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# FOOD preservation



**NDSU**

EXTENSION

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# Freezing Foods

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Freezing is one of the easiest, quickest, most versatile and convenient methods of preserving foods for later use. Properly frozen foods maintain more of their original color, flavor and texture, and generally more of their nutrients than foods preserved by other methods.

## Objectives

This project will help you:

- Learn how to freeze foods properly to maintain top quality
- Learn how to prepare frozen foods for use
- Learn how to show others what you have learned

## Suggested Project Requirements

All 4-H'ers enrolled in this project should:

1. Label frozen products properly.
2. Prepare a freezer inventory and keep it updated.
3. Compare the cost of at least two home frozen products with the same foods that were frozen commercially.
4. Give a demonstration related to home freezing.
5. Freeze at least two types of foods. Examples are fruits and vegetables, baked products and meat or fruit and prepared foods.
6. Prepare at least two types of frozen foods for serving.
7. Determine specific requirements for your project. This could include meeting with a 4-H leader, parent, etc.
8. Keep a record of the work you have done.

## Required Experience

Boys and girls who enroll in this project should have had some experience with food preparation and have some basic skills for cleaning and preparing foods for use.



## Demonstration and Project Expo Ideas

- Show how to blanch vegetables using water or steam.
- Show different methods for wrapping meat.
- Show recommended packaging materials and explain how to select them.
- Show how to label frozen foods and how to keep a freezer inventory.
- Show how to prepare and package food for freezing. Example: Show methods of freezing fruit: sugar, syrup or other pack.

## Career Exploration

Have you ever thought about a career in:

- Bakery management?
- Meat packing?
- Grocery or restaurant management?
- Convenience food research or development?
- Horticultural research?

To learn more about a career related to food preservation, read a book, talk to local resource people in your community or search this topic on the web.

## Suggested Exhibits

- Two-way folder or display of a balanced meal, including foods you have frozen, plus a record of foods you have frozen to date
- Two-way folder or display of three project photographs and short story explaining what you did for the project, including the list of foods frozen
- Two-way folder or display discussing what you learned about a foods career and how it relates to frozen foods

## Important General Information

Frozen foods are kept safe to eat by cold temperatures. Cold temperatures simply stop the growth of organisms, which cause foods to spoil. Freezing also slows chemical changes that make food quality poorer. Organisms that cause spoilage become active again when the food is thawed. Thus, poorly handled thawed foods can produce illness. Freezing foods is an inexpensive means of preserving foods.

### Start With Good Food



Freezing does not improve food. The frozen food will be only as good as what you put into the freezer. Therefore, selecting top-quality foods for freezing and handling them with care are important.

## Preparation of Food for Freezing

Use the recommended procedures for freezing each food. For example: Some foods require a pretreatment while others do not. Some foods freeze better in a liquid than they do dry.

Place foods in the freezer as soon as you have them packaged and labeled. Do not overload the freezer with unfrozen foods.

## Storage

Store frozen foods at 0 degrees or lower. Rotate your frozen foods; that is, use older foods first. Do not store foods too long. Frozen foods will not become unsafe to eat, but with long storage, they can become less attractive and less tasty.

## Labels

Label each package with the name of the product, date, amount and any added ingredients. Use freezer tape, freezer marking pens or gummed labels made especially for freezer use. (*Example*)



## Inventory

Keep a list of all the foods in the freezer. Update the list each time food is placed into the freezer or removed. Tape the list on the freezer door with a pen and get everyone in your home who uses the freezer to put their mark on the inventory.

## Thawing and Preparing Foods

Most of the changes you see during thawing happen because of freezing and storage. When food is thawed, the ice crystals melt and the liquid is absorbed back into the food or leaks out of the food. Slow thawing is better than rapid thawing because more liquid stays in the food.

Thawing food in the refrigerator is the safest method. When food that needs refrigeration stands at room temperature to thaw, food spoilage is possible.

Frozen foods may be prepared for use in many different ways. Use care not to overcook them.

## Further Information

For more detailed information and instructions on freezing individual foods, see NDSU Extension publication FN403 ("Food Freezing Guide") and the NDSU Extension website: [www.ag.ndsu.edu/food](http://www.ag.ndsu.edu/food)

# Canning and Food Preservation

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Learning to preserve foods in your home can provide you with a skill you may use for a lifetime. Keeping up to date and using only current, recommended methods and processing times is important.

## Objectives

This project will help you:

- Learn how to can foods properly and safely for later use
- Learn how to show and tell others about home canning

## Suggested Project Requirements (Minimum)

All 4-H members enrolled in the project need to:

1. Label canned products correctly.
2. Evaluate your finished products.
3. Compare the cost of one home canned product with a commercially prepared one of the same kind. (About 2¼ cups of sugar are in 1 pound.)
4. Give a demonstration related to canning.
5. Keep a record of canning done.

## Beginners

1. Can at least 10 jars of jams, jellies or preserves. This needs to be two different types.
2. Prepare at least one jar of food for a gift. For example, use an attractive label, a ribbon, a cloth lid cover, etc.

## Intermediate

1. Can at least six jars of pickles or relishes.
2. Can at least three kinds of fruit and/or tomatoes.

## Advanced

1. Can at least three kinds of low-acid foods. This includes red meat, seafood, poultry and all fresh vegetables, except tomatoes. Most mixtures containing low acid and acidic foods are low acid unless enough lemon juice, citric acid or vinegar is added to make them an acidic food.

## Required Experience

Any youth may enroll in the project. Members who enroll should have had some experience in food preparation and know some basic skills about cleaning, preparing and using fresh fruits and vegetables.

## Demonstration and Project Expo Ideas

- Show how to use a pressure canner.
- Explain and show how to select fruits and vegetables at top quality.
- Show steps in preparing one home canned product.
- Show how to test a seal, prepare a home-canned product for storage and explain storage conditions.
- Show results on one of the experiments.



## Suggested Exhibits

A properly labeled jar of your canned food

## Important General Information

Home canning of foods can be fun and provide satisfaction, a savings, an improved diet and variety in menus. All facts need to be considered when figuring the economic

savings incurred through home preservation of foods.

**Heat** is a necessary part of home canning. Organisms that cause food spoilage (yeast, bacteria and molds) are destroyed by heat.

Enzymes are present in food and heat stops the enzyme action, thus preventing changes from occurring in the canned product.

When food is heated in a jar, the air is forced out of the jar. With a proper seal, air is kept out and the food is preserved for later use.



this affects pressures and boiling points in home canning. Therefore, know the altitude where you live and make necessary adjustments. These adjustments are given in NDSU Extension publications.

## Processing

- Follow directions in current Extension publications or other recommended sources for processing method, time and pressure.

## Materials to Help You Learn

[www.ag.ndsu.edu/food](http://www.ag.ndsu.edu/food)

## Select and Prepare Equipment

- The **boiling water-bath canner** is used for fruits, jellies, jams, preserves, pickles, relishes and usually tomatoes.
- A **pressure canner** is used for all low-acid foods such as vegetables, meats and many mixtures of foods. **A pressure canner is the only way to reach temperatures above the boiling point.** Dial gauges on pressure canners need to be checked at least annually to assure accuracy. Most acid food may be processed in a pressure canner, if you wish.
- **Open-kettle (canning without cooking in the closed jar) is not recommended for any food.**
- Use only **jars and lids** made for home canning.

## Start With Good Food

- Canning does not improve food. Use fruits that are fresh, firm and ripe. Vegetables should be fresh, young and tender.

## Adjust for Altitude

- The altitude in North Dakota varies from 800 feet above sea level in the east to 3,000 feet in the west. As altitudes increase, air becomes thinner and

## Publications

FN155	Wild Side of the Menu – No. 3 Preserving Game and Fish at Home
FN172	Jellies, Jams, Spreads
FN173	Home Canning Low-Acid Vegetables
FN174	Home Canning of Fruits and Fruit Products
FN175	Canning and Freezing Tomatoes and Making Salsa
FN176	The Art and Practice of Sausage Making
FN182	Freezing Fruits
FN187	Freezing Vegetables
FN188	Canning Meats
HE189	Making Pickled Products
FN403	Food Freezing Guide
FN433	Sauerkraut: From Garden to Table
FN434	Let's Preserve Fruit Pie Filling
FN580	Jerky Making: Then and Now
FN584	From the Garden to the Table: Salsa!
FN590	Jams and Jellies From North Dakota Fruits
FN613-616	Food Freezing Basics
FN1396	Why Add Lemon Juice to Tomatoes and Salsa Before Canning
FN1415	Questions and Answers About Using a Pressure Canner
FN1423	Jams and Jellies From Native (Wild) Fruits
FN1425	Q&A about Using a Water-bath Canner
FN1427	Food Preservation: Facts or Myths
FN1492	Let's Preserve Salsa
FN1584	Let's Preserve Salsa II
FN1586	Making Fruit Leathers
FN1587	Drying Fruits
FN1588	Drying Vegetables

## DVDs/Trunks

- So Easy to Preserve: Canning Fruits & Tomatoes, Canning Vegetables, Drying, Preserving Foods, Freezing Foods, Jams & Jellies, and Pickling
- How To Dry Foods Easily
- It's Good Business: Processing Salsa Safely *(also available in Spanish)*
- Processing Salsa Safely at Home
- Food Preservation Trunks (canning and dehydration)



## Experiments

1. Jars need to be in excellent condition. Prepare two jars of food – one in a perfect canning jar and one with nicks on the sealing rim. Process both correctly. After the jars cool, check seals and compare liquid level in the two jars. Plan to serve the food in the nicked jar immediately.
2. Show the importance of sterilization by placing a piece of moist bread in a sterile jar, sealing and processing in a hot-water bath for 15 minutes. In a second jar that has been washed and air-dried, place a second piece of bread and screw the lid down firmly. Observe the two jars daily for several weeks. Note the changes that occur in the appearance of the bread.

## Labels for Fruits, Vegetables, Pickles, Relishes, Jams and Preserves

By using labels giving detailed information, one can judge more accurately the best methods to use in canning and the best varieties of fruits and vegetables to can.

At least some containers, including those exhibited from each lot canned, need to be labeled with the suggested label shown.

Include the variety when known. Fruit and vegetables exhibited must have a label containing all of this information. Make your own label following this form or a copy.

## Fruits, vegetables, pickles, relishes, jams and preserves

Name of Product:  
Date Canned:  
Type of Pack:  
Method of Processing:  
Time of Processing:  
Pounds of Pressure:  
Altitude:  
Name:

## Jellies and jams

Name of Product:  
Date:  
Method of Processing:  
Time of Processing:  
Altitude:  
Name:

## To Make the Best Better in Your Home-canned Foods

To keep improving your methods in home preservation of fruits and vegetables, you need to evaluate every jar of food you can at home.

# Common Defects and Probable Causes in Food Products

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## Canned Foods

Common Defects	Probable Causes
Loss of liquid during processing	Jars packed too full; pressure fluctuated in pressure canner; pressure lowered too fast.
Sediment on bottom of jar (vegetables)	Minerals in hard water; starch from overripe vegetables; bacterial spoilage (liquid murky, food soft) — don't use.
Jar fails to seal	Many reasons, including failure to follow instructions, piece of food or grease left on jar rim or forced between jar and lid during processing. Ring too tight.

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## Pickles and Relishes

Common Defects	Probable Causes
Hollow pickles	Faulty growth of cucumbers, cucumbers standing too long before processing, improper curing.
Soft or slippery pickles	Brine or vinegar used too weak.
Shriveled	Too much salt, sugar or vinegar added at one time; too much time between gathering and pickling.
Dark	Minerals in water; ground spices; iron or copper utensils used.

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## Jellied Fruit Products

Common Defects	Probable Causes
Soft or syrupy jelly	Too little pectin, acid or sugar; too much made at one time.
Tough or stiff jelly	Too little sugar; overcooking; too much pectin in fruit.
Cloudy jelly	Fruit too green; fruit cooked too long before straining; juice not properly strained; jelly poured into jars too slowly; jelly mixture stood too long before poured.
Crystals in jelly	Too much sugar; mixture cooked too little, too slowly or too long.
Bubbles	If bubbles stand still, utensils from which jelly was poured not held close to tops of jars; jelly poured too slowly. If bubbles move, jelly is spoiling — do not use.
Fruit floats in jar	Fruit not fully ripe, not thoroughly crushed or ground, undercooked, not properly packed in jars.
Faded; dark at top of container	Too warm storage place; stored too long; faulty seal.

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## “Don’ts” to Remember

1. **Don’t take shortcuts or experiment in home canning.** Use only tested, currently approved methods.
2. **Don’t reuse sealing lids unless their instructions recommend use.** A tight seal is necessary for a safe canned product.
3. **Don’t use any canned products showing any sign of spoilage.** Check jars for a good seal, a normal appearance and normal odor when opening them.

## Evaluate Your Canned Foods Exhibit

The canned products you exhibit at your county fair and achievement days, or at the State Fair, need to meet certain qualifications.

1. Exhibits must qualify according to requirements of event such as number and size of containers, kind and variety of product.
2. Containers for all canned exhibits must be standard clear glass jars made for home canning. Jars and covers must be free of all defects. All jars should be sparkling clean. Canned foods must have been prepared within a one-year period to judging date and must be properly vacuum sealed. (Vinegar or window cleaner can be used to clean the outside of jars for exhibits.) Remove all rings and clean underneath rings. Replace rings for travel purposes.
3. Labels need to be complete, informative and securely attached to jars.

4. All canned foods must be processed in a boiling water-bath or pressure canner. Boiling water-bath processing is acceptable for fruits, tomatoes, jams, jellies, preserves, marmalades, pickles and relishes. Processing time must not be less than recommended currently in U.S. Department of Agriculture (USDA) guidelines.

Pressure canner method must be used instead of the boiling water-bath method for low-acid vegetables. Tomatoes and fruits may be pressure canned if desired. Time and processing by pressure canner and number of pounds of pressure must not be less than currently recommended according to USDA guidelines.

## Standards to Consider When Judging Home-canned Foods

### APPEARANCE

#### • Color

- **Fruits** need to have uniform and natural color for the cooked fruit at prime stage of maturity. They must be free from bruises or brown spots and free from artificial coloring.
- **Vegetables** need to have uniform and natural color for the vegetable used. Color should be close to the color of the freshly cooked vegetable and free from artificial coloring, scorch or burn marks.
- **Sweet spreads** (jams, preserves and marmalades) need to be bright, characteristic of the fruit and free from discoloration due to overcooking or excess of spices.



- **Jellies** need to have characteristics of the fruit, bright color and (with some kinds of fruit) be translucent.
  - **Pickles and relishes** need to have characteristics of the product. They should be bright, clear, have natural color and be free from spots or blemishes.
  - **Meats** need to look cooked and be a uniform color.
- **Liquid**
    - **Fruits.** Liquid should be free from sediment and cloudiness. Syrup needs to be of the consistency required to sweeten the fruit but should not be thick. Liquid needs to cover the fruit.
    - **Vegetables.** Liquid needs to be clear and free from cloudiness, sediment and seeds. An exception may be whole tomatoes. Greens and starchy vegetables such as corn, shelled beans and peas need to have enough liquid to make a loose pack of the product. In all packs, liquid needs to cover the food.
- **Pickles and relishes.** Liquid needs to be free from sediment and cloudiness and have sufficient liquid to cover the product and prevent discoloration.
  - **Canned meat.** Liquid needs to be clear. If tomato liquid is used, it should have very little sediment.
- **Pack**
    - **Fruit** needs to have a firm, sold pack showing good use of jar space, yet be loose enough to permit circulation of liquid throughout the pack. Fruit should be evenly distributed. Fruit plus liquid should be filled to ½ inch from top of jar. Whole fruit or pieces of fruit need to show uniformity of size and shape. Fruits should not show air bubbles or foam.
    - **Vegetables** need to show good use of jar space with all spaces filled but not crowded and a firm but not tight pack. Pieces need to be reasonably uniform in shape and size. Vegetables should be packed to 1 inch from top of jars and liquid should cover product.

- **Pickles and relishes** need to show economy of space. Shape and size of products need to be uniform and practical. Pickles and relishes, plus liquid, should be filled to ½ inch from the top of jar.
- **Sweet spreads** need to show good balance of pieces in gel. Spread should be free of foam, air bubbles, suds or skin. Should be filled to ¼ inch from top.

- **Consistency**

- **Jams** need to show spreading consistency, with fruit well distributed in jellied juice.
- **Jellies** should hold shape when turned out on a plate but quiver when moved; should be tender, cutting easily with a spoon, and holding sharp edges. Jellies should be free from crystals.
- **Preserves** should be whole, small fruits or uniform pieces of larger fruits, clean and tender, yet retaining shape and surrounded by thick syrup or jellied juice.
- **Marmalade** should be shredded pulp and skin distributed in a jellied mass. Citrus marmalades should be a jellied mass and fruit should be clear.

## CONTAINERS

- **Jars and Lids**

- Jars should be clean, and need to be suitable in size and shape for product. Jars must be standard ones made for home canning. Jar and lid should be free from cracks, rust or other damage. Jars must be labeled properly with complete information if exhibited.

## QUALITY of CONTENTS

- **Texture**

- **Fruit** needs to be firm but tender and uniform in ripeness. Underripe fruit looks hard. Overripe fruit will be unduly soft or mushy.
- **Vegetables** need to be tender, firm enough to hold shape, not over mature or undermature and free from spots or blemishes.
- **Pickles and relishes** should be tender, firm, crisp and must not be overmature.

- **Flavor**

- **Fruit** flavor should be as close as possible to the flavor of cooked fruit. If judging unopened jars, flavor is indicated by proper ripeness, good color, proper texture (not over- or underprocessed), and consistency of syrup.
- **Vegetable** flavor should be as close as possible to the flavor of the freshly cooked vegetable. If the jars are not opened for judging, the flavor is indicated by the maturity, color and amount of cooking (not over- or underprocessed). Overprocessing may be indicated by a soft or mushy texture and some darkening of color. Under processing may be indicated by vegetables that look too firm and fresh (not completely cooked).
- **Sweet spreads** (jams, jellies, preserves and marmalades) should have characteristic flavors of fruit, and be free from excessive sweetness, bitterness or over-cooked flavor.
- **Pickles and relishes** should be a pleasing blend of flavors characteristic of particular relishes or pickles being judged.



Publications to help with  
canning procedures are available at:

[www.ag.ndsu.edu/food](http://www.ag.ndsu.edu/food)

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