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Third Year Canning

By

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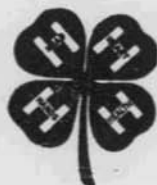
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COOPERATIVE EXTENSION SERVICE IN AGRICULTURE AND HOME ECONOMICS
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BOYS' AND GIRLS' CLUBS



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Third Year Canning Requirements

FOR COMPLETION

- 10 quarts of fruit
- 10 quarts of vegetables
- 5 quarts of meat (3 kinds)
- 5 glasses or jars of jelly
and jam.

FOR EXHIBITS

- 2 varieties of fruit
- 2 varieties of vegetables
- 3 varieties of meat
- 3 varieties of jelly

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Third Year Canning

Steps in Canning Meat

1. Study the timetable carefully and follow directions.
2. Meats should be canned with a steam pressure cooker. Jars do not need to be sterilized, but they should be washed, and cleaned, ready for use.
3. All equipment should be ready for use—jars, lids, rubbers (if used), and all equipment for cooking, such as kettles, steam pressure cooker, sharp knives, etc. Utensils for meat canning are preferably aluminum, enamelware, or stainless metal.
4. Any meat that is suitable for use as food may be canned.
5. Unless the meat is to be canned at once, chilling the carcass after slaughtering is necessary.
6. Raw meat is easier to handle if chilled, but there is little difference between the flavor or tenderness of the canned product whether it is chilled or not.
7. Frozen meat may be canned, but it will not be as good a product.
8. If meat has been frozen, do not thaw it out before canning. Cut or saw the frozen product.
9. Cut the meat into desired size and when using glass jars, precook the meat before canning until no red color shows, but do not cook until done.
10. Add broth, if desired, to the canned meat before sealing.
11. Remove excess fat before canning.
12. Cool as quickly as possible after processing.
13. Salt is added to meat as follows: $\frac{1}{2}$ teaspoon to 1 pint, 1 teaspoon to 1 quart, or the meat may be seasoned in the precooking.

Operation of Steam Pressure Cooker

Experts agree that non-acid foods should be processed under steam pressure. It is equally important that the home canner carefully follow the instructions which come with the cooker. Operators of pressure cookers of the household sizes depend on a pressure gauge for indicating the internal temperature. This is satisfactory provided the gauge is working properly and all air is allowed to escape before the processing time is begun. However, it would be more reliable if each steam pressure cooker were equipped with a reliable thermometer to indicate the actual temperature within. One of the reasons for the success of commercial canning is that the processing is controlled through the use of a thermo-couple and a self-recording thermometer which shows the exact temperature inside the retort at all times during the steriliz-

ation period. The accuracy of the steam pressure gauge is influenced by altitude and the fact that it may become inaccurate after a period of use. The following rule has been given as a means of making proper adjustment in steam pressure to provide the necessary temperature for the various altitudes above sea level at which the steam pressure cooker may be used. "At altitudes over 2,000 feet, add 1 pound pressure for each additional 2,000 feet." (U. S. D. A. Farmers' Bulletin 1762.) This adjustment is necessary because pressure gauges are set at the factory to be used at sea level.

Checking the Steam Pressure Gauge

If the spring in the steam pressure gauge becomes weakened after a period of use or if some foreign substances get into it so it cannot work freely, then, of course, it is unreliable and spoilage and botulism may result.

One method for checking the accuracy of the steam pressure gauge is to place a maximum temperature thermometer in a can or jar of water inside the cooker. Put water in the bottom of the cooker, put the lid on, and use the same exhausting method as if you were canning food in the cooker. After closing the petcock, let the pressure rise to 10 or 12 pounds. Note the maximum pressure reached and keep it at that pressure for 10 minutes. Remove the cooker from the heat and let it stand until the gauge registers zero. Open the cooker and read the thermometer, check the temperature shown on the thermometer against the steam pressure necessary to give this temperature. The difference between the steam pressure maintained while the thermometer was in the cooker and the steam pressure shown in the table to correspond with the temperature shown on the thermometer is the amount that the pressure gauge is out of adjustment. Usually pressure gauges read too high so it will usually be necessary to operate the cooker at pressures higher than appear correct.

The mercury in the maximum temperature thermometer must be shaken down like a clinical thermometer before it is used again. District home demonstration agents are equipped with these thermometers and canning centers also should have them.

**Temperature of Steam in Degrees Fahrenheit Corresponding
to Gauge Pressure in Pounds**

Pounds Pressure per square inch	Temperature degrees Fahrenheit
5	227.1
6	229.6
7	232.3
8	234.7
9	237.0
10	239.4
11	241.5
12	243.7
13	245.8
14	247.8
15	249.8
16	251.6
17	253.4
18	255.4
19	257.0
20	258.8

Example:

At 12 pounds pressure for the cooker tested, the thermometer actually registered 237° F. This is the correct temperature for 9 pounds steam pressure, which means a discrepancy of 3 pounds pressure (12 pounds minus 9 pounds). When this cooker which has a discrepancy of 3 pounds is operated, 3 pounds should be added to the desired pressure. For example, 18 pounds pressure on this gauge is actually equal to only 15 pounds. This method of testing also makes allowance for elevation so that no additional change will have to be made for high altitudes.

Directions for Canning Meats and Poultry

Any meat suitable for cooking for other purposes is satisfactory for canning. Certain cuts are better suited than others. Methods for canning meat and poultry are the same. Pork and some cuts of other meat are better suited to curing than to canning. It is always advisable to put up a few cans of broth in canning either meat or poultry.

In canning meat or poultry, the head space is particularly important. If the liquid does not cover the meat, it will discolor and lose flavor during the storage. Exception: fried chicken, etc.

Meat and poultry canned in glass jars should be precooked. When tin cans are used, meat may be precooked or it may be packed raw and the cans exhausted before sealing. Cut the meat in uniform pieces, precook until the red color has disappeared. Pack hot. Press the meat down with a wooden spoon or mallet. Cover with broth, leaving sufficient head space, and process immediately.

Beef, veal, lamb, chicken and other poultry, and pork may be canned successfully, but the steam pressure cooker should be used. In canning meats, it is more economical to can the meat alone and combine with other foods at the time of serving. The meat may be canned immediately when slaughtered. Unless it is canned at once, the carcass should be chilled. There is little difference in the flavor and tenderness of the canned product when the meat is chilled or unchilled, but raw meat is easier to handle when it has been chilled. Frozen meat may be canned, but it does not make a high quality product. If the meat has been frozen, do not thaw before canning. Saw or cut into uniform lengths and plunge at once into boiling water. Simmer until the red color has gone, then pack hot and process immediately.

Chicken and other Poultry: For canning select plump, 2-year-old hens, preferably those selected from the flock during July and August. Young birds may be canned, but the texture and flavor of the meat is not as good as that from mature birds.

Dress the chickens as for cooking. Take particular care not to break the gall bladder because the meat is then unfit for canning. Remove the lungs, kidneys, and eggs. Cut the chicken into the usual-sized pieces for serving and separate into three piles—the meaty pieces (breasts, thighs, legs, and upper wing joints), the bony pieces (backs, wings, necks, and perhaps the feet after they have been skinned), and the giblets.

The giblets should not be canned with the other meat as they will flavor and discolor it. Also, it is better to can the livers alone, and the gizzards and hearts together. Remove the chicken skin or not, as desired, and trim off lumps of fat. Too much fat makes chicken difficult to process.

Make broth with the bony pieces. Cover with slightly salted cold water, simmer until the meat is tender, and drain off the broth to use as liquid in canning the meaty pieces. Strip the meat from the bones and can as small pieces or use in making sandwich spread.

The meaty pieces of chicken may be canned either with or without the bone. With the bone the product is better flavored. Precook and pack hot. Process immediately for 85 minutes at 15 pounds pressure.

Other poultry may be canned using the same method.

Precook giblets in water and pack hot, or exhaust in tin cans, and process according to timetable.

Beef: Select cuts of beef commonly used for roast or steak from the round, loin, chuck, rib, etc. Cuts that contain more connective tissue and bone may be canned for stew meat or soup mixture. Wipe the meat with a damp cloth, remove bone and gristle, leaving only enough fat to give flavor. If using glass jars, precook the meat 30 to 40 minutes. Pack into containers. Add 1 teaspoon of salt for each quart, cover with broth, and process immediately. If using tin cans, follow the same method or pack the

meat raw and exhaust the cans. Process 85 minutes at 15 pounds pressure.

Beef Heart and Tongue. Tongue may be canned as follows: Wash the tongue, drop into boiling water and simmer for about 45 minutes or until the skin can be removed. Skin and cut into pieces that will fit into the containers. Reheat in broth, pack immediately into containers, add the seasoned broth and cover. Process immediately for 85 minutes at 15 pounds pressure.

Heart. Wash the heart. Remove the thick connective tissue. Cut into pieces suitable for canning. Put in boiling water and simmer for 15 to 20 minutes. Pack at once and add the seasoned broth. Process same as tongue.

Pork. The cuts for canning are usually the loin, meat from spareribs, head, tongue, and heart. The hams and shoulders should be preserved by curing. Remove the excess fat and proceed as for beef. Pack hot. Process immediately for 85 minutes at 15 pounds pressure.

Lamb or Mutton. Lamb or mutton may be canned using the same method as for beef.

Meat Broth. Clear meat broth for canning should be fairly concentrated. Avoid prolonged boiling as it causes loss of flavor. Meat bones may add flavor, but avoid cooking too long under pressure. Remove excess fat before canning.

Vegetable Soup. Two quarts beef or chicken broth, 1 cup diced meat or chicken, 1 cup finely diced carrots, 1 cup finely diced celery, $\frac{1}{4}$ cup finely diced onions. Use the soup broth and diced meat or poultry left from the canning of meat or chicken. Add the vegetables. Season. Cook at 15 pounds pressure for 20 minutes. Pack hot in the can and process at 15 pounds pressure for 30 minutes.

TIMETABLE FOR PROCESSING MEATS AND CHICKEN IN THE STEAM PRESSURE COOKER

At Altitudes Over 2,000 Feet, Add 1 Pound of Pressure for Each Additional 2,000 Feet. Follow Directions Given on Preceding Pages for Operation of Cooker and Removal of Jars and Cans after Processing. Cool Tin Cans in Cold Water. 250° F., or 15 pounds pressure

Product	No. 2 can	No. 2½ can	No. 3 can	Pint glass jar	Quart glass jar
	Minutes	Minutes	Minutes	Minutes	Minutes
Beef:					
Fresh	85	110	120	85	120
Heart and tongue	85	110	120	85	120
Chicken and other poultry:					
With bone	55	65	70	65	75
Boned	85	110	120	85	120
Lamb and Mutton	85	110	120	85	120
Pork:					
Fresh	85	110	120	85	120
Soups:					
Broth, clear	25	30	30	25	30
Soup stock	40	45	45	40	45
Veal	85	110	120	85	120

GAUGE PRESSURE AND CORRESPONDING TEMPERATURES

Gauge pressure corresponding to specified process temperatures at various altitudes.*

Temp. Deg. F.	Sea Level	Feet above sea level							Temp. Deg. C.
		500	1000	2000	3000	4000	5000	6000	
225	4.2	4.5	4.7	5.2	5.7	6.2	6.6	7.1	107.2
240	10.3	10.5	10.8	11.3	11.7	12.2	12.7	13.1	115.6
250	15.1	15.4	15.6	16.1	16.6	17.1	17.5	18.0	121.1

*This table is taken from the National Cannery Association Bulletin 26-L (Third Ed.) "Processes for Non-Acid Canned Foods in Metal Containers." June 1937.

Evidences of Spoilage

Foods canned in tin sometimes show the following evidences of spoilage.

Buckled cans.—Cans that have caved in, or collapsed, on the sides are called buckled cans. This may occur when No. 3 or larger-sized cans are cooled too quickly after processing. These large cans should be allowed to remain in the cooker until the

pressure gauge has reached zero to avoid a too sudden change of pressure. Cans of smaller sizes when slack-filled sometimes buckle on cooling and break the seams. In this case the food should be put into other cans and reprocessed; or used at once.

Springers.—Springers are cans with bulged ends. The ends of cans generally become convex, or outwardly curved, during processing because of expansion of the food and the formation of steam. When the cans cool the ends should snap back to a concave, or inwardly curved, position. If a can is too full, the ends may not snap back into proper position. Such a can is called a springer. Such cans should be marked so they will not be confused with those that become bulged during storage.

Swelled Cans.—When gas is formed within a can it may cause the ends to bulge. For example, some fruits, such as prunes, apples, and some berries, react with the metals of the can, and hydrogen gas is liberated. When this collects, the can may become a "hydrogen swell." In this case the food itself is not affected. However, in several types of food spoilage, gases are produced that cause swelled cans. For this reason bulged ends on a can are regarded as an indication of spoilage. When canned fruits show such a condition, they should be examined for other indications of spoilage. When a can of meat or non-acid vegetables has bulged ends it should be disposed of by burning.

Perforations.—Some of the fruits that react with the metals of the can producing hydrogen swells may also cause perforations and leaks. This results from the centering of the chemical reaction on a few points. If the can is discovered soon after leaking starts, the food may be used, but if the leakage is not detected until later, fermentation or other types of spoilage may have set in.

Canned foods are likely to develop perforations and hydrogen swells rather quickly if stored in too warm a place, hence cool storage is especially important for canned fruits that react in this way on the metal.

Frozen Canned Foods

Freezing does not cause canned foods to spoil unless it breaks the seal and permits micro-organisms to enter. All frozen canned foods should, therefore, be examined for leakage. Sometimes freezing may bulge tin cans and spread the seams enough to permit bacteria to enter and yet not cause leakage. Bulged cans of frozen food should be used as promptly as possible if they cannot be kept frozen.

(Much of the above material on the canning of meats has been taken from U. S. D. A. Farmers' Bulletin No. 1762, *Home Canning of Fruits, Vegetables, and Meats*, which may be used for further reference.)

Score Cards

Meat

Package—Tightly sealed containers of specified size, clean, neatly labeled, preferably clear glass or tin can. (If tin cans are used, they should be bright, have slightly concave ends, showing some vacuum. A gauge may be used to determine vacuum.)	10
Pack	20
Fullness—All space should be filled, not crowded. (Fancy pack not practical.) Size pieces characteristic of product.	10
Proportion of meat to liquid—The liquid should just cover the product.	10
Product	50
Absence of defects—Original material of good quality, free from indications of spoilage, properly trimmed without excessive fat, bone, or skins.	10
Color—As nearly that of a standard cooked product as possible, without undue discoloration.	10
Consistency—Tender without excessive overcooking.	10
Flavor and aroma—Characteristic of the kind of meat.	20
Liquid	20
Clearness—Little or no cloudiness.	
Condiments—Should be suitable and not excessive.	

 100

Jelly

Surplus fruits and fruit juices should be made into jelly, jams, marmalades, etc.

Characteristics of a good jelly.—A good jelly is clear, or of attractive color, and free from sediment or crystals. When removed from the glass it retains its form, yet quivers when touched. It is tender, not tough or gummy, and when cut, a smooth sparkling surface remains. It is not syrupy, yet spreads smoothly on bread. The flavor and odor should be pleasing and characteristic of the fruit from which the jelly is made.

Essentials for a good jelly:

1. Fruit juice containing both pectin and acid in the right proportion.
2. Sugar in the right proportion to pectin and acid.
3. Proper cooking.
4. Proper equipment and containers.

Classification of Fruits According to Suitability for Jelly-Making
(From California Extension Circular No. 2)

Fruits rich in acid and pectin	Fruits rich in pectin but deficient in acid	Fruits rich in acid but deficient in pectin	Fruits deficient in both acid and pectin
Apples (sour) Blackberries (sour) Crabapples Currants (red) Gooseberries Grapes (Eastern) Loganberries Plums (most varieties) Prunes (sour)	Apples (varieties of low acid) Pears (unripe) Prunes (sweet) Quinces (ripe; some varieties)	Apricots Strawberries Rhubarb*	Overripe fruits Peaches Raspberries

* Not a fruit, but suitable for jelly-making if pectin is supplied.

What Fruits to Use: Different varieties of fruits vary greatly in their suitability for jelly-making because of differences in pectin and acid content. In the table the more common varieties are classified according to their suitability. Fruit juices are divided into two general classes.

1. Those that contain sufficient pectin and acid in sufficient amounts. See table above.
2. Those lacking in acid or pectin, or both. See table above.

Steps in Jelly-Making

1. Assemble and sterilize jelly glasses and lids.
2. Assemble large amount equipment: kettles, flannel or felt jelly bag, spoon, sieve, colander.
3. Use suitable and good products. Extract the juice using as little water as possible—1 pint of water is usually necessary for each pound of apples or quinces. For grapes, currants, and berries, no water should be added. The fruits should be crushed and heated in their own juice.
4. Measure or weigh juice and sugar—usually $\frac{3}{4}$ cup sugar to 1 cup of juice.
5. Heat until sugar is dissolved.
6. Test the jelly. One of the simplest tests is to allow the hot liquid to drop from a large spoon. If the jelly in part will congeal and hang in a sheet from the spoon, it is done.
7. Remove from heat. Skim and pour into hot sterile glasses.
8. When jelly is set, pour boiling paraffin on top of each glass. Place the lid. Wipe off the glass and store in a cool place.

Equipment:

1. Pans for washing fruit.
2. Stainless steel paring knives.
3. Quart cup.

4. Standard measuring cup.
5. Large kettle for cooking fruit.
6. Long-handled spoon.
7. Tray.
8. Jelly bag (flannel or felt).
9. Large pan for sterilizing jelly glasses.
10. Sauce pan for cooking jelly.
11. Teaspoons.
12. Colander.
13. Jelly glasses.
14. Paraffin.
15. Small container for melting paraffin.
16. Labels.

Quantity of water to 1 pound prepared fruit

Red raspberries	No water.
Plums	$\frac{1}{2}$ cup.
Quinces	1 cup, or water to cover.
Apples	1 to 2 cups.
Crabapples	1 cup, or water to cover.
Blackberries (firm fruit)	No water to $\frac{1}{4}$ cup.
Blackberries (soft)	No water.
Raspberries (soft)	No water.
Currants	No water to $\frac{1}{4}$ cup.
Gooseberries	No water to $\frac{1}{4}$ cup.
Grapes (ripe)	No water. Crushed, using juice.
Grapes (wild)	1 cup.

Sugar: Use beet sugar. Repeated tests show that there is no difference between refined beet and cane sugar. Beet sugar is a Western product. Work with a small quantity of juice at a time—6 to 8 cups. Measure the sugar and juice accurately.

Quantity of sugar to 1 cup of Juice

Apples	$\frac{3}{4}$ cup.
Blackberries	$\frac{3}{4}$ cup.
Black raspberries	$\frac{3}{4}$ cup.
Wild plum	$\frac{3}{4}$ cup.
Red raspberries	$\frac{3}{4}$ cup.
Grapes (cultivated)	$\frac{3}{4}$ to 1 cup.
Grapes (wild)	1 cup.
Crabapples	1 cup.
Currants	1 cup.
Gooseberries	1 cup.

Utilize Pulp:

Utilize left-over pulp to make jam, fruit butters, etc.

Jellies can be made easily from grapes (tame or wild), quinces, plums, currants, apples (sour), blackberries (under-ripe), cranberries.

Apple Pectin:

Combine with such fruits as peaches, strawberries, apricots, rhubarb, and other fruits lacking pectin (*see table*).

One pound apple pulp (made from the skins and cores)	4 pints water 4 pounds fruit
Juice of one lemon	

Boil 30 minutes. Press through a cheese cloth. Strain through flannel jelly bag without pressure. Boil this juice 15 minutes. Can in glass jars, and keep for jelly making.

Jelly Failures and Their Causes

The following is a list of common jelly failures and their causes:

1. Mold or fermentation.
 - a. Containers not sterilized by boiling in water.
 - b. Careless handling of container after sterilization.
 - c. Imperfect seal or container.
 - d. Too little sugar.
2. Color dark, cloudy.
 - a. Juice squeezed rather than allowed to drip.
 - b. Juice not strained through thick cloths.
 - c. Overcooking.
3. Sugar crystals.
 - a. Too much sugar or too little acid or pectin.
 - b. Sugar added too near end of cooking process.
4. Weeping.
 - a. Too much acid in proportion to pectin present.
5. Jelly soft.
 - a. Juice poor in pectin because too ripe or unsuitable for jelly making.
 - b. Too much sugar.
 - c. Insufficient cooking.
6. Jelly stiff.
 - a. Too little sugar.
 - b. Cooked too long.
7. Jelly tough and gummy.
 - a. Overcooked.
 - b. Too little acid.
8. Jelly syrupy.
 - a. Too much sugar.
 - b. Too little pectin (fruit too ripe or unsuitable).
 - c. Long, slow cooking (destroys pectin).

Score Card

Jellies

Package—Glasses of uniform size, and full, clean and neatly labeled.	10
Color—Characteristic color of the fruit, bright, translucent.	20
Consistency—Holds its shape when removed from the glass but quivers when moved.	30
Tender, cuts easily with a spoon and holds sharp edges. Free from crystals.	
Flavor—Characteristic flavor of fruit used, free from excessive sweetness, acid, and overcooked flavor.	40
	100

Suggestions for Club Meetings

First Meeting—*Organization*

1. Call to order.
2. Roll call.
3. Election of officers.
4. Explanation of requirements by leader.
5. Place and time of meetings.
6. Club pledge.
7. Dismissal.

Second Meeting

1. Call to order.
2. Roll call.
3. Announcements by leader.
4. Discussion of canning of meat and poultry.
5. Use of steam pressure cooker discussed and operation shown.
6. Selection by leader of demonstration team for following meeting.
7. Club pledge.
8. Games.
9. Dismissal.

Third Meeting

1. Call to order.
2. Roll call.
3. Demonstration of canning fruits or vegetables.
4. General discussion by club of points involved.
5. Review steps in canning.
6. Selection of demonstration teams for next meeting.
7. Club pledge.
8. Dismissal.

Fourth Meeting—

1. Call to order.
2. Roll call.

3. Demonstration of canning meat by one team.
4. Demonstration of canning soup mixtures by second team.
5. Selection of demonstration teams. Following meeting to be practice judging.
6. Appoint committee to arrange for provision of canned fruits, vegetables, and meats to be judged at next meeting.
7. Club pledge.
8. Dismissal.

Fifth Meeting

1. Call to order.
2. Roll call.
3. Check on record books.
4. Announcements by leader.
5. Practice judging by entire group, using score cards.
6. Selection of demonstration teams for following meeting.
7. Song.
8. Club pledge.
9. Dismissal.

Sixth Meeting

1. Call to order.
2. Roll call.
3. Report on home work.
4. General report of individual members on problems in canning.
5. Demonstration of jelly making.
6. Following meeting to be judging demonstration of jelly—selection of team by leader.
7. Club pledge.
8. Games.
9. Dismissal.

Seventh Meeting

1. Call to order.
2. Roll call.
3. Report on record books.
4. Report on home work.
5. Judging demonstration of jelly.
6. General discussion.
7. Announcements by leader and selection of demonstration team for next meeting.
8. Song.
9. Club pledge.
10. Dismissal.

Eighth Meeting

1. Call to order.
2. Roll call.
3. Announcements.
4. General discussion of all demonstrations given to date.
5. Judging demonstration on jelly, using score card.
6. Club pledge.
7. Dismissal.

Ninth Meeting

1. Call to order.
2. Roll call.
3. Review steps in jelly making: equipment used, quantity of water to fruit, essentials for good jelly.
4. Plans for next meeting.
5. Club pledge.
6. Games.
7. Dismissal.

Tenth Meeting

1. Call to order.
2. Roll call.
3. Plans for Achievement Day.
4. Report on home work.
5. Judging demonstration. Team selected spontaneously by leader.
6. General review of points in canning.
7. Check on record books.
8. Appoint committees to arrange for picnic lunch.
9. Club pledge.
10. Dismissal.

Eleventh Meeting

1. Call to order.
2. Roll call.
3. General plans for completion of year's work.
4. Record books completed.
5. Judging contest—score cards used.
6. Picnic lunch.
7. Club pledge.
8. Games.
9. Dismissal.

Twelfth Meeting

Achievement Day.—Record books are to be turned in for the final completion of the project, and the club may present exhibits of work done or other activities suitable for the achievement day program.