lid should not spring up when pressed in the center; tapping the lid with a spoon will produce a ringing sound.

## Non-Acceptable Canning Methods

- Open kettle canning
- Electric multi-cooker appliances such as electric pressure cookers
- Microwave oven
- Conventional or convection ovens, gas or electric
- Slow cooker
- Crock pot
- Dishwasher
- Canning powder or aspirin
- The sun

## Canning Materials Not Recommended

- Mayonnaise-type (salad dressing) glass jars are not recommended for use with foods to be processed in a pressure canner because of excessive jar breakage. These jars should not be used for fair exhibits.

- Other commercial jars with mouths that cannot be sealed with two-piece canning lids are not recommended for canning any food at home.
- Jars with wire bails and glass caps.
- One-piece zinc porcelain-lined caps.

## Unacceptable Jar Seals

- If lid is flat or bulging, it may not be sealed.
- Unnatural odors, spurting liquids, rising air bubbles, unnatural color, cotton-like mold growth on top of food and underside of lid.
- Paraffin or wax seals for sweet spreads.

## Headspace Recommendations

In general, these are the headspace recommendations. Follow tested recipes and their recommendations.

- ¼ inch for jams and jellies
- ½ inch for most fruits, tomatoes, pickles
- 1 to 1¼ inch for most low-acid foods

## County Fair and State Fair Requirements for Canned Foods

**Canned foods.** All canned foods should be prepared and processed according to tested recipes from the *USDA Complete Guide to Home Canning* (2015), *So Easy to Preserve* (University of Georgia, 6th edition), K-State Research and Extension Food Preservation publications, other extension publications, or the *Ball Blue Book, 38th edition*. All entries must include a recipe and recipe source.

**Home-canned, low-acid foods.** Meats, corn, beans, peas, potatoes, carrots, etc., must be pressure canned properly for the elevation where the canning takes place. Label must include canning method, processing time, elevation, date processed, type of pressure canner (dial gauge or weighted gauge), and amount of pressure (psi) when pressure canning method is used.

**Home-canned acid or acidified foods.** Fruits, pickled products, tomatoes, jams, and jellies may be water-bath processed properly for the elevation where the canning takes place. Some fruits and tomato products have an option to be pressure canned.

Tomatoes must be acidified. To ensure a safe acid level in whole, crushed, or juiced tomatoes, add 2 tablespoons of bottled lemon juice or ½ teaspoon of citric acid per quart of tomatoes. For pints, use 1 tablespoon of bottled lemon juice or ¼ teaspoon of citric acid. Acid can be added directly to the jars before filling them with tomatoes. Add sugar to offset acid taste, if desired. Two tablespoons of a 5 percent acidity vinegar per pint

or four tablespoons of a 5 percent acidity vinegar per quart may be used instead of lemon juice or citric acid. However, vinegar may cause undesirable flavor changes.<sup>1</sup> Label must include canning method, processing time, elevation, date processed, and amount of pressure (psi) when pressure canning method is used.

<sup>1</sup> *So Easy to Preserve*, 6th edition. The University of Georgia Cooperative Extension.

## Herbs and Vegetables in Vinegar and Oil

Flavored vinegars are the easiest and safest to make. Because vinegar is high in acid, it does not support the growth of *Clostridium botulinum* bacteria. However, some vinegars may support the growth of *Escherichia coli* bacteria. Infused oils have the potential to support the growth of *C. botulinum* bacteria; therefore, these products may cause great harm if not made and stored properly. By following approved procedures, both types of products can be safely prepared and used.

The safety concern with flavored oils is simple: Infused oils and oil-based mixtures of garlic, herbs, or dried tomatoes can pose a health hazard if not kept refrigerated. Refrigeration is necessary because all other conditions that favor growth of *C. botulinum* are met: low acid environment with pH higher than 4.6, anaerobic conditions (oil), food and moisture source (garlic), not boiled before eating.

Home-prepared garlic-in-oil mixtures should not be stored at room temperature. Refrigerate leftovers for use within three weeks, freeze, or discard.

Less has been documented on the dangers of storing whole chiles, fleshy vegetables or herbs in oil, but they, too, are best made fresh and stored in the refrigerator for use within 10 days. Dried tomatoes-in-oil are less a safety concern than other mixtures in oil because the pH of tomatoes is generally 4.6 or lower, and the water activity is less than 0.85. However, to ensure safety, it is recommended that all tomato-in-oil and herb-in-oil products be stored at refrigerator temperatures.<sup>3</sup>

<sup>3</sup> <https://extension.oregonstate.edu/catalog/pub/sp-50-701-herbs-vegetables-oil>

## Home-Style Canned Quick Breads

Home-style canned quick breads have been featured in popular magazines, websites, specialty shops, or other outlets. They are typically manufactured by small “home-based” operations and the process consists of oven-baking a batter in a wide mouth glass jar. A canning lid and ring are then screwed onto the jar for storage at room temperature.

From a food safety standpoint, inadequate heat treatment of this type of product coupled with favor-

able storage conditions could lead to development of botulinum toxins.

In a Kansas State University study on the survival of inoculated *C. sporogenes* PA 3679, canned banana bread was baked at a temperature of 177°C (350°F). Even though this resulted in a highly desirable product appearance, it did not result in a safe product (totally free of inoculated *Clostridium* after storage) for human consumption, especially when baked products were stored under conditions (35°C or 95°F) which favor spore germination. When baked at higher temperatures to enhance food safety, it formed an excessive crust which made an undesirable consumer product.<sup>4</sup>

The standard procedure (which people would use at home) for home-canned quick bread recommends baking at 191°C (375°F) for 50 minutes. Even though this treatment resulted in non-detectable levels of sporeformers in uninoculated breads after 8 hours of storage at room temperature, the practice of making canned breads and cakes is not recommended. In addition, the glass used to make canning jars is not tempered for dry oven heat and may break in the oven.

<sup>4</sup> Aramouni, F.M.; K.K. Kone; J.A. Craig and D.Y.C. Fung. Growth of *Clostridium sporogenes* PA 3679 in Home-Style Canned Quick Breads. *Journal of Food Prot.* 57:882-886

## Pumpkin Butter

Home canning is NOT recommended for pumpkin butter or any mashed or pureed pumpkin or winter squash. The only directions for canning pumpkin and winter squash are for cubed flesh.

Source: <https://nchfp.uga.edu/blog/beware-pumpkin-butter>

## Gift Baskets

All items exhibited within the gift basket must conform to the rules and regulations of the foods division. The entry form must include the recipe, the intended use for human consumption, and food safety precautions taken during and after preparation. Entries

will count as non-perishable food products, not as an educational exhibit.

## Fancy Packs

Many fancy pack methods can create unsafe products and are often not allowed. Safe processing depends on following specified preparation instructions, including cutting foods as directed. Dense packing can prevent adequate heat penetration, reduce food temperature during hot packing, and compromise safety. Processing times also assume a specific initial food temperature. Therefore, fancy packs are generally impractical and not recommended unless explicitly stated in the recipe, such as vertically packing asparagus.

## Dried Meats

Illnesses due to *Salmonella* and *E. coli* O157:H7 from homemade jerky raise questions about the safety of traditional dehydrating methods for making beef and venison jerky. The current recommendation for making jerky safely is to heat meat to 160°F before or after the dehydrating process. This step assures that any bacteria present will be destroyed by wet heat. The optimum dehydrating temperature is 140°F to allow internal moisture to be removed and prevent case hardening. It is not recommended to make jerky from raw poultry.

Learn more from *Preserve it Fresh, Preserve it Safe: Dry Meat Safely at Home*, <https://www.bookstore.ksre.ksu.edu/pubs/MF3173.pdf>

## Freeze Dried Foods

At this time, there are no judging standards for evaluating freeze dried foods. Therefore, freeze dried foods are not allowed.

When using a freeze dryer, follow manufacturer's instructions for usage and processes for the best results. Learn more about freeze drying at <https://www.rrc.k-state.edu/preservation/drying.html>.

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