



FOOD PRESERVATION

Freezing Vegetables

Barbara J. Willenberg, Associate State Food and Nutrition Specialist
Department of Food Science and Human Nutrition

Frozen foods can add variety to your meals year-round. As with any method of food preservation, following specific guidelines will assure you of high quality, safe food. For additional information, refer to other Human Environmental Sciences guides in the Quality for Keeps freezer series.

Blanching

Blanching, or scalding vegetables in boiling water or steam for a short period of time, is a must for almost all vegetables to be frozen except onions and green peppers. It slows or stops the action of enzymes. Up until harvest

Quality for Keeps



time, enzymes cause vegetables to grow and mature. If vegetables are not blanched, or not blanched long enough, the enzymes continue to be active during frozen storage causing off-colors,

off-flavors and toughening.

In addition, blanching cleanses the surface of dirt and spoilage organisms, brightens the color and helps retard loss of vitamins. It also wilts or softens vegetables and makes them easier to pack.

Blanching time is crucial and varies with the vegetable and size of the pieces to be frozen. Under-blanching speeds up the activity of enzymes and is worse than no blanching. Over-blanching causes loss of flavor, color, vitamins and minerals. Follow recommended blanching times for specific vegetables.

Tips for successful freezing

- Select varieties suitable for freezing. Check a seed catalog or ask the grower.
- Work under sanitary conditions.
- Select young, tender vegetables of good quality that are fresh from the garden. Freezing does not improve quality. Sort for size, ripeness and color.
- If the vegetables cannot be frozen immediately, refrigerate them.
- To prevent loss of quality and nutrients, work in small quantities, enough for only a few containers at a time.
- Wash and drain all vegetables before removing skins or shells. Wash small lots at a time through several changes of cold water. Lift the produce out of the water so the dirt washed off will not get back on the food. Do not let the vegetables soak.
- Remember that yields vary depending on the condition of the produce as well as the preparation and packing methods used. See Table 1 for the approximate yield of frozen vegetables from fresh.
- Prepare each vegetable as directed in this guide and refer to MU publication GH 1501, *Freezing Basics*, for more detailed information on the freezing process and recommended storage times.

Table 1. Approximate yield of frozen vegetables from fresh

Vegetable	FRESH (as purchased or picked)	FROZEN (pints)
Asparagus	1 crate (12, 2-lb. bunches) 1 to 1½ lbs.	15 to 22 1
Beans, lima (in pods)	1 bu. (32 lbs.) 2 to 2½ lbs.	12 to 16 1
Beans, snap, green and wax	1 bu. (30 lbs.) ¾ to 1 lb.	30 to 45 1
Beets (without tops)	1 bu. (52 lbs.) 1¼ to 1½ lbs.	35 to 42 1
Broccoli	1 crate (25 lbs.) 1 lb.	24 1
Brussels sprouts	4 quart boxes 1 lb.	6 1
Carrots (without tops)	1 bu. (50 lbs.) 1¼ to 1½ lbs.	32 to 40 1
Cauliflower	2 medium heads 1½ lbs.	3 1
Greens (chard, collard and mustard)	1 bu. (12 lbs.) 1 to 1½ lbs.	8 to 12 1
Corn, sweet (in husks)	1 bu. (35 lbs.) 2 to 2½ lbs.	14 to 17 1
Eggplant	2 average	2 pints
Kale and spinach	1 bu. (18 lbs.) 1 to 1½ lbs.	12 to 18 1
Okra	1 bu. (26 lbs.)	34 to 40
Peas (in pods)	1 bu. (30 lbs.) 2 to 2½ lbs.	12 to 15 1
Peppers, green	¾ lb. (3 peppers)	1
Pumpkin	50 lbs. 1½ lbs.	30 1
Squash, summer	1 bu. (40 lbs.) 1 to 1¼ lbs.	32 to 40 1
Squash, winter	3 lbs.	2
Sweet potatoes	¾ lb.	1
Tomatoes	1 bu. (45 lbs. ¹)	26 to 34
Tomatoes, for juice	1 bu. (45 lbs. ¹)	20 to 28

¹As defined by the Missouri Department of Agriculture.

Water blanching

For home freezing, the best way to blanch vegetables is in boiling water. Use a blancher with a basket and cover, or fit a wire basket into a large

kettle with a lid.

Use one gallon of water per pound of prepared vegetable. Using these proportions, the water should continue to boil when vegetables are lowered into

water. Put vegetables in blanching basket and lower into vigorously boiling water. Place a lid on the blancher. Start counting blanching time as soon as the water returns to a boil. Keep heat high

so that water continues to boil throughout the blanching process. See recommended blanching times for specific vegetables.

Steam blanching

Heating in steam is the recommended method for grated summer squash and sprouts. For broccoli, pumpkin, sweet potatoes and winter squash, both steaming and boiling are satisfactory methods. Steam blanching takes about 1½ times longer than water blanching.

To steam, use a pan with a tight-fitting lid and a basket that holds the food at least three inches above the bottom of the pan. Use 1 to 2 inches of water in the pan, bring to a boil and leave on high throughout the blanching process.

Place vegetables in the basket in a single layer so that steam reaches all parts quickly. Cover the pan and start counting time as soon as the lid is on.

Microwave blanching

Research has shown that microwave blanching is not always an effective method, as some enzymes may not be inactivated. This could result in low-quality frozen vegetables with off-colors, off-flavors and poor texture. If blanching is done in a microwave oven, follow individual manufacturer's instructions. Microwave blanching does not save time or energy.

Cooling

As soon as blanching is complete, cool vegetables quickly and thoroughly to stop the cooking process. To cool, plunge the basket of vegetables immediately into a large quantity of cold water. Change water frequently or use cold running water or iced water. If ice is used, about one pound of ice for each pound of vegetable is needed. Cool vegetables for the same amount of time as they are blanched. Drain

Types of packs

Dry pack

Dry packing is recommended for all vegetables because it results in a good quality product and preparation for freezing and serving is easier. After vegetables are blanched, cooled and drained, package quickly in rigid freezer containers or freezer bags. Remove as much air as possible from bags. Leave ½-inch headspace for rigid containers. Seal tightly, label and freeze.

Tray pack

A variation of dry packing is tray packing. After vegetables are blanched, cooled and drained, spread in a single layer on shallow trays and freeze. Leave in the freezer just long enough to freeze firm. Longer exposure to dry freezer air will result in moisture loss and quality changes. When frozen, promptly package leaving no headspace, seal tightly, label and return to the freezer. The advantage of tray packing is that vegetable pieces remain loose and can be poured from the container and the package reclosed.

vegetables thoroughly after cooling. Extra moisture can cause a loss of quality when vegetables are frozen.

Thawing and using

Follow the guidelines below to keep frozen vegetables safe and preserve their color, flavor, texture and nutritive value:

- Don't thaw frozen vegetables before cooking (with a few exceptions). Corn-on-the-cob should be thawed so the kernels will not be warmed while the cob interior is still cold. In addition, greens, broccoli and asparagus will cook more uniformly if thawed slightly and broken apart before cooking. Thaw in the refrigerator or under cold running water. Never allow to thaw at room temperature.
- When cooking frozen vegetables, bring a small amount of water to boil and add the frozen vegetables. Bring water to a boil again, cover the pan and lower the heat. Cook just until vegetables are fork tender,

usually about half the cooking time for the same fresh vegetable. See Table 2 for a timetable for cooking frozen vegetables.

- Prepare only enough frozen vegetables for one meal. Any leftovers could be used in salad. Do not refreeze cooked, frozen vegetables.

Other methods of cooking frozen vegetables include steaming, stir frying, pressure cooking or microwaving. Frozen vegetables can be added without thawing to soups or stews. Add them near the end of cooking to prevent texture loss. Many frozen vegetables can be baked in a covered, greased casserole in the oven. Partially thaw and separate pieces first. Although baking time for frozen vegetables varies, the approximate time for baking most partially thawed vegetables is 45 minutes at 350 degrees F. This is not a time- or energy-efficient method, however, unless other foods are being baked in the oven at the same time.

Table 2. Timetable for cooking frozen vegetables¹

Vegetable	Time to cook after water returns to a boil (in minutes)
Asparagus	5 to 10
Beans, lima	
Large type	6 to 10
Baby type	15 to 20
Beans, snap, green or wax	
1-inch pieces	12 to 18
Julienne strips	5 to 10
Beans, soybeans, green	10 to 20
Beet greens	6 to 12
Broccoli	5 to 8
Brussels sprouts	4 to 9
Carrots	5 to 10
Cauliflower	5 to 8
Chard	8 to 10
Corn	
Whole-kernel	3 to 5
On-the-cob (thawed)	3 to 4
Kale	8 to 12
Kohlrabi	8 to 10
Mustard greens	8 to 15
Peas, green	5 to 10
Spinach	4 to 6
Squash, summer	10 to 12
Turnip greens	15 to 20
Turnips	8 to 12

¹Use ½ cup lightly salted water for each pint (2 cups) of vegetables with these exceptions: lima beans, 1 cup; corn-on-the-cob, water to cover.

Freezing instructions for specific vegetables

Asparagus

Select young tender spears. Wash thoroughly and sort into sizes. Trim stalks and remove scales with a sharp knife. Cut into even lengths to fit containers.

Water blanch small spears 2 minutes, medium spears 3 minutes, and large spears 4 minutes. Cool promptly,

drain, package, seal and freeze.

Beans: green, snap or wax

Select young tender pods when the seed is first formed. Wash in cold water and cut into 1-inch or 2-inch pieces or slice lengthwise.

Water blanch 3 minutes. Cool promptly, drain, package, seal and freeze.

Beans: lima, butter or pinto

Harvest while the seed is in the

green stage. Wash, shell and sort according to size.

Water blanch small beans 2 minutes, medium beans 3 minutes, and large beans 4 minutes. Cool promptly, drain, package, seal and freeze.

Beets

Select deep, uniformly red, tender, young beets. Wash and sort according to size. Trim tops, leaving ½-inch of stem and tap root, to prevent bleeding of color during cooking

Cook in boiling water until tender — for small beets 25 to 30 minutes; for medium beets 45 to 50 minutes. Cool promptly in cold water. Peel, remove stem and tap root and cut into slices, julienne strips or cubes. Package, seal and freeze.

Broccoli

Select firm, young, tender stalks with compact heads. Remove leaves and woody portions. Separate heads into convenient-size sections and immerse in brine (4 teaspoons salt to 1 gallon water) for 30 minutes to remove insects. Drain and split lengthwise so flowerets are no more than 1½ inches across.

Water blanch 3 minutes in boiling water or steam blanch 5 minutes. Cool promptly, drain, package, seal and freeze.

Brussels sprouts

Select green, firm and compact heads. Trim, removing coarse outer leaves. Wash thoroughly and immerse in brine (4 teaspoons salt to 1 gallon of water for 30 minutes) to remove insects. Sort into small, medium and large sizes.

Water blanch small heads 3 minutes, medium heads 4 minutes, and large heads 5 minutes. Cool promptly, drain, package, seal and freeze.

Cabbage (including Chinese cabbage)

Frozen cabbage or Chinese cabbage is suitable for use only as a cooked vegetable. Select freshly picked, solid heads. Trim coarse outer leaves from head. Cut into medium to coarse shreds or thin wedges, or separate head into leaves.

Water blanch 1½ minutes. Cool promptly, drain, package, seal and freeze

Carrots

Select young, tender, coreless carrots. Remove tops, wash and peel. Leave small carrots whole. Cut others into thin slices, ¼-inch cubes or lengthwise strips.

Water blanch small whole carrots 5 minutes, diced or sliced 2 minutes, and lengthwise strips 2 minutes. Cool promptly, drain, package, seal and freeze

Cauliflower

Choose compact, snow-white heads. Trim off leaves, cut head into pieces about 1 inch across and immerse in brine (4 teaspoons salt to 1 gallon of water) for 30 minutes to remove insects. Drain.

Water blanch for 3 minutes in water containing 4 teaspoons salt per gallon of water. To prevent darkening, add 2 to 3 tablespoons of lemon juice per gallon of blanching water. Cool promptly, drain, package, seal and freeze.

Celery

Celery loses its crispness when frozen. The frozen product is suitable only for cooked dishes. Select crisp, tender stalks, free from coarse strings. Wash thoroughly, trim and cut stalks into 1-inch lengths.

Water blanch for 3 minutes. Cool promptly, drain, package, seal and freeze.

Corn

Select only tender, freshly-gathered corn in the milk stage. Husk and trim the ears, remove silks and wash.

Corn-on-the-cob. Water blanch small ears (1¼ inches or less in diameter) 7 minutes, medium ears (1¼ to 1½ inches in diameter) 9 minutes, and large ears (more than 1½ inches in diameter) 11 minutes.

Cool promptly and completely to prevent a "cobby" taste. Drain, package, seal and freeze.

Whole kernel corn. Water blanch 4 minutes on the cob. Cool promptly, drain and cut from cob. Cut kernels from cob about two-thirds the depth of the kernels. Package, seal and freeze.

Cream style corn. Water blanch 4 minutes on the cob. Cool promptly and drain. Cut off kernel tips and scrape cobs with the back of a knife approximately half the depth of the kernel to remove the juice and the heart of the kernel. Package, seal and freeze.

Another way to prepare cream style corn for freezing is to cut and scrape the corn from the cob without blanching. Place the cut corn in a double boiler and heat with constant stirring for about 10 minutes or until it thickens; cool by placing the pan in ice water. Package, seal and freeze.

Dill

Do not wash dill. Break dill heads off stems. Place heads in rigid containers, seal and freeze.

Eggplant

Harvest before seeds become mature and when color is uniformly dark. Wash and peel. If eggplant is to be fried, cut in ½-inch slices. For casseroles or mixed vegetables, dice or cut in strips. Work quickly, preparing only enough eggplant for one blanching.

Water blanch diced pieces or strips

2 minutes in 1 gallon of boiling water containing 4½ teaspoons citric acid or ½ cup lemon juice. One-third-inch slices should be blanched for 4 minutes. Cool, drain, package, seal and freeze.

Note: Slices to be fried should be packed between sheets of freezer wrap for easy removal.

Greens

(Includes beet, chard, collard, kale, mustard, spinach and turnip greens.)

Select young, tender green leaves. Wash thoroughly and cut off woody stems. Cut leaves of chard into pieces.

Water blanch collards 3 minutes and all other greens 2 minutes. Blanch tender young leaves 1½ minutes. Cool, drain, package, seal and freeze.

Note: Do not steam blanch greens.

Fresh herbs

Wash, drain and pat dry with paper towels. Wrap a few sprigs of leaves in freezer film wrap and place in a freezer bag. Seal and freeze.

Chop and use in cooked dishes. Herbs prepared in this way are usually not suitable for garnish, as they become limp when thawed.

Kohlrabi

Select young, tender, mild-flavored kohlrabi, small to medium in size. Cut off tops and roots. Wash and peel. Leave whole or dice into ½-inch cubes.

Water blanch whole kohlrabi 3 minutes and cubes 1 minute. Cool promptly, drain, package, seal and freeze.

Okra

Select young tender pods and separate into small pods (4 inches or under) and large pods. Wash. Remove stems at the end of the seed pods, being careful not to cut into the seed pod.

Water blanch small pods 3 minutes and large pods 4 minutes. Cool promptly and drain. Leave whole or slice

crosswise. Package, seal and freeze.

For frying. After blanching, coat okra with cornmeal or flour. Tray freeze in a single layer on shallow trays. Place in freezer just long enough to freeze firm. Package, seal and return to freezer immediately.

Onions

Bulb onions store well in a cool, dry place, so freezing is usually not necessary. It is not necessary to blanch mature onions before freezing. Just dice or slice, package, seal and freeze.

Onion rings. Wash, peel and slice onions. Separate into rings. Water blanch for 10 to 15 seconds. Cool promptly, drain and coat with flour. Dip in milk. Coat with a mixture of equal parts of cornmeal and pancake mix. Arrange in a single layer on a tray. Freeze. Pack into containers using freezer wrap to separate the layers. Seal and return to freezer immediately. Fry frozen rings in 375 degree F oil until golden brown.

Peas: edible podded

Select bright green, tender pods. Wash, remove stems and blossom ends and any strings. Leave whole.

Snow peas. Also called sugar or Chinese peas. Should be harvested when peas are just barely visible in the pods. To freeze, water blanch in boiling water for 2 minutes.

Sugar snap peas. Should be picked when the pods are round and fully mature, 2 to 3 inches long. To freeze, water blanch in boiling water for 2 to 3 minutes. Cool, drain, package, seal and freeze.

Peas: black-eyed or field

Select pods when seeds are tender and well-filled. Wash, shell and discard overmature and immature seeds and those injured by insects. Wash again.

Water blanch 2 minutes. Cool

promptly, drain, package, seal and freeze.

Peas: green

Harvest when pods are filled with young, tender peas that have not become starchy. Wash and shell.

Water blanch 1½ minutes. Cool, drain, package, seal and freeze.

Peppers: bell or sweet

Sweet or bell peppers can be frozen without blanching. Blanched peppers are limp and easier to pack; however, they can only be used in cooked dishes. Select crisp, tender, green or bright red pods. Wash, cut out stems, cut in half and remove seeds and white membrane. Cut in halves, slices, ½-inch strips, rings or dice depending on intended use.

Blanched. Water blanch halves 3 minutes, strips or rings 2 minutes. Cool promptly, drain, package, seal and freeze.

Unblanched. Package raw, seal and freeze.

Peppers: hot

To prevent burning hands when handling hot peppers, wear rubber gloves. Do not touch eyes. Wash peppers and peel by:

1. Placing in a 400 degree F to 450 degree F oven for 6 to 8 minutes. Remove from heat and allow to stand in a wet towel to steam for 15 minutes. Remove skin, stem and seeds.
Or:
2. Blister the skin of the peppers thoroughly on a hot range or with a flame, turning frequently to prevent scorching. Steam peppers as directed above. Slash skin and insert knife at tapered end, pulling the skin off toward stem. Remove stem and seeds.
Flatten whole peppers to remove air.

Pack into containers. For ease in separating when thawing, place freezer wrap between peppers. Seal and freeze.

Potatoes

Because fresh potatoes are available year-round, most people do not find it practical to freeze potatoes at home. However, if potatoes are to be home frozen, it's best to freeze cooked, mashed potato patties, baked stuffed potatoes or french fries.

Baked stuffed potatoes or mashed potato patties. Prepare according to your favorite recipe, cool quickly in the refrigerator, then wrap in moisture/vapor proof packaging. Seal and freeze. The recommended maximum storage time is one month at 0 degrees F. To serve, unwrap and reheat in a 350 degree F oven.

French fried potatoes. Pare and cut potatoes lengthwise into strips about ¼-inch thick. Rinse quickly in cold water and dry well on paper towels.

Oven method: Arrange potato strips in shallow baking pan, brush with melted butter or margarine, and bake at 450 degrees F just until they begin to brown, turning occasionally. Cool quickly in the refrigerator.

Oil method: Blanch potato strips in vegetable oil heated to 370 degrees F until tender but not brown. Drain and cool quickly in refrigerator.

Place prepared strips in moisture/vapor proof containers or bags. Seal and freeze. The maximum recommended storage time is two months at 0 degrees F.

To serve: Return frozen potatoes to baking sheet and bake at 450 degrees F until golden brown, turning occasionally. Or deep-fat fry frozen potatoes at 390 degrees F until golden and crisp.

Pumpkin

Select full-colored mature pumpkins with fine texture. Wash, cut into cooking-size sections and remove seeds.

Cook until soft in boiling water, in steam, in a pressure cooker, in an oven or microwave oven. To cool, place pan containing pumpkin in cold water and stir occasionally. Remove pulp from rind and mash. Package, seal and freeze.

Note: Small pumpkins can be pierced and baked whole on a tray in an oven or microwave oven until soft. After cooling, peel, remove strings and seeds and mash. Package, seal and freeze.

Squash: summer

(Cocozelle, Crookneck, Straight-neck, White scallop, Zucchini)

Choose young squash with tender skin. Wash and cut in ½-inch slices.

Water blanch 3 minutes. Cool promptly, drain, package, seal and freeze.

Grated zucchini (for baking). Choose young tender zucchini. Wash and grate without peeling. Steam blanch in small quantities for 1 to 2 minutes until translucent. Drain well and pack in containers in amounts needed for recipes. Cool by placing the containers in cold water. Seal and freeze. If watery when thawed, drain the liquid before using the zucchini.

Squash: winter

(Acorn, Banana, Buttercup, Butternut, Golden Delicious, Hubbard)

Select firm, mature squash with a hard rind. Prepare same as for pumpkin.

Sweet potatoes

Choose medium to large sweet potatoes that have been cured for at least one week. Sort according to size and wash.

Cook until almost tender in water,

steam in a pressure cooker, oven or microwave oven. Let stand at room temperature until cool. Peel sweet potatoes, cut in halves, slice or mash.

If desired, to prevent darkening, dip whole sweet potatoes or slices for 5 seconds in a solution of 1 tablespoon citric acid or ½ cup lemon juice to 1 quart water. To keep mashed sweet potatoes from darkening, mix 2 tablespoons orange or lemon juice with each quart of mashed sweet potatoes. Pack into containers, seal and freeze.

Baked. Wash, trim and heat potatoes in oven at 350 degrees F without peeling until slightly soft. Cool, remove peel and wrap individually in aluminum foil. Place in freezer bags and freeze. Complete the baking in an oven at 350 degrees F immediately before serving, leaving the potatoes wrapped in foil.

Tomatoes

Select firm, ripe tomatoes with deep red color. Frozen tomatoes will have a mushy texture when thawed and are suitable only for cooking, i.e. in soups, stews, spaghetti sauces, etc. In addition, tomatoes that are frozen raw become watery and develop an off-flavor after a short period in the freezer. Tomatoes that are too ripe for safe canning, but still sound and free from decay, can safely be frozen.

Raw. Wash and dip in boiling water for 30 seconds to loosen skins. Core and peel. Freeze whole or in pieces. Pack into containers, leaving 1-inch headspace. Seal and freeze.

Juice. Wash, sort and trim firm, vine-ripened tomatoes. Cut in quarters or eighths. Simmer 5 to 10 minutes. Press through a sieve. If desired, season with 1 teaspoon salt to each quart of juice. Pour into containers, leaving 1½-inches headspace. Seal and freeze.

Stewed. Remove stem ends, peel and quarter ripe tomatoes. Cover and cook until tender (10 to 20 minutes).

Place pan containing tomatoes in cold water to cool. Pack into containers, leaving 1-inch headspace. Seal and freeze.

Tomato products such as sauce, puree, catsup and chili sauce can be frozen. Prepare as usual, cool rapidly, pack into rigid containers, leaving headspace, and freeze.

Green tomatoes

Select firm, sound green tomatoes. Wash, core and slice ¼-inch thick. No blanching is necessary.

For frying. Pack slices into containers with freezer wrap between the slices. Seal and freeze.

Turnips or parsnips

Select small to medium, firm turnips or parsnips that are tender and have a mild flavor. Wash, peel and cut into ½-inch cubes.

Water blanch for 2 minutes. Cool, package, seal and freeze.

Mashed. Cut into chunks and cook until tender. Drain, mash, cool and pack into containers. Seal and freeze.

For more information on this subject and many others, visit the MU Extension Publications Web site at:

<http://muextension.missouri.edu/explore>



OUTREACH & EXTENSION
UNIVERSITY OF MISSOURI
COLUMBIA

■ Issued in furtherance of Cooperative Extension Work Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. Ronald J. Turner, Director, Cooperative Extension, University of Missouri and Lincoln University, Columbia, MO 65211.
■ University Outreach and Extension does not discriminate on the basis of race, color, national origin, sex, religion, age, disability or status as a Vietnam era veteran in employment or programs. ■ If you have special needs as addressed by the Americans with Disabilities Act and need this publication in an alternative format, write ADA Officer, Extension and Agricultural Information, 1-98 Agriculture Building, Columbia, MO 65211, or call (573) 882-7216. Reasonable efforts will be made to accommodate your special needs.