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4-H 264 Foods for the Future 3

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WELCOME

Foods for the Future was written by Eloise Christianson, M.S. and Laurel Branen, M.S., R.D. under contract with the University of Nebraska.

What You Will Learn

☐ New words
☐ All about botulism
☐ How to process using a pressure canner
☐ About canning vegetables
☐ About canning meats and poultry

What You Will Do

☐ Can several vegetables using the pressure canner
☐ Can several meats using the pressure canner
☐ Evaluate your products
☐ Answer Quiz Time questions
DEFINITIONS

HISTORICAL FOOTNOTES — Interesting historical facts about food preservation and those foods that we like to preserve.

YOU’RE THE CONSUMER — Important information you need to make wise consumer decisions.

KITCHEN SAFETY — Hints on how to work in the kitchen safely.

FOOD SAFETY — Hints on how to work with food to keep it safe to eat.

WORDS TO KNOW — New words and their meanings to be used in a chapter.

I DON'T GET IT? — A question/answer format for questions you may have.

EXPERIMENTS — Activities that help you understand what happens to food under varying conditions.

KNOW-HOWS — Mini-projects that you need to know how to do before you can complete the major project.

HOW-TOS — Major project that tells you how to preserve your food.

A RAINBOW OF SERVING IDEAS — Suggestions on how you can use your preserved food.

QUIZ TIME — A fun time to answer some questions on what you have learned.
In Foods For The Future 2 you learned the importance of acid content in processing your food. Foods below pH 4.5 can be processed using the boiling-water bath method. This includes fruits, tomatoes and pickled vegetables. In this unit you will use the pressure canner to can "low acid" foods or foods above pH 4.5. Low acid foods are vegetables and meats.

Very high temperatures can be reached in a pressure canner. The high temperature is needed to kill the specific bacteria *Clostridium botulinum*. The illness caused by this bacteria is called botulism poisoning. Many people have died from botulism. For this reason it is important that you learn to can vegetables and meats properly using the pressure canner.

This is your planning chapter. In it you will do four things:

1. Learn new words about pressure canning.
2. Learn more about botulism.
3. Look at a pressure canner and learn its parts.
4. Plan out how many and which vegetables you will can.

**WORDS TO KNOW**

**Botulism** - Deadly illness caused by a toxin (or poison) produced by *Clostridium botulinum* in sealed containers. Correct processing techniques eliminate this danger in low acid foods.

**Pressure Canning** - Processing or cooking food at a temperature higher than boiling water in a special canner which can be sealed to hold steam pressure. A higher pressure is reached when water in the closed canner changes to steam and takes up more space. As the pressure increases, the temperature within the canner also increases. This higher temperature kills bacteria which boiling temperatures won't kill in the same length of time. Low acid foods must be processed under pressure. (DO NOT confuse a pressure canner with a steam canner.)

**Low Acid Foods** - Those foods with little natural acid. Meats and vegetables (except tomatoes) are low acid foods.

**Gauge** - Part of the pressure canner which shows pressure and temperature inside the canner.

**Gasket** - Rubber seal that goes around the edge of the inside of the lid of the pressure canner.

**Petcock** - A valve for letting air out of the pressure canner.

**Heat Penetration** - Rate at which the heat goes through the total quantity of food in a jar.
Botulism

How many times have you heard someone say, "I’ve canned this way my whole life and I’ve never had anything go bad. I don’t need to update my information!" Unfortunately, some people do think just this way. Read the following paragraphs on the occurrence of foodborne botulism and you will understand why it is important to can foods safely.

Botulism was first recognized in the U.S. in 1899. In the 79 years from 1899 to 1978, there were 778 reported outbreaks of botulism in this country. Two thousand nineteen individuals were involved, of which 1,002 died! The death rate has declined significantly in recent years. This is due mainly to improved detection methods, more readily available antitoxin and especially to the pressure canner.

One of the famous outbreaks of botulism in the U.S. killed an entire family of 12. The outbreak involved home-canned string beans. It occurred in Albany, Oregon in 1924.

Since 1899 there have been 10 outbreaks, 28 cases and 21 deaths in Nebraska. The latest outbreak occurred in 1979!

Preventative Measures

Since the major cause of botulism outbreaks is improperly processed home-canned foods, here are some simple preventive measures you can use:

- Follow proper techniques when canning food in the home. Follow the specific instructions that come with your canner.
- Do not use dangerous canning methods for low acid vegetables and meats—only can these foods using the pressure canner. Dangerous methods for these foods include the boiling-water bath method, steam canning, oven canning, and dishwasher canning.
- Use up-to-date home canning recipes. The best sources of up-to-date information are recently published booklets by the Cooperative Extension Service, the USDA, major manufacturers of home canning equipment, and reputable test kitchens. Avoid following the home canning advice of celebrities, old cookbooks, "back-to-nature" publications and any out-of-date home canning leaflets. Some potentially dangerous instructions can be found in old official publications. So be up to date and keep yourself safe!
- Inactivate the toxin. You cannot see, smell or taste the toxin or poison produced by C. botulinum. But it is easily destroyed by heat. To do this:
  — Bring food to a boiling temperature and hold that temperature for 10 minutes.
  — A good rule to follow is: **Always boil home-canned vegetables and meats 10 minutes before tasting them.**

Food canned in the home under proper conditions for the type of food involved is safe to eat. Problems only develop when improper canning techniques are used. For more information on botulism see NebGuide G83-640. (Available at your local Extension office.)
Using a Pressure Canner

There are two different types of pressure canners available. One has a weighted gauge which automatically limits the pressure to a preset level; the other type has a petcock and dial gauge which registers the amount of pressure inside the canner. Have one or more pressure canners available to look at as you review this section. Point out the different parts as you read about them.

Follow the manufacturer’s directions exactly for your pressure canner. To get a general idea of what you will be doing, some general points on pressure canners have been included that are the same for all canners.

- Many manufacturers strongly suggest that a pressure canner equipped with a pressure gauge be checked at least once or twice a year to make sure it is accurate. An accurate pressure gauge is necessary to get correct processing temperatures which are needed to prevent spoilage of foods.

To check the accuracy of a gauge, look at the pointer. If the pointer is loose and moves back and forth when the cover is tipped, it should be replaced. If the pointer falls away from the stop pin two or more pounds, or if it does not return to one pound of the stop pin, it should be replaced. Check your gauge now.

For your own safety, test or replace gauges on old canners that have not been used for some time and on canners purchased at garage or farm sales. To have your pressure gauge checked, call your Extension agent for detailed information.

Follow these steps for successful pressure canning:

1. Put 2 to 3 inches of hot water in the canner. Place fitted jars on the rack, using a jar lifter. Fasten canner lid securely. See Figures 1, 2, 3.

2. Leave weight off vent port or open petcock. Heat at the highest setting until steam flows from the petcock or vent port.

3. Maintain high heat setting, exhaust steam 10 minutes, and then place weight on vent port or close petcock. The canner will pressurize during the next 3 to 5 minutes. See Figure 4.

4. Start timing the process when the pressure reading on the dial gauge indicates that the recommended pressure has been reached, or when the weighted gauge begins to jiggle or rock. See Figures 5, 6, and 7.

5. Regulate heat under the canner to maintain a steady pressure at or slightly above the correct gauge pressure. Quick and large pressure variations during processing may cause unnecessary liquid losses from jars. Weighted gauges on Mirro canners should
jiggle about 2 or 3 times per minute. On Presto canners, they should rock slowly throughout the process. See Figure 7.

6. When the timed process is completed, turn off the heat, remove the canner from heat if possible, and let the canner depressurize. Do not force-cool the canner. If you cool it with cold running water in a sink, or open the vent port before the canner depressurizes by itself, liquid will spurt from jars, causing low liquid levels and jar seal failures. Force-cooling may also warp the canner lid of older model canners, causing steam leaks. Depressurization of older models should be timed. Standard size heavy-walled canners require about 30 minutes when loaded with pints and 45 minutes with quarts. Newer thin-walled canners cool more rapidly and are equipped with vent locks. These canners are depressurized when their vent lock piston drops to a normal position. See Figures 8 and 9.

7. After the vent port or petcock has been open for 2 minutes, unfasten the lid and remove it carefully. Lift the lid away from you so that the steam does not burn your face.

8. Remove jars with a lifter, and place on towel or cooling rack, if desired.

**Cooling Jars**

When you remove hot jars from a canner, do not retighten their jar lids. Retightening of hot lids may cut through the gasket and cause seal failures. Cool the jars at room temperature for 12 to 24 hours. Jars may be cooled on racks or towels to minimize heat damage to counters. The food level and liquid volume of raw-packed jars will be noticeably lower after cooling. Air is exhausted during processing and food shrinks. If a jar loses excessive liquid during processing, do not open it to add more liquid. Check for sealed lids as described below.

**Testing Jar Seals**

After cooling jars for 12 to 24 hours, remove the screw bands and test seals with one of the following options:

**Option 1.** Press the middle of the lid with a finger or thumb. If the lid springs up when you release your finger, the lid is unsealed.

**Option 2.** Tap the lid with the bottom of a teaspoon. If it makes a dull sound, the lid is unsealed. If food is in contact with the underside of the lid, it will also cause a dull sound. If the jar lid is sealed correctly, it will make a ringing, high-pitched sound.
YOU'RE THE CONSUMER: On Canning Vegetables

Before you decide which vegetables you can, there are several things you need to consider. One of the first things you need to ask yourself is if the vegetable is practical to can. For example: carrots and potatoes, these two vegetables are both readily available year around. They are also inexpensive, and can be stored for relatively long periods of time. Therefore, these vegetables may not be practical to can.

You may want to can for convenience. Potatoes and carrots take some time to cook when raw. If you frequently prepare stew, soups and casseroles using these vegetables, and you don't have much preparation time, then canning these vegetables may be practical for you.

Cost and time are other considerations. Are you purchasing your vegetables or are they home-grown? Do you have the time to can your vegetables while they are fresh? Does it cost you more to home-can your vegetables than to buy canned vegetables?

All of these things need to be thought of when choosing which vegetables to can. Choose wisely for your family.

KITCHEN SAFETY

Since using a pressure canner can be dangerous, can at least two vegetables. This allows you to gain as much experience as possible. Always pressure can with an experienced adult. If you have questions, be sure to ask!

Two chapters have been included on pressure canning vegetables. The specific directions in Chapter II are included for canning corn. If corn is unavailable, choose another starchy vegetable to can (peas, lima beans, pumpkin). For Chapter III, choose one or two non-starchy vegetables to can. Asparagus, snap beans, beets and carrots are examples of non-starchy vegetables.

Decide now how many and which vegetables you will can. Choose at least two! Write them down in the space provided. The vegetable preparation chart on page 15 may be helpful.

--- QUIZ TIME ---

1) Which statements are true about botulism?
   A. Botulism was first recognized in the U.S. in 1899.
   B. 1,001 people died of botulism between 1899 and 1978 in the U.S.
   C. Botulism has never occurred in Nebraska.
   D. The major cause of botulism is home-canned fruits.
   E. Problems only develop when improper canning techniques are used.
   F. The poison produced by C. botulinum is not readily killed by heat.

2) What are 2 preventive measures you can use to avoid botulism?
   A. 
   B. 

3) List one source of home-canning recipes you should avoid.
   A. 

Answers: A, B, E
4) Crossword

Across:

2. A valve for letting air out of a pressure canner
3. Rubber seal
6. Container that holds steam. (Two words.)
8. Meats and vegetables are. (Three words.)

Down:

1. Rate at which heat is transferred. (Two words.)
5. Shows pressure and temperature inside canner.
7. First recognized in U.S. in 1899.
CHAPTER II

Canning Vegetables

At the last meeting you decided which vegetable you would can. In this chapter we are going to apply the basic principles of canning low acid foods by canning sweet corn. If you decided on another vegetable to use, be sure to use up-to-date canning information for the procedure and processing times.

The amount of canned food you get from a given quantity of fresh vegetables varies with the kind of vegetable, the quality, the maturity and possibly even the variety. The size of pieces and the way you pack the vegetable—raw or hot pack—also makes some difference in the number of finished jars. To help estimate the amount of fresh vegetables you need, use this chart:

<table>
<thead>
<tr>
<th>Kind of Vegetable</th>
<th>Pounds per Quart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asparagus</td>
<td>2 1/2 to 4 1/2</td>
</tr>
<tr>
<td>Beans, Lima, in pods</td>
<td>3 to 5</td>
</tr>
<tr>
<td>Beans, snap</td>
<td>1 1/2 to 2 1/2</td>
</tr>
<tr>
<td>Beets, without tops</td>
<td>2 to 3 1/2</td>
</tr>
<tr>
<td>Carrots, without tops</td>
<td>2 to 3</td>
</tr>
<tr>
<td>Corn, sweet, in husks</td>
<td>3 to 6</td>
</tr>
<tr>
<td>Peas, green, in pods</td>
<td>3 to 6</td>
</tr>
<tr>
<td>Pumpkin or winter squash</td>
<td>1 1/2 to 3</td>
</tr>
<tr>
<td>Spinach and other greens</td>
<td>2 to 6</td>
</tr>
<tr>
<td>Squash, summer</td>
<td>2 to 4</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>2 to 3</td>
</tr>
</tbody>
</table>

FOOD SAFETY

Never can pumpkin or winter squash after it is mashed. It is too thick for the heat to penetrate to the center and can spoil. Can these foods in 1-inch cubes. They can be mashed just before using.

KNOW-HOW: to store your canned food for the future

Store canned food in a cool, dry place. Warmth can cause canned food to lose quality. Hot pipes behind a wall sometimes make a shelf or closet too warm for storing food. Canned food should not be in a place where it can freeze. Freezing may crack a jar or break a seal and let in bacteria that cause spoilage. Dampness can corrode metal lids and eventually cause leakage. Properly canned and stored, canned food will retain good eating quality for a year.

HOW TO: Can Sweet Corn

Timing is important. The rule “two hours from garden to jar” is especially important with corn. This is because corn loses its sweetness rapidly after picking. It is better to work with a small amount of corn at a time.
• Select any good garden variety of corn. The right stage of maturity is important for good flavor and yield. Choose ears with bright green husks. Silks have turned brown when corn is mature. When husked, mature corn has plump, milky kernels. In Figure 10 you can see that immature ears yield less corn.
• Never use ears with mold for canning. Also avoid wormy corn. See Figure 11. If only the tip is wormy, you can cut it off. Otherwise, throw the ear away and do not try to trim. Wormy corn or mold make sterilizing too difficult and may cause corn to spoil.
• Quickly husk and remove the silk. Wash.
• Use a cutting board and sharp knife. If you want whole kernel corn, cut the corn from the cob at about 2/3 the depth of the kernel. See Figure 12. Do not scrape the cob for whole kernel corn.

An easy way to cut corn: Place the pointed end in the tube of an angel food cake pan. Cut kernels off. They will fall into the pan.

• Use either the raw or hot pack method: (Salt is optional. It is ONLY used for flavor and is NOT needed for a safe product. You can salt before eating.)
RAW PACK
- Fill jars to within 1 inch of the top. Do not shake or press down.
- Add 1/2 teaspoon salt to each pint jar (optional).
- Fill to 1/2 inch of the top with boiling water. Adjust lids.

HOT PACK
- Measure corn into a sauce pan. Add one-half as much boiling water as you have corn. Heat to boiling.
- Pack hot corn to within 1 inch of the top of the jar and cover with boiling hot cooking liquid.
- To release bubbles, insert a thin rubber spatula. Leave 1-inch headspace.
- Add 1/2 teaspoon salt for each pint jar (optional).

Processing
• Be sure you follow the manufacturer’s directions for the correct amount of water to put in your pressure canner.
• Place jars on the rack, leaving space between them for air to circulate. Fasten the cover and open the petcock, or leave the weighted gauge off.
• Turn on the heat and watch for a steady stream of steam. Let steam escape for at least 10 minutes. Then close the petcock or put on the weighted gauge.
• When the pressure reaches 11 pounds, start counting time. Adjust the heat to keep the pressure the same during the entire processing time. Process whole kernel corn in pints for 55 minutes and in quart jars for 85 minutes at 2,000 ft. Add 1 pound pressure for each additional 2,000 feet.
• Remove the canner from the heat as soon as time is up if you are using an electric range. If using a gas range, turn off the gas. Let the canner cool naturally. Do not try to rush the cooling process in any way.
• When the gauge pointer is at zero, wait a minute or two and then slowly open the petcock or remove the weighted gauge. Unfasten the cover and open it away from your body so the steam escapes away from you.
• Lift the jars from the canner. Space the jars on a cooling rack. When cool, test the jars for a good seal.
• Label with the date and product. Store in a cool, dry place. See Figure 13.
• To evaluate your product turn to page 22.
• If you choose to can another starchy vegetable, do that at your next meeting. If not, continue on to the next chapter.
CHAPTER III

Canning More Vegetables

You will can one or two non-starch vegetables in this chapter. You have already chosen which additional vegetables you are going to can. Directions for a specific vegetable are not given in this chapter, but the Vegetable Preparation Chart has been included and may be helpful. Just remember to use up-to-date canning information to can your non-starchy vegetables. The Vegetable Preparation Chart has both starchy and non-starchy vegetables included, but only can non-starchy vegetables.

Historical Footnote

The first pressure canner was invented by a French engineer, Denys Papin in 1679. His invention was the first to successfully harness the power of steam. However, it was considered crude and impractical for the homemaker. It was not until 1914, 235 years later, that a successful home pressure canner was developed. But even this model was complicated.

Today we are fortunate to use pressure canners that are less cumbersome and operate on principles that are easy to understand. Water heated to boiling creates steam. When the steam is not allowed to escape, pressure is the result. This pressured steam brings the temperature to above boiling, for example at 10 pounds pressure the temperature is 240 °F.

FOOD SAFETY

Don’t ever use canned food that shows any sign of spoilage. Look closely at each container before you open it. Bulging can ends or jar lids or any sign of a leak may mean spoiled food. When you open the container, look for other signs of spoilage — spurting liquid, an off-odor or mold. If food shows any sign of spoilage, don’t use it — or even taste it. Throw it away.

I Don’t Get It

As I read through specific canning instructions I saw “pack loosely” and “pack firmly” in the directions. What foods should be packed loosely and which firmly?

ANSWER:

In general, meats and foods high in starch (corn, peas, lima beans) should be packed “loosely” because heat penetrates these foods more slowly. Starchy foods also expand. By packing them loosely it gives them room to expand. All other foods are generally packed “firmly” because they shrink and allow heat to penetrate more easily.
## Vegetable Preparation Chart

<table>
<thead>
<tr>
<th>Vegetable and Preparation</th>
<th>Pack</th>
<th>Salt</th>
<th>Liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asparagus</strong></td>
<td>Raw</td>
<td>1/2 t. per pint</td>
<td>Cover boiling water.</td>
</tr>
<tr>
<td></td>
<td>Hot</td>
<td>1 t. per quart</td>
<td>Cover with boiling cooking liquid or boiling water.</td>
</tr>
<tr>
<td>1. Wash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Trim off — scales — tough ends</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Wash again.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Cut into 1 inch pieces.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lima Beans</strong></td>
<td>Raw</td>
<td>1/2 t. per pint</td>
<td>Cover with boiling water.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 t. per quart</td>
<td>to 1/2 inch of top.</td>
</tr>
<tr>
<td>1. Select only young, tender beans.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Shell</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Wash beans.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Snap Beans</strong></td>
<td>Raw</td>
<td>1/2 t. per pint</td>
<td>Cover with boiling water.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 t. per quart</td>
<td>to 1/2 inch of top.</td>
</tr>
<tr>
<td>1. Wash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Trim ends.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Cut into 1 inch pieces.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Beets</strong></td>
<td>Hot (only)</td>
<td>1/2 t. per pint</td>
<td>Cover with boiling water.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 t. per quart</td>
<td>to 1/2 inch of top.</td>
</tr>
<tr>
<td>1. Sort for size.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Cut off tops, leaving 1 inch stem.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Also leave root.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Wash beets.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Cover with boiling water and boil until skins slip easily — 15 to 25 minutes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Skin and trim.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Leave baby beets whole. Cut medium and large beets into 1/2 inch cubes or slices. Halve or quarter large slices.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Processing Time in Minutes at 11#/ Pressure at 2,000 Feet**

<table>
<thead>
<tr>
<th></th>
<th>Pint jars</th>
<th>Quart jars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pint jars . . . 30</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Quart jars . . . 50</td>
<td>40</td>
<td>50</td>
</tr>
</tbody>
</table>

* Add 1 pound pressure for each additional 2,000 feet elevation.
## Vegetable and Preparation

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Pack</th>
<th>Time in Minutes at 11# Pressure at 2,000 Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrots</td>
<td>Raw</td>
<td>1/2 t. per pint cover with boiling water to 1/2 inch of top.</td>
</tr>
<tr>
<td></td>
<td>Hot</td>
<td>Pack hot corn to 1 inch of top.</td>
</tr>
<tr>
<td>Corn, Cream Style</td>
<td>Raw</td>
<td>1/2 t. per pint cover with boiling water to 1/2 inch of top.</td>
</tr>
<tr>
<td></td>
<td>Hot</td>
<td>Pack hot corn to 1 inch of top.</td>
</tr>
<tr>
<td>Corn, Whole Kernel</td>
<td>Raw</td>
<td>1/2 t. per pint cover with boiling water to 1/2 inch of top.</td>
</tr>
<tr>
<td></td>
<td>Hot</td>
<td>Pack hot corn to 1 inch of top.</td>
</tr>
<tr>
<td>Peas, Fresh Green</td>
<td>Raw</td>
<td>1/2 t. per pint cover with boiling water to 1/2 inch of top.</td>
</tr>
<tr>
<td></td>
<td>Hot</td>
<td>Pack hot corn to 1 inch of top.</td>
</tr>
<tr>
<td>Spinach (and other Greens)</td>
<td>Raw</td>
<td>1/4 t. per pint cover with boiling water to 1/2 inch of top.</td>
</tr>
</tbody>
</table>

### Processing

**Carrots**

Usually, it does not seem wise to can carrots. They can be stored for relatively long periods of time, and fresh ones are relatively inexpensive all year round.

**Corn, Cream Style**

1. Husk and remove silk.
2. Wash.
3. Cut corn from cob at about center of kernel and scrape cob.

**Corn, Whole Kernel**

1. Husk and remove silk.
2. Wash.
3. Cut from cob at about 2/3 the depth of the kernel.

**Peas, Fresh Green**

1. Shell.
2. Wash.

**Spinach (and other Greens)**

1. Can only freshly picked, tender spinach.
2. Pick over.
3. Wash thoroughly.
4. Cut out tough stems and midribs.

---

**NOTE:** Can pumpkin, summer squash, winter squash and sweet potatoes if practical. For detailed information see USDA Home and Garden Bulletin No. 8, Home Canning of Fruits and Vegetables.

* Add 1 pound pressure for each additional 2,000 feet elevation.
KNOW-HOW:

heat penetration works

You have learned that heat penetration is the rate at which the heat goes through the total quantity of food in a jar. There are two ways heat is carried through the jar: convection and conduction, or a combination of both. See Figure 14.

In conduction heating, the heat is transferred from the outside of the jar toward the center. Ground meat is an example of conduction heating.

In convection heating, as the liquid in the jar heats, it rises in the jar and the colder liquid falls. This causes what is called a convection current. Heat is transferred by this moving liquid. Peas, carrots, and string beans are examples of foods that heat by convection currents.

How To: can non-starchy vegetables

Can one or two nonstarchy vegetables using up-to-date canning information. Use the Vegetable Preparation Chart if it is useful. Evaluate your canned vegetables on page 22.
Canning Meat

CHAPTER IV

Meat is a low acid food and needs to be processed using a pressure canner. To insure the safety of canned meats and poultry, jars must be processed at a sufficiently high temperature for a long enough time to kill all bacteria that cause spoilage or food poisoning.

In this chapter you will can stewing meat. To gain more experience with canning meat, can more than one kind. Be sure to use current canning information.

The following sections give you some general information used when canning meat. This information can also be used for canning poultry.

Know How: to choose meat
Use only good quality meat or poultry. Chill home produced meat immediately after slaughter to prevent spoiling and to permit tenderizing. Meat is easier to handle when it is cold. For thorough chilling, keep meat at a temperature below 40°F until time to prepare it for canning. Can it within a few days after slaughter.

If meat must be held for longer than a few days, freeze it. Store frozen meat at temperatures of 0°F or lower until canning time. Then cut or saw frozen meat into pieces of desired size. If frozen meat is thawed before canning, thaw it in a refrigerator at a temperature of 40°F or lower until most of the ice crystals have disappeared.

Keep all meat clean and sanitary. Rinse poultry thoroughly in cold water, then drain. Keep all meat as cool as possible during preparation for canning. Handle it rapidly; process it as soon as containers are packed.

FOOD SAFETY
To control the bacteria that cause spoilage, keep everything that touches meat as clean as possible. Scrub pans in hot soapy water. Rinse them well in boiling water before putting meat in them. Wash knives and kitchen tools to be used in canning, rinse well with boiling water.

Cutting boards, wooden utensils, and wooden work surfaces need special treatment to keep spoilage bacteria under control. Scrape surfaces if necessary, scrub with hot soapy water and rinse well with boiling water. Then disinfect clean surfaces. Use a liquid chlorine disinfectant (household laundry bleach) or other disinfectant. Dilute according to directions on the container. Cover wooden surfaces with the disinfectant solution and leave 15 minutes. Wash solution off with boiling water.
Packing the Meat
Pack meat loosely in containers. Jars may lose liquid during processing if they are packed too tightly or too full. Work with one jar at a time. Keep precooked meat hot while packing. Use boiling liquid (broth, meat juice, or water) if directions call for added liquid.

These two methods are used for packing meat:

HOT PACKING: Meat is precooked before it is packed in jars. Boiling broth or boiling water is poured over the meat before containers are processed in a pressure canner. The temperature of food packed hot should be at least 170°F at the time jars are closed.

RAW PACKING: Meat is packed uncooked. Raw packed meat usually is heated to 170°F to exhaust or remove air from jars processing in a pressure canner. Exhausting air from jars is a time-consuming process. For example, to exhaust air from raw packed chicken it will take about 75 minutes. For this reason it is more common to hot pack meat products. Directions will not be included to raw pack meat.

Making Broth
To make meat or poultry broth, place bony pieces in a saucepan and cover with cold water. Simmer until meat is tender. Pour broth into another pan; skim off fat. Add boiling broth to containers packed with precooked meat or poultry. Fill to level specified in directions.

Salt: To Add Or Not To Add
Salt may be added to canned meat for flavor. It does NOT act as a preservative in canned meat. So it does not need to be added to make the meat product safe. If you decide to use salt, add it after the meat is packed in the jar. Amounts for various-sized containers are given in the canning directions.

About Fat
Remove as much fat as possible from meat before canning. Cut off all large lumps, trim marbled meat without slashing the lean meat unnecessarily. Do not use very fatty meat or poultry for canning. After packing containers, wipe the tops free of fat. Any fat that gets on the rim of jars may prevent an airtight seal.

I Don’t Get It
Why is it so important to remove as much fat as possible?
Answer:
Fat is an insulator, or does not allow heat to penetrate. It may cause the heat to penetrate too slowly and cause spoilage.
Yield of Meat

The number of jars you get from a given amount of raw meat varies with the size of the pieces and the way the meat is packed. For a quart jar, allow approximately the following amounts of fresh, untrimmed meat with bone or ready-to-cook chicken:

**BEEF:**
- Round .................. 3 to 3 1/2 pounds
- Rump .................. 5 to 5 1/2 pounds

**PORK LOIN** .................. 5 to 5 1/2 pounds

**CHICKEN:**
- Canned with bone 3 1/2 to 4 1/4 pounds
- Canned without bone 5 1/2 to 6 1/4 pounds

HOW TO: can stew meat

Stew meat is usually cut into smaller pieces because it is a less tender cut of meat. The hot pack method is used here, but the raw pack method can also be used.

- Cut the meat into chunks or small pieces suitable for stew meat.
- Put meat in a large shallow pan. Add just enough water to keep it from sticking. Cover pan.
- Precook meat slowly until medium done. Stir occasionally, so meat heats evenly.
- Pack jars loosely with hot meat. Leave a 1-inch headspace.
- Add salt if desired. (1/2 teaspoon/pint; 1 teaspoon/quart)
- Cover meat with boiling meat juice, adding boiling water if needed. Leave a 1-inch headspace. Adjust lids. (Remember to wipe off the tops of the jars.
- Process in the pressure canner at 11 pound pressure (add 1 pound pressure for each additional 2,000 feet):
  - pints ........ 75 minutes
  - quarts ........ 90 minutes
- Follow cool down directions you have already learned.
- When jars are cool, label.
- Evaluate your product on page 22.

A RAINBOW OF SERVING IDEAS

In the recipe card write some ideas on how you would use your stew meat.
Canning poultry is similar to canning other meats. The directions for canning poultry can be used for chicken, duck, goose, guinea and turkey. You can also use them for game birds, domestic rabbits and small-game animals. Poultry, rabbits and small-game birds can be canned with or without bones. When looking at the directions they should state if it is with or without bones.

The directions included here are for chicken without bones using the hot pack method. If you want more experience, try canning chicken with bones or try canning another kind of poultry. The directions here are only a guide for you to follow.

**HOW TO: Can Chicken**
- Cut up chicken. Remove bone, but not skin, from meaty pieces either before or after precooking. (It is easier after precooking.)
- Pack hot poultry loosely in jars leaving a 1-inch headspace.
- Add salt if desired. (1/2 teaspoon/pint; 1 teaspoon/quart)
- Pour in boiling broth leaving 1-inch headspace. Wipe off tops of jars and adjust lids.
- Process in a pressure canner at 11 pounds pressure at 2,000 feet (add 1 pound pressure for each additional 2,000 feet):
  - pints ........ 75 minutes
  - quarts ........ 90 minutes
- Follow cool down directions you have already learned.
- When jars are cool, label.
- Evaluate your poultry products on page 22.

**A RAINBOW OF SERVING IDEAS**
In the recipe card write some ideas on how you would use your canned chicken or other poultry.

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**YOU'RE THE CONSUMER:**

**On canning meats**

When is meat most practical to can? Most people only think of freezing their meat. Freezing does a good job of preserving meat, but the meat must be frozen until ready to thaw and use. If you don't have freezer storage, you may find that canning meat is very practical. If you prepare your own convenience foods or stews, soups, or casseroles, the cooking time can be greatly reduced when using canned meats.

If you go camping, fresh or frozen meat can be a problem. Since canned meats do not require refrigeration until they are opened they are practical to use. Just remember to use the home-canning rule: Always boil home-canned vegetables and meats 10 minutes before tasting.
... QUIZ TIME ... 

1. Meats and poultry can be safely canned at home using
   A. the boiling-water bath method.
   B. the open-kettle method.
   C. the pressure canner.
   D. the hot pack method in sterile jars, then sealing and storing.
   E. A and C are correct
   F. C and D are correct

2. Explain in the space provided the special treatment equipment will undergo before contact with meats to be canned, and why.

3. Which statements are true about canning meats and poultry? Of those statements that are false, what is the correct statement?
   A. Pack meats tightly in containers.
   B. Precooked meat does not need to be kept hot while packing.
   C. If directions call for added liquid, you can only use meat juices.
   D. Meats are only hot packed, except for precooked meats.
   E. Poultry is never to be canned with bone.

3. All answers are false.

2. See page 17.
1. C

ANSWERS: 21
Name __________________________________________

County _________________________________________

SCORE CARD

25 Appearance
Uniform
Natural color
Clear liquid
No indication of spoilage

25 Pack
Full
Not crowded
Proper headspace
Air bubbles removed

25 Container
Clean
Standard jar
Appropriate closure
Properly labeled

25 Canned by
recommended method

Ribbon Awarded:
Purple
Blue
Red
White
No Award

Good
Needs
Improvement

Comments

Canning Poultry

HOW TO: Can Chicken

1. Cut up chicken. Remove bone, but not skin, from meat and either boil before or after according to your recipe. A bottom and a top label are highly recommended. A bottom label is needed to identify the jar, and a top label is needed to identify the contents. A top label can be used for cooking instructions or storage instructions.

2. Using the proper heat, place jars on hot plate, and heat at the highest temperature possible. The jars should not be crowded, and the headspace should be properly air bubbles removed.

3. Clean jars with proper labels and proper closure.

4. Canned by recommended method.

Ribbons Awarded:

Purple
Blue
Red
White
No Award

Good
Needs
Improvement

Comments