CIRCULAR A-87

Guard Against Spoilage

in

Home Canned Foods

NORTH DAKOTA AGRICULTURAL COLLEGE
EXTENSION SERVICE
FARGO, NORTH DAKOTA

FORMS OF SPOILAGE — CAUSES

	DESCRIPTION OF SPOILAGE	ORGANISM CAUSING IT
FERMENTATION	Any bulging can or jar with a loose seal is suspicious. Bulging is due to production of carbon-dioxide gas. Usually there is an outburst of gas and a spurt of liquid when container is opened. The product is sour, soft, discolored, and has a cheesy, alcoholic odor. Has bubbles. Not harmful.	Growth of yeast due to undercooking or from introduction of air.
SWELLS	Is gaseous and frothy in appearance and has bad odor. Not poisonous.	Bacteria (usually non-spore forming).
FLAT SOUR	No appearance from the outside of can suggests spoilage. Product is usually soft and mushy but may appear sound. Has sour taste and sour, unpleasant odor. Liquid may be cloudy. Does not have gas and no bulged top or seams. Not poisonous.	Bacteria (heat loving and spore forming).
MOLD	Fuzzy, grayish or white growth forms on surface of food. Usually has musty odor and food is often slimy. Not poisonous.	Molds. Needs air to grow.
PUTREFACTION	Gas is always present. Product is usually darker than normal. Has a foul odor and is slimy and soft.	Bacteria (spore forming).
SULFIDE SPOILAGE	Grayish or black discoloration throughout the food. Rotten egg odor. No gas present. Food too spoiled to eat.	Bacteria.
BOTULISM	Certain bacteria found in foods produce extremely dangerous *toxin* which causes fatal disease known as botulism. Usually associated with other spoilage. May have cheesy or rancid, rotten odor, becoming more pronounced by heating. Gas sometimes but not always present. Liquid may be cloudy. Food sometimes soft or slimy, but not always. In some foods spoilage may not be detected by appearance, odor or even taste. The toxin is almost always fatal. Food as vegetables and meat showing any signs of spoilage should be *destroyed.* The safest way to dispose of the food is by burning.	Bacteria. (Clostridium botulinum is a spore-forming putrefactive anaerobe. Found in dirt and most dangerous of all bacteria).

AND PREVENTION

FOOD AFFECTED	PREVENTION AND REMARKS
Fruit and fruit juices.	Use water bath for processing in place of open kettle. Have a perfect seal. Food spoiled by yeast not harmful but should not be eaten due to flavor. Usually develops a short time after canning. Yeasts are easily destroyed in fruit with light syrups or no syrup, due to low sugar.
Vegetables (as greens, mature peas, beans and corn). Fruits, fruit juices and tomato products.	Use absolutely clean containers and equipment. *Can only fresh foods.* Process carefully.
Vegetables (as peas, corn and beans). Tomatoes and tomato juice.	Can only freshly gathered foods. Do not try to can too much in one batch. *Speed* is most important. Keep food cool while gathering and preparing for canning. Cleanliness is essential. Cool containers quickly after processing. Store canned foods in cool place. Never add sugar to vegetables before canning.
Vegetables, meat, poultry, fruit, fruit juices, tomato products.	Use pressure cooker only for meats and vegetables. Use water bath for fruits and fruit juices. Have a perfect seal. Do not under-process.
Vegetables (as greens, corn), meats, poultry (fat meats).	*Under-processing* is chief cause. Always use pressure cooker and follow reliable directions. Cleanliness important.
Vegetables (as corn, mature peas and beans.	Speed in handling from garden through processing and cooling. Use pressure cooker. Cleanliness essential. May cause darkened lids on jars.
Vegetables. Meats.	*Under-processing* and carelessness is the cause. Use only a pressure cooker. Follow reliable directions. Cleanliness essential. *Speed* in all steps of canning,

POOR QUALITY IN CANNED FOODS		HOW TO PREVENT IT
BROWNISH DISCOLORATION OF FRUITS	(Apples, peaches and pears). Not harmful to eat if no gas or off odor is present.	Treat fruits before canning with solution of vinegar or lemon juice, salt and water. Handle fruit quickly. Have food hot when sealed. Do not over-cook or under-process. Store in dark place.
BROWNISH DISCOLORATION IN CORN	Is harmless but lacks best flavor.	The sugar caramelizes in young corn, causing brown color. Avoid over-cooking. Cool rapidly after canning to avoid over-cooking. Avoid too high temperatures. Too young corn used. Should be in milk stage.
TURNING PINK	(Pears, apples). *Not harmful* if there are no signs of spoilage.	Fruit grown in very dry, hot weather often turns pink. Avoid over-cooking or heating at *too high a temperature.* Store in cool, dark place.
FLOATING FRUIT	Not harmful.	Avoid using over-ripe fruit. Fill containers full of fruit. Do not use too much sugar. Do not over-cook or process too long. Have food hot when sealed.
CLOUDINESS	In mature peas and beans. May be harmful.	Starch content too high. Do not use mature vegetables. Poor canning varieties used. Uneven grading -- small peas cook to pieces before others are cooked. Vegetables shelled too long before canning. Hard water or salt may contain impurities. In case of kraut or dill pickles, fermentation causes cloudiness and is normal and not harmful.
GRAYISH OR BLACK DISCOLORATION	In meats, corn, peas and fish. Small amounts of sulfur compounds are liberated by protein foods during processing and these combine with the iron base of tin covers and cans, to form iron sulfide which is grayish to black in color. The black discoloration or deposit is noticeable on top of can and along seam. Grayish deposits are sometimes scattered throughout the contents.	Avoid using water containing iron or copper. Use stainless steel knives during preparation. Use pure salt. Avoid using iron or copper kettles when precooking the food. Work quickly. Do not use too much fat in meats. Avoid too much head space in jars. This is not poisonous but is unattractive and should be avoided.

CAUTION: *Before tasting, bring all home canned vegetables, meats and poultry to a rolling boil and boil for at least 10 minutes. If food then smells or looks queer, destroy it. Burn spoiled food.*

FOLLOW THESE STEPS FOR GOOD QUALITY

1. Use only tender, ready-to-eat products.
2. Gather products in cool of the morning.
3. Can as soon as possible after gathering. (1 hour)
4. Can in small amounts.
5. Wash foods thoroughly.
6. Have all equipment spotlessly clean.
7. Use enamel, glass or aluminum cooking kettles.
8. Work quickly - aim for speed.
9. Use perfect jars and covers.
10. Have food hot when sealed.
11. Watch your time table. Be accurate.
12. Cool food quickly out of drafts and store in dark cool, dry place.

REFERENCES USED:

C-221 - "Prevent Spoilage and Poor Quality in Home Canned Foods" - Extension Service, Texas.
"Safe Home Canning" - by Meta Given.
AWI-93- "Home Canning" - USDA.
"Food Spoilage" - by Dr. C.I. Nels[illegible] Ph.D., NDAC.

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