

## Prevent

# *Spoilage and Poor Quality in*

## **HOME CANNED FOODS**

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# PREVENT SPOILAGE IN CANNED FOODS

## Why Food Spoils

You lose time, labor and money when your food spoils. The three causes of food spoilage are:

1. UNDERPROCESSING.
2. FAULTY SEALS.
3. IMPROPER HANDLING.

You can prevent spoilage easily if you seal containers properly and if you follow directions carefully in B-194, "Home Canning . . . Fruits, Vegetables."

### FOOD HAS SPOILED IF

Gas is present in jar or can.  
There is a bad odor.

Appearance is unusual. Sometimes the trouble is poor quality and not spoilage, but to be safe

**BEWARE OF :**

1. Cloudy or frothy liquid.
2. Discolored foods.
3. Mold on surface.
4. Slimy texture.

## Faulty Seals Greatest Trouble

At least 80 percent of spoiled food is caused by poor seals in jars or cans. Follow the directions that come with the jar lids or sealer for closing jars and sealing cans. Check these points carefully when canning:

### In Jars

#### GUARD AGAINST:

1. Nicks or chips on top of jars.
2. Old or damaged jar rubbers or rubber compound in lid.
3. Rubbers not adjusted properly.
4. Particles of food or grease on sealing surfaces.
5. Insufficient heat to seal lid.
6. Too rough handling when processing; inverting or tilting jars while food is still hot.
7. Excess fat that deteriorates rubber during storage.
8. Improper storage:
  - a. Heat and light deteriorate rubber and may cause spoilage.
  - b. Freezing may break seal.

### In Tin Cans

#### AVOID:

1. A poorly adjusted sealer. Lids with compound gaskets must have a tighter seal than those with paper gaskets.
2. Letting paper gasket get wet, because it often falls out.
3. Using badly bent cans or placing them crooked in sealer.
4. Leaving food particles or grease on the rim of the can.
5. Too high pressure or a sudden release of steam which may cause seam to spread in number 3 cans.
6. Fat on the compound gasket which may cause deterioration.

## How To Prevent Underprocessing

1. Follow reliable processing time tables for either pressure canner or water bath.
2. Can low-acid vegetables and meats in pressure canner only.
3. Use a pressure canner with an accurate gauge.
4. Do not close petcock of the canner before air is driven out.
5. Never pack containers too full or too tight; especially shelled beans, corn, greens, mature peas and pumpkin. Follow directions for filling containers.
6. Avoid using too much fat in meats or adding fat to vegetables. Bacteria are less readily killed in fat than in water.
7. Have food hot when container is closed unless canning by the one-step cold-pack method.
8. Use a rack and arrange jars in water bath to allow free circulation of water.
9. When using pressure canner for vegetables and meats, count processing time when gauge registers the necessary pressure. When using water bath for fruits and tomatoes, count time when water begins to boil after the containers have been put in.
10. Follow instruction in B-194, "Home Canning . . Fruits and Vegetables," if canning fruits or tomatoes by steaming method.

# How To Identify and Prevent Kinds of Spoilage

Food	Description of Spoilage	Organism	Prevention	Remarks
I Fruit and Fruit Juices (not tomatoes)	<b>Fermentation:</b> Has bubbles, a cheesy, alcoholic odor and a sour taste. The carbon-dioxide which accumulates during fermentation may break the seal on the jar or spread the seam of the can. Usually there is an outburst of gas and a spurt of liquid when the container is opened.	Yeast	<ol style="list-style-type: none"><li>1. Have good seal.</li><li>2. Use water bath for processing instead of open kettle. Boiling food in open kettle will destroy yeast; however, more organisms from the air or container may get on the food as it is being transferred to the jar or can; therefore, fruit should be heated in a water bath after it is packed in container.</li></ol>	<ol style="list-style-type: none"><li>1. Is easiest organism killed by heat.</li><li>2. Usually develops within a short time after canning.</li><li>3. Foods spoiled by yeast are not harmful, but usually have a very disagreeable flavor and should not be eaten.</li><li>4. Yeasts are more easily killed in unsweetened fruit or fruit cooked in a light syrup.</li></ol>
II Fruit, Fruit Juices and Tomato Products	<b>Swells in Fruit:</b> Is gaseous and frothy in appearance. Has bad odor.	<b>Bacteria</b> Acid-tolerant and usually non-sporeforming.	<ol style="list-style-type: none"><li>1. Use fresh food.</li><li>2. Have food, containers and equipment clean.</li><li>3. Process adequately.</li></ol>	<ol style="list-style-type: none"><li>1. Spoilage develops within a few days after processing.</li><li>2. Food is not dangerous to health but is not wholesome.</li></ol>
III Tomatoes and Tomato Juice	<b>Flat Sour in Tomatoes:</b> Has a medicinal, sour or bitter flavor. Sometimes a sour odor. Does not have gas or change of appearance.	<b>Bacteria</b> A Mesophilic group which is sporeforming.	<ol style="list-style-type: none"><li>1. Use fresh, clean, sound tomatoes.</li><li>2. Have food hot when jar is closed unless canning by one-step method.</li><li>3. Cool quickly after canning.</li><li>4. Store in a cool place.</li></ol>	<ol style="list-style-type: none"><li>1. Is not dangerous to health but unappetizing in flavor.</li></ol>
IV Fruit, Fruit Juices and Tomato Products	<b>Mold:</b> A fuzzy, grayish or white growth forms on surface of the food. Usually has a musty odor. Food is often slimy.	Mold	<ol style="list-style-type: none"><li>1. Have good seal.</li><li>2. Use water bath for processing instead of open kettle. Boiling food in open kettle will destroy mold; however, more organisms from the air or container may get on the food as it is being transferred to the jar or can. Therefore, fruit and tomato products should be heated in a water bath after they are packed in container.</li></ol>	<ol style="list-style-type: none"><li>1. Is not dangerous in small amounts on fruits and tomatoes. Remove mold along with part of the food near it, and boil the rest of the food 10 minutes in open kettle before tasting.</li><li>2. Mold may destroy the acidity of the fruit, affect the protein and consume air present; then the botulinum organism can develop. This does not apply to preserves and jelly because of the high sugar and solids content, nor does it apply to pickles because of the acid content. With these, remove the mold and some of the product, but it is not necessary to reheat.</li></ol>
V Vegetables and Meat	Same as above.	Mold	<ol style="list-style-type: none"><li>1. Have good seal.</li><li>2. Use pressure canner only for meats and vegetables.</li></ol>	<ol style="list-style-type: none"><li>1. Is dangerous.</li><li>2. Discard by burning or burying with lye.</li><li>3. Mold in vegetables and meats nearly always indicates poor seal.</li></ol>
VI Vegetables and Meat  This spoilage is common in fat meat, greens, corn and mature-shelled beans and peas.	<b>Putrefactive:</b> Has very foul odor which is more pronounced upon heating. Is slimy or soft. Usually is darker than normal product. Gas is always present.	<b>Bacteria</b>  A putrefactive anaerobe which is sporeforming.	<ol style="list-style-type: none"><li>1. Underprocessing is cause of this spoilage. Process all vegetables and meats in pressure canner. Follow processing times in reliable canning bulletins.</li><li>2. Have food, all utensils, table surface and containers thoroughly clean.</li><li>3. Use clean water for brine.</li></ol>	<ol style="list-style-type: none"><li>1. Spoilage develops in a few days or within several weeks.</li><li>2. Do not taste unheated food if suspected of putrefactive spoilage. It may be dangerous. Heat at boiling temperature with frequent stirring for 15 to 20 minutes before tasting. If odor becomes more pronounced, destroy food and container by burning or burying with lye.</li><li>3. In meats, the presence of excessive fat may make the food difficult to process adequately.</li><li>4. Never add meat to vegetables for canning.</li></ol>
VII Vegetables and Meat  All meat and vegetables not properly processed are susceptible.	<b>Botulinum:</b> When in protein foods, may have a cheesy or rancid butter odor, or rotten odor which becomes more pronounced by heating. Gas is sometimes but not always present. Liquid is sometimes but not always cloudy. Food is sometimes soft or slimy but not always. When typical, it is like putrefactive described above, but it is not always typical. In some products such as snap beans, greens and asparagus, the spoilage may not be detected by appearance, odor or even taste; therefore, these foods are more dangerous when spoiled in this way.	<b>Bacteria</b>  <b>Clostridium botulinum</b> is a spore-forming putrefactive anaerobe. These bacteria are found in dirt and are the most dangerous of all bacteria which may be present in foods.	<ol style="list-style-type: none"><li>1. Underprocessing is cause of this spoilage. Process all vegetables and meats in a pressure canner. Follow processing times in reliable canning bulletins.</li><li>2. Have food, all utensils, table surface and containers thoroughly clean.</li><li>3. Use clean water for liquid.</li></ol>	<ol style="list-style-type: none"><li>1. Is deadly poisonous. The toxin is so poisonous that death has resulted from merely tasting a small bite of the spoiled food.</li><li>2. It usually develops in canned food during storage of 2 or 3 weeks or longer.</li><li>3. Heat any doubtful food in an open kettle for 15 to 20 minutes at boiling temperature with frequent stirring before tasting. If a bad odor develops during heating, destroy the food and container immediately by burying with lye.</li><li>4. Reheat such food if served at a later meal. If the organism is present, toxin may develop between meals.</li><li>5. Botulinus toxin develops in canned foods only when they have been improperly processed.</li><li>6. It does not develop in pickles, preserves or jellies.</li></ol>
VIII Vegetables  Shelled beans, peas and corn are very susceptible. This is also common in pumpkin, greens and mature snap beans.	<b>"Flat Sour":</b> No gas is present and there is no bulged seam. Has disagreeable sour flavor. Has unpleasant odor. Usually has cloudy liquid and sloppy appearance.	<b>Bacteria</b>  Thermophilic group which has very resistant spores.	<ol style="list-style-type: none"><li>1. Speed in gathering, preparing, processing and cooling is most important.</li><li>2. Keep food cool while gathering and preparing for canning and while storing after canning.</li><li>3. Avoid temperature of 100 to 130 degrees F. at all times. Food should be kept higher or lower than this temperature.</li><li>4. Cleanliness is essential.</li><li>5. Never add sugar to vegetables before canning</li></ol>	<ol style="list-style-type: none"><li>1. Is not poinsonous but should not be eaten.</li><li>2. The thermophilic bacteria which cause flat sour develop best at a temperature between 100 to 130 degrees F.; therefore, avoid letting food stand at this temperature for any length of time, before, during or even after canning.</li><li>3. Even though these bacteria may not all be destroyed when the food is canned, if the food is cooled quickly and stored in a cool place, the bacteria will lay dormant and cause no trouble. However, if the bacteria are still present and the containers are not cooled quickly and not stored in a cool place, bacteria may develop and cause spoilage.</li></ol>
IX Vegetables  Common in greens, mature peas, shelled beans and corn.	<b>"Swell":</b> Gas is present. Cans swell and jars burst or crack or break the seal. If match is lighted as gas escapes when swelled can is opened, a flame will burn. Usually has faint odor of rancid butter.	<b>Bacteria</b>  Thermophilic anaerobe which is sporeforming.	Same as above.	<ol style="list-style-type: none"><li>1. Is not poisonous but should not be eaten.</li><li>2. This spoilage usually develops in 1 to 4 weeks if stored in a warm place.</li></ol>
X Vegetables  Occurs in corn, mature peas and beans.	<b>Sulfide spoilage:</b> Contains a grayish or black discoloration throughout the product. Has rotten egg odor which is due to hydrogen sulfide. No gas is present.	<b>Bacteria</b>  Thermophilic group which must have protein present.	Same as above.	<ol style="list-style-type: none"><li>1. Is too foul to eat.</li><li>2. The hydrogen sulphide is similar in appearance to iron sulfide or copper sulfide which is not spoilage. The difference is a foul odor in hydrogen or sulfide spoilage.</li></ol>
XI Black Beets	<b>Black Beets:</b> No unusual odor or gas is present. Blackening of beets is only indication of spoilage.	<b>Bacteria</b>  Mesophilic which must have iron present.	<ol style="list-style-type: none"><li>1. Process properly.</li><li>2. Avoid contact with iron.</li><li>3. Cleanliness is essential.</li></ol>	<ol style="list-style-type: none"><li>1. Iron must be present for the bacteria to develop the color. The iron may come from water, an iron kettle or a chipped enamel vessel used for precooking. After long storage, the iron base of the can may cause the trouble.</li></ol>

# How to Identify and Prevent Kinds of Poor Quality Canned Foods

Description	Prevention	Remarks
<div>I</div> <div>Brownish Discoloration of Fruit</div> <div>ApplesPearsPeachesApricotsPineapple</div>	<div><div>1. Prevent discoloration of such fruits as peaches, pears, apricots and apples by using <i>one</i> of the following methods:<div><div>a. Use 125 mg. of ascorbic acid (vitamin C) for each pint of fruit, or for each ½ cup of syrup. Ascorbic acid comes in tablets of 25 mg., 50 mg. and 100 mg. Dissolve the tablets in the hot sugar syrup which is to cover the fruit. Powdered ascorbic acid may be used instead of the tablets. It is added to the syrup just before pouring it over the fruit. Use ¼ teaspoon of powdered ascorbic acid per pint of syrup.</div><div>b. Dissolve ¼ teaspoon of citric acid in 1 quart cool water. Leave fruit in the solution only 15 to 20 minutes, remove, pack jars and cover with sugar syrup. Use about a gallon of solution for a bushel of fruit.</div><div>c. There are special commercial preparations of ascorbic acid for canning fruits on the market. These usually contain added sugar and citric acid. When using commercial mixes, follow manufacturers’ directions and be sure to use enough liquid to cover the fruit.</div><div>d. Mix 2 tablespoons of vinegar or lemon juice and 2 tablespoons of salt with 1 gallon of cold water. Allow the peeled pieces to remain in the solution not longer than 15 to 25 minutes. Drain and pack in jars immediately. This method is not as effective as the above methods, but it is less expensive.</div></div></div></div> <div>2. Handle fruit quickly in preparing it to prevent unnecessary exposure to air or treat with solution described above.</div> <div>3. Drop into already prepared syrup as fruit is being peeled, if it is not treated with solution described above. This is especially good for pineapple.</div> <div>4. If to be packed raw and steamed, it is best to treat with solution described above or cover with hot syrup and start heating as quickly as possible.</div> <div>5. Have food hot when sealed.</div> <div>6. Do not overcook or underprocess. Either may cause discoloration. Follow directions in B-194, “Home Canning . . . Fruits and Vegetables.”</div> <div>7. Store jars in dark place.</div>	<div><div>1. If discoloration is just on top, the fruit was not hot enough when sealed or it was exposed to air too long before heating. It may be a poor seal.</div><div>2. Discolored fruit is not harmful to eat if there is no gas present, no off-odor nor off-flavor and the liquid is clear.</div></div>
<div>II</div> <div>Pears and Apples</div> <div>Turning pink to light purple.</div>	<div><div>1. Keep fruit cool after it is gathered and before it is canned.</div><div>2. Avoid overcooking fruit or heating at too high temperature.</div><div>3. Store in cool, dark place.</div></div>	<div><div>1. If fruit was grown in very dry, hot weather, it often turns pink.</div><div>2. This is an enzymatic and chemical reaction.</div><div>3. It takes place in tin cans more often than jars.</div><div>4. It is found in commercially canned pears as well as in home canned.</div></div>
<div>III</div> <div>Grayish to Black Discoloration</div> <div>Occurs in meats, corn, mature-shelled peas and beans. Grayish deposits are more noticeable in top of can and along seam. Sometimes it is scattered throughout contents. The plain can often has purplish splotches on surface.</div>	<div><div>1. Avoid precooking in iron or copper kettle.</div><div>2. Avoid using water which has iron or copper in it.</div><div>3. Use stainless steel knives for preparation.</div><div>4. Use pure salt such as dairy, cheese or curing salt, if possible.</div><div>5. Use proper kind of can.</div><div>6. Use young tender vegetables.</div><div>7. Work quickly in preparation and do not let vegetables stand too long.</div><div>8. Do not use too much fat in meats. Never add fat to vegetables.</div><div>9. Avoid too much head space in can.</div><div>10. Have food hot when sealed.</div><div>11. Store jars in cool, dark place.</div></div>	<div><div>1. Small amounts of sulphur compounds are liberated by protein foods during processing. These combine with the iron base of a tin can, jar lid or other iron to form iron sulphide which is grayish to black in color.</div><div>2. If there is no bad odor, the food may be eaten after boiling at least 15 minutes in an open kettle.</div><div>3. It is unattractive and should be avoided if possible.</div></div>
<div>IV</div> <div>Brownish Discoloration</div> <div>in tender young corn.</div>	<div><div>1. Avoid over cooking.</div><div>2. Use young corn, but not too young.</div><div>3. Cool rapidly after canning.</div></div>	<div><div>1. When corn is too young or is overcooked when it is very young and tender, the sugar caramelizes and causes a brownish discoloration.</div><div>2. It is not harmful but lacks the best flavor.</div><div>3. When corn is at right milk state (not too young nor too old) it yields a better product.</div></div>
<div>V</div> <div>Faded Food</div>	<div><div>1. If in jars, store in a dark place because light destroys color.</div><div>2. Use “R” enamel cans to prevent loss of color in red foods such as berries, beets or cherries if to be canned in tin.</div><div>3. Use varieties that do not lose color when canned.</div><div>4. Fresh young tender products retain color best.</div><div>5. Improper preparation and precooking destroys color such as in beets and greens.</div><div>6. If contents are not hot enough when sealed, the food on top often fades.</div><div>7. Avoid loss of liquid when canning in glass.</div><div>8. Do not overcook or store in too warm a place.</div><div>9. Use food within 1 year because age hastens fading.</div><div>10. To help prevent fading of strawberries canned in glass, add 1 teaspoon lemon juice per pint just before the berries are processed.</div></div>	<div><div>1. Faded food is all right to eat if there is no gas, off-odor, or cloudy liquid present.</div><div>2. It is usually considered that the deeper the color, the more food value present.</div></div>
<div>VI</div> <div>Floating Fruit</div>	<div><div>1. Avoid using overripe fruit.</div><div>2. Fill container full of fruit.</div><div>3. Refill after steaming if “pack raw and steam” method is used.</div><div>4. Do not use too much sugar.</div><div>5. Have food hot when sealed.</div><div>6. Do not overcook or process too long.</div></div>	<div><div>1. If no gas or off-odor is present, food is safe to eat.</div><div>2. Overcooking causes loss of food value as well as texture.</div></div>
<div>VII</div> <div>Mushy Food</div> <div>(Not Spoiled)</div>	<div><div>1. Do not use overripe products.</div><div>2. Use good canning varieties if possible.</div><div>3. Gather in cool of the day and work quickly in preparing for canning.</div><div>4. Do not precook food too long or allow it to stand at a warm temperature any longer than necessary.</div><div>5. Avoid too much stirring or rough handling in packing.</div><div>6. Quickly bring pressure up for vegetables or meats and bring the water to a boil quickly for fruits in water bath.</div><div>7. Avoid letting pressure go too high.</div><div>8. Do not process too long.</div><div>9. Cool quickly after canning.</div><div>10. Store in cool place but do not allow to freeze.</div></div>	<div><div>1. If no gas or off-odor is present, mushy food is safe to eat.</div><div>2. Overcooking causes loss of food value as well as texture.</div><div>3. If overcooking of foods cannot be prevented, use in soups.</div></div>
<div>VIII</div> <div>Toughness or Hardness</div> <div>in foods</div>	<div><div>1. Avoid using underripe fruits or too mature vegetables such as shelled beans, peas and corn.</div><div>2. Do not use hard water for syrup or brine.</div><div>3. Salt containing large amounts of calcium or magnesium cause toughness. This may be desirable in tomatoes.</div><div>4. Process proper length of time.</div><div>5. Certain varieties of vegetables which are not adaptable for canning often become hard or tough.</div></div>	<div><div>1. Do not use soda to soften vegetables because it destroys food value.</div><div>2. If vegetables are extremely hard, and if cooking does not tenderize them, they can be ground and used in soups.</div></div>
<div>IX</div> <div>Cloudiness in Liquid</div> <div>Common in mature peas and beans</div>	<div><div>1. The starch content in too mature beans and peas usually causes cloudiness.</div><div>2. Poor canning varieties cause cloudiness.</div><div>3. Uneven grading results in cloudiness. Small tender peas cook to pieces by the time older ones are heated through.</div><div>4. If peas or beans are shelled too long before canning or if they are allowed to stand in too deep a container and heat, there may be a cloudy liquid in the canned product.</div><div>5. Hard water or salt containing impurities or lump-preventing substances such as magnesium carbonate may cause cloudiness.</div><div>6. In case of fruit, poor-quality sugar or overripe fruit results in cloudiness.</div><div>7. In case of kraut or dill pickles, fermentation causes cloudiness. It is normal and not harmful.</div></div>	<div><div>1. Cloudiness often indicates spoilage; therefore, be cautious. Flat sour and botulinus spoilage are often accompanied by cloudiness.</div><div>2. Look for disagreeable odor. Boil food 15 minutes before tasting if liquid is very cloudy or if there is question about how food was canned. If food doesn’t smell or taste normal after heating, it should be discarded. In spoiled foods the white deposits and cloudiness of liquid are usually in large amounts.</div></div>
<div>X</div> <div>Yellow Deposits</div> <div>(glucoside crystals)</div> <div>Snap Beans Greens Asparagus</div>	<div><div>1. Cannot be prevented as far as is known now.</div><div>2. It is thought to be due to soil and climatic conditions during growth.</div><div>3. Yellow deposits are caused by a chemical reaction of the sugar and a complex organic compound.</div></div>	<div><div>1. The little yellow specks or deposits are found several weeks to 6 months after canning. When the jar is vigorously shaken or the contents heated, the deposits dissolve and disappear.</div><div>2. There is no off-odor or unusual flavor and the green color is not affected.</div><div>3. The substance is harmless and may be eaten without danger of poisoning if the food is safe otherwise.</div></div>
<div>XI</div> <div>White Deposits</div> <div>(oxalate crystals)</div>	<div><div>1. Cannot be prevented as far as is known now.</div><div>2. Forms from normal constituents of the food.</div></div>	<div><div>1. If in large amounts, may be washed off.</div><div>2. Is not dangerous if eaten. Be sure the white deposits are not indications of spoilage as described under cloudiness.</div></div>
<div>XII</div> <div>Swelled Cans but not Spoilage</div> <div>(hydrogen springer)</div> <div>Often found in prunes, berries, apples and kraut canned in plain tin cans.</div>	<div><div>1. Use proper type of container.</div><div>2. Have food hot when sealed.</div><div>3. Fill container full.</div><div>4. Process correctly.</div><div>5. Cool quickly.</div><div>6. Store in cool place.</div><div>7. Do not store too long.</div></div>	<div><div>1. This is caused by the reaction of the acid on the metal base of the can.</div><div>2. If there is no off-odor, cloudy liquid, unusual color or disagreeable flavor, food may be used without danger.</div></div>

# How to Obtain Good Quality

1. Use *young tender* products.
2. Gather and can in the *cool* of the morning.
3. Can in *small amounts*.
4. *Clean* food thoroughly.
5. Keep *clean* all utensils, containers and cloths which come in contact with food.
6. Use *aluminum, unchipped enamel* or *glass* for holding or precooking food.
7. Aim for *speed* in preparation. "One hour from the garden to can" is ideal.
8. Use proper *type* of can or jar for food being canned.
9. Have food *hot* when sealed unless canning vegetables by the one-step, cold-pack method.
10. Get a *good* seal.
11. Do not *overcook* or *underprocess*.
12. *Cool* quickly.
13. Store in a *dark, dry* place.
14. Store in a cool place—50 to 70 degrees F. It is best for canned food if the temperature does not go below 40 degrees F. or above 80 degrees F.

## *References for Home Canning*

- B-194, Home Canning . . . Fruits, Vegetables
- B-101, Canning Meat in the Home
- B-214, Canning Poultry
- B-200, Sweets for the Family Table
- B-188, Pickles and Relishes
- L-214, The Hows and Whys of Hominy