

## Wild Side of the Menu No. 3

# PRESERVATION OF GAME MEATS AND FISH

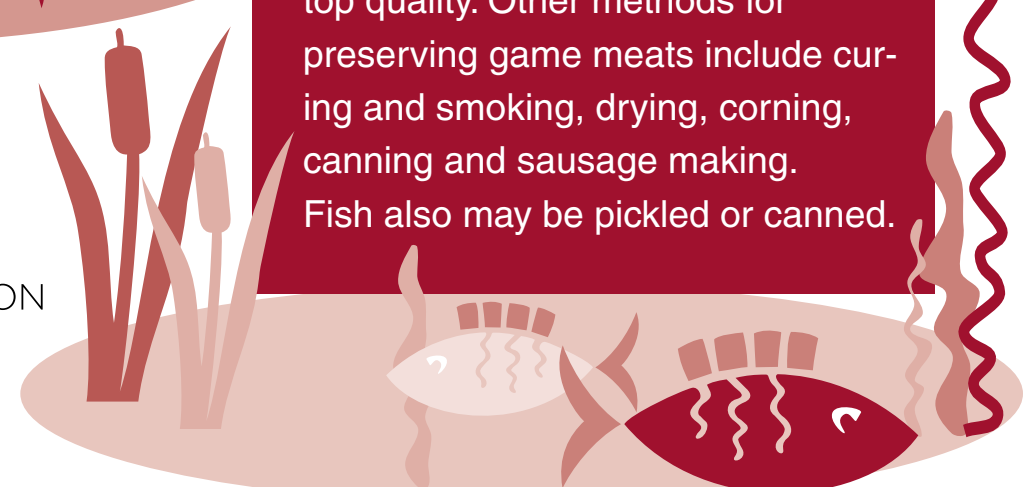
**Martin Marchello**, Ph.D., Professor (retired)  
Department of Animal Sciences, NDSU

**Julie Garden-Robinson**, Ph.D., R.D., L.R.D.  
Food and Nutrition Specialist



Wild game provides wholesome, nourishing food, but it should be handled and preserved carefully to retain quality. Like domestic meat, wild meat is perishable, so care is needed to maintain its safety. The purpose of this publication is to provide recommendations for safely preserving game meats and fish for later enjoyment.

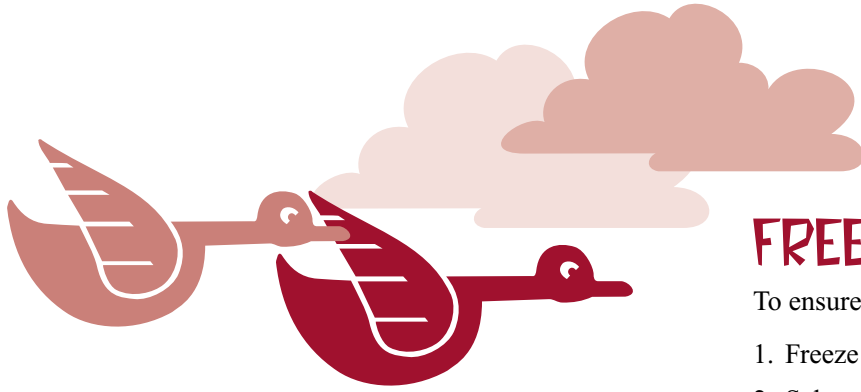
Freezing meat and fish is the most accepted way to maintain top quality. Other methods for preserving game meats include curing and smoking, drying, corning, canning and sausage making. Fish also may be pickled or canned.



**NDSU** EXTENSION SERVICE

North Dakota State University  
Fargo, North Dakota

SEPTEMBER 2003  
Reviewed April 2012



## FOOD SAFETY GUIDELINES

- Wash your hands for at least 20 seconds with soap and water before beginning to work and after changing tasks or after doing anything that could contaminate your hands, such as sneezing or using the bathroom.
- Start with clean equipment. After using, clean equipment thoroughly with hot soapy water.
- After washing cutting boards, other equipment and surfaces with hot soapy water and rinsing, sanitize with a solution of 1 tablespoon chlorine bleach per gallon of water (or approximately 1 teaspoon per four cups water). After spraying the surface or dipping cutting boards in the solution, allow to air-dry. Remake sanitizing solution daily.
- Keep raw meat separate from other foods on cutting boards and other work surfaces. Consider using color-coded cutting boards.
- If using frozen meat in sausage formulations, thaw it in a refrigerator at 40 degrees Fahrenheit or below on the lowest shelf to avoid dripping of juices on ready-to-eat foods.
- Keep meat as cold as possible (40 F or lower) during sausage processing.
- Use a food thermometer to measure internal temperature of smoked meat and other preserved meat. Use a food thermometer to measure doneness in cooked meat, too.
- Use a pressure canner (not a water bath canner) when canning game meat and fish. Dial gauge pressure canners should be calibrated yearly.

## FREEZING GAME MEATS

To ensure good quality in frozen meat:

1. Freeze meat while it is fresh and in top condition.
2. Select proper freezer wrapping materials. To ensure quality, the wrapping material needs to be moisture/vapor resistant. Be sure to use packaging material designed for freezing.
3. Wrap tightly; pressing out as much air as possible.
4. Freeze and store at 0 F or lower.
5. Avoid long storage periods.

Most wild game will keep up to one year frozen without loss of quality. Vacuum packaging of meat before freezing will help maintain excellent quality of the meat.

In most states, hunting laws require that all wild game be used before the next hunting season. Check regulations for the amount of game you can keep and length of time that you can keep it.



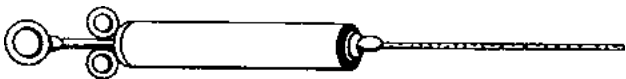
# CURING AND SMOKING GAME

One purpose in curing meat is to make a high-quality meat product for future use. Only properly butchered and thoroughly cooled meats should be used.

Fresh meats can be home-cured by two methods: dry cure or pickle cure (often called sweet pickle cure). Traditionally, dry-cured meats were not injected with sweet pickle; however, when temperature control is difficult or impossible, injecting “pickle” helps to ensure a safe, high-quality product.

The purpose of injecting or pumping is to distribute pickle ingredients throughout the interior of the meat so that curing begins on the inside and cures outward at the same time that curing begins on the outside and works inward. This protects the meat against spoilage and provides a more even curing.

Pumping is usually done with a stitch pump\*, an instrument with a hollow needle and holes in the needles through which brine can come out when the needle is inserted in the meat (Figure 1).



**Figure 1**

\* Can use ordinary syringe. Inject into several areas.

## Stitch Pumping

Pickle recipes usually are given on packages of commercial cure. Start by scrubbing the tip pump in warm soap water, then rinse. To keep the pump sanitary while pumping meat, don't touch the needle with hands or lay it down. When not in use, put pump needle-end-down in container that holds the pickle.

To use, draw pump full of pickle and insert needle all the way into the meat. Push with slow even pressure. As pickle is forced into meat, draw the pump toward you to distribute pickle as evenly as possible. Always fill pump full of pickle to prevent air pockets.

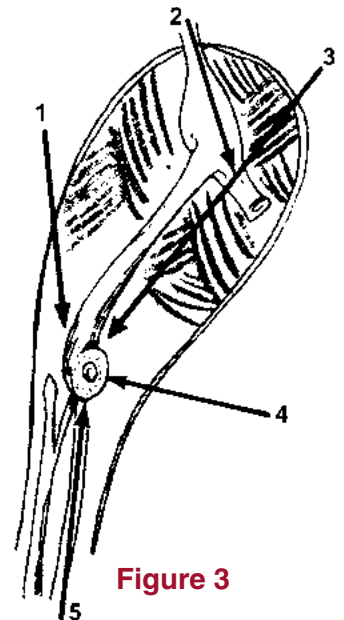
Meat will bulge a little and a small amount of pickle will run out of the meat when the pump is withdrawn. To stop the pickle from running out after the needle is withdrawn, pinch the needle holes together with thumb and forefinger for a few seconds.

Use three or four pumpfuls of pickle for legs and shoulders that weigh 10 to 15 pounds, and five or six pumpfuls for those that weigh 15 to 25 pounds.

The diagrams of the shoulder and leg (Figures 2 and 3) show the bone structure. The lines show how and where the needle of the pump should be inserted for making the five different pumping strokes for large legs and shoulders. For smaller legs and shoulders, fewer injections are needed.



**Figure 2**



**Figure 3**



## Dry-curing Game

After pumping, apply dry cure using the recipe below or a commercial product.\* Rub well over all the meat especially around the bones, hock and the knee joint.

### Dry cure (for 100 pounds of meat)

6 pounds salt  
3 pounds sugar  
3 ounces sodium nitrate or  
1 ounce sodium nitrite\*\*

### Rub dry cure mix over entire leg surface:

1/3 of mix on first day  
1/3 of mix on seventh day  
1/3 of mix on fourteenth day

Place on flat surface, uncovered, at 38 F for two days per pound of leg, or approximately four to six weeks. Curing action stops when temperature inside the meat gets below 34 F.

When the meat is cured, let the smaller legs soak for 30 to 40 minutes and larger ones 60 minutes in lukewarm water. Then work and scrub with clean stiff brush to remove grease and salt. Meat is now ready to smoke.

## Using Sweet Pickle Cure

Put pumped leg in a container such as a crock, barrel, sealed wooden box or a stainless steel container, or in a USDA-approved plastic container that is approved for food products, such as containers used in the restaurant trade. Do not use other metal containers. Add water to cover the meat. Make up pickle solution just prior to putting in the product.

Remove the meat and add enough salt to the water so an egg will float, measuring as you add. If you do not have a specific pickle cure recipe, add sugar to equal one-half the amount of salt used. Add commercial cure to pickle solution according to package directions.

Put leg into pickle solution. Let stand at 38 F for three days per pound of meat (45 days for 15 pounds of meat). If temperature becomes warm and brine becomes ropy, remove meat. Wash the meat. Boil and skim pickle solution or make a new one. The new

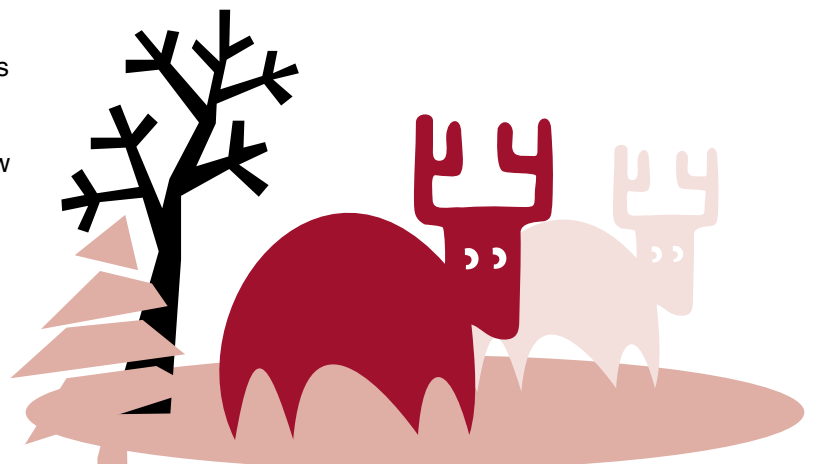
pickle solution should be as strong as the original. If space is a limiting factor, it might be advantageous to bone out the wild game. This procedure is described in Circular FN-125, "Wild Side of the Menu, No. 2, Field to Freezer." Keep the pieces of meat as large as possible and then use one of the procedures described for curing. Smoke after curing is complete.

## Smoking

Smokehouses can be as simple as a tarp covering or as sophisticated as a commercial unit. An old refrigerator makes a useful smokehouse. Caution: For safety, remove the locking device from the door and replace with a simple latch that will lock only from the exterior. Plans for more elaborate smokehouses are available at North Dakota State University Extension Agriculture and Biosystems Engineering Department, North Dakota State University Station, Fargo, North Dakota 58105.

Hardwood such as hickory, maple, chokecherry, oak or apple is best for smoking. Never use a soft wood such as pine because the resin tars will produce off-flavors.

Smoke leg until golden brown at 110 F to 125 F. Then raise smokehouse temperature to 170 F until the internal temperature of the meat reaches a minimum of 137 F. Usually the internal temperature is brought up to 141 F. If you want to have a fully cooked product, then you need to bring the internal temperature to at least 148 F. Ready-to-eat commercial products are even finished at higher temperatures. Once the desired smoke color is obtained, you want to finish your product in your oven. Always use a calibrated meat thermometer to check temperatures.



\*Freeze-Em-Pickle made by B. Heller and Company; "Morton Tender Quick Cure" or other products are appropriate. Each product has its own recipes.

\*\* Sodium nitrate and sodium nitrite (USP Grade) can be obtained at a drug store. Salt peter (potassium nitrate) may be used instead.

# DRYING OR "JERKING"

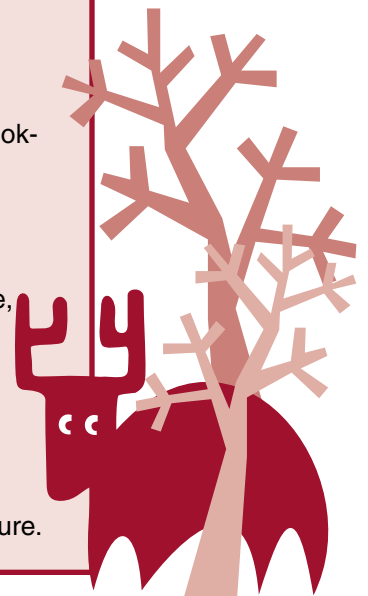
Drying or "jerking" meat is an art that has been known since the dawn of civilization. There are many recipes which can be tried, but before you begin check the **jerky maker's checklist** and then adapt these directions to your own circumstances.

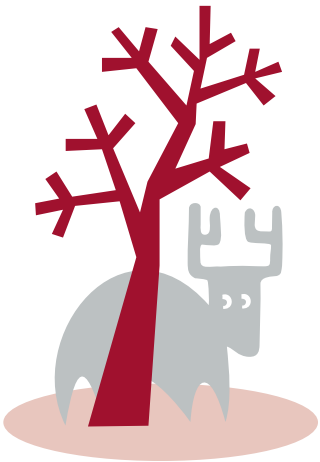
## A Jerky Maker's Checklist

1. Use fresh lean meat that is free of fat and connective tissue.
2. Slice the meat across the grain.
3. Add the correct amount of seasoning. If you do not have a scale, use approximate equivalent measures for seasonings as follows:

Salt.....	10.5 ounces (298 grams)	= 1 cup
	8.0 ounces (227 grams)	= 3/4 cup
	3.0 ounces (85 grams)	= 4½ level tablespoons
Sugar .....	5.0 ounces (141 grams)	= 2/3 cup
	3.5 ounces (100 grams)	= 1/2 cup
	1.0 ounce (28 grams)	= 2 level tablespoons
Ground spices.....	0.5 ounces (14.3 grams)	= 6 level teaspoons
	0.08 ounces (2.4 grams)	= 1 level teaspoon
Salt peter .....	0.3 ounce (8.5 grams)	= 2 level teaspoons
(Potassium Nitrate)		
4. Cure the meat the correct length of time at 38 F. Salted meat should be placed in wooden, stainless steel or stone containers.
5. Keep the drying or smoking temperature in the smokehouse or oven at 120 F (use a thermometer).
6. If an oven is used, line the sides and bottom with aluminum foil to catch the drippings. Open the door to the first or second stop, or prop open to allow moisture to escape and to lower the oven temperature. A fan will speed air circulation and the drying process.
7. Use hardwood for smoking. (Do not use pine, fir or conifers because they cause off-flavors.)
8. Remove the jerky from the smokehouse or oven before it gets too hard for your taste. Five pounds of fresh meat should weigh approximately two pounds after drying or smoking.
9. Store jerky in clean, airtight containers or plastic bags at room temperature, or wrap it in freezer paper and freeze. Check often during the first month to be sure jerky is dry enough to keep well. Although jerky will last almost indefinitely at any temperature, its quality deteriorates after a few months.
10. Seasonings and smoking or drying times can be changed to suit individual tastes. Be careful however, to maintain minimum temperatures to avoid bacterial growth.

Large pieces of meat that are pickle-cured make excellent jerky when sliced and dried or smoked. Corned meat pickle solutions are preferred because spices are included in the cure.





## Smoked Deer Jerky

Debone hind leg, splitting into individual muscles; top, bottom and tip. Pump with brine\* (two pounds commercial saltcure mixture per gallon of water).

Place in crock or USDA-approved plastic container. Do not use plastic containers such as garbage cans, plastic bags or supermarket ice cream buckets. Cover completely with brine and weight meat down to keep it submerged.

Store in cooler (38 F) for 10 days.

Every two days, change the position of the meat and weight it down again.

After 10 days remove from brine and smoke five hours at 150 F.

Hang to dry at room temperature (about two weeks). Cut off to use as needed.

## Beef (or Deer) Jerky

1. Pre-freeze meat to be made into jerky so it will be easier to slice.
2. Cut partially thawed meat into long slices no more than ¼ inch thick. For tender jerky, cut at right angles to long muscles (across the grain). Remove as much visible fat as possible to help prevent off-flavors.
3. Prepare two to three cups of marinade of your choice in a large saucepan.
4. Bring the marinade to a full rolling boil over medium heat. Add a few meat strips, making sure they are covered by the marinade. Reheat to a full boil.
5. Remove pan from range. Using tongs, remove strips from hot marinade (work quickly to prevent overcooking) and place in single non-overlapping layers on drying racks. (Repeat steps four and five until all the meat has been precooked.) Add more marinade if needed.
6. Dry at 140 to 150 F in dehydrator, oven or smoker. Test for doneness by letting a piece cool. When cool, it should crack but not break when bent. There should not be any moist or underdone spots.
7. Refrigerate the jerky overnight in plastic freezer bags, then check again for doneness. If necessary, dry further.

**CAUTION:** Soaking the strips in marinade before precooking is not advised as the marinade could become a source of bacteria. Putting unmarinated strips directly into the boiling marinade minimizes a cooked flavor and maintains the safety of the marinade.

Source: Oregon State University

## Hot Pickle Cure Jerky

**Yield:** Five pounds of fresh meat should weigh approximately two pounds after drying or smoking.

1. Slice 5 lb. of meat (¼ inch thick strips) with the grain. Use lean meat free of fat and connective tissue.
2. Spread out meat and sprinkle on 3 Tbsp. salt, 2 tsp. ground black pepper, and 2 Tbsp. sugar. Put the meat in a pan or dish and let stand for 24 hours in the refrigerator.
3. Pound the meat on both sides to work in the spice. Optional: Dip strips of meat in a liquid smoke solution (five parts water to one part liquid smoke) for one to two seconds for added flavor.
4. Make a brine by dissolving ¾ cup salt, ½ cup sugar, and 2 Tbsp. ground black pepper in a gallon of water. Stir to dissolve the salt and sugar.
5. Bring the brine to a low to medium boil. Immerse the fresh meat strips (a few at a time) into the boiling brine until they turn gray (one to two minutes). Remove meat from the brine, using clean tongs or other utensils that have not contacted the raw meat.
6. Spread out meat on a clean dehydrator rack or on a clean rack in the top half of a kitchen oven. If you use a kitchen oven, open the oven door to the first of second stop. Heat at 120 to 150 F (lowest oven temperature) for 9 to 24 hours or until the desired dryness is reached.
7. Remove jerky from oven before it becomes too hard or brittle. Properly dried jerky should crack when bent in half but should not break into two pieces.
8. Store jerky in clean jars or plastic bags, or wrap it in freezer paper and freeze. If kept dry, properly prepared jerky will last almost indefinitely at any temperature, but is quality deteriorates after a few months.

Source: University of Wyoming

# CORNING GAME

Venison, antelope, moose, bear or beef can be corned following the same method. People who usually do not like wild meats may like them corned, as corning takes out the musky wild flavor and tenderizes the toughest wild meats. A good piece of round is wonderful corned, but less desirable cuts of meat like the brisket can be corned, too.

## To make six gallons of corning liquid:

- 3 pounds (6¾ c.) salt
- 10 ounces (1⅜ c.) sugar
- 2 ounces sodium nitrate
- ½ ounce sodium nitrite
- 3 level tsp. black pepper
- 3 level tsp. ground cloves
- 6 bay leaves
- 12 level tsp. mixed pickling spice

For onion flavor, add one medium-size onion, minced. For garlic flavor, add 4 garlic cloves, minced. Put the ingredients into a pickle crock or glass jar and add enough water to make a total of 6 gallons, including the ingredients. Cover the container.

The ideal temperature for corning meat is about 38 F. During the fall or spring months, this is not too difficult to obtain. In the winter, an unheated part of a basement can be used for corning meat. During summer months, it is hard to find a place around 38 F. Higher temperatures need not affect the end result of the corning process at all, if, for every 15 F of temperature above 38 F, you add one-third more salt. At 83 F, add three pounds more salt, making a total of six pounds of salt.

Place meat into the liquid. Put a heavy plate on meat; weight plate, if necessary, to keep meat below pickle brine.

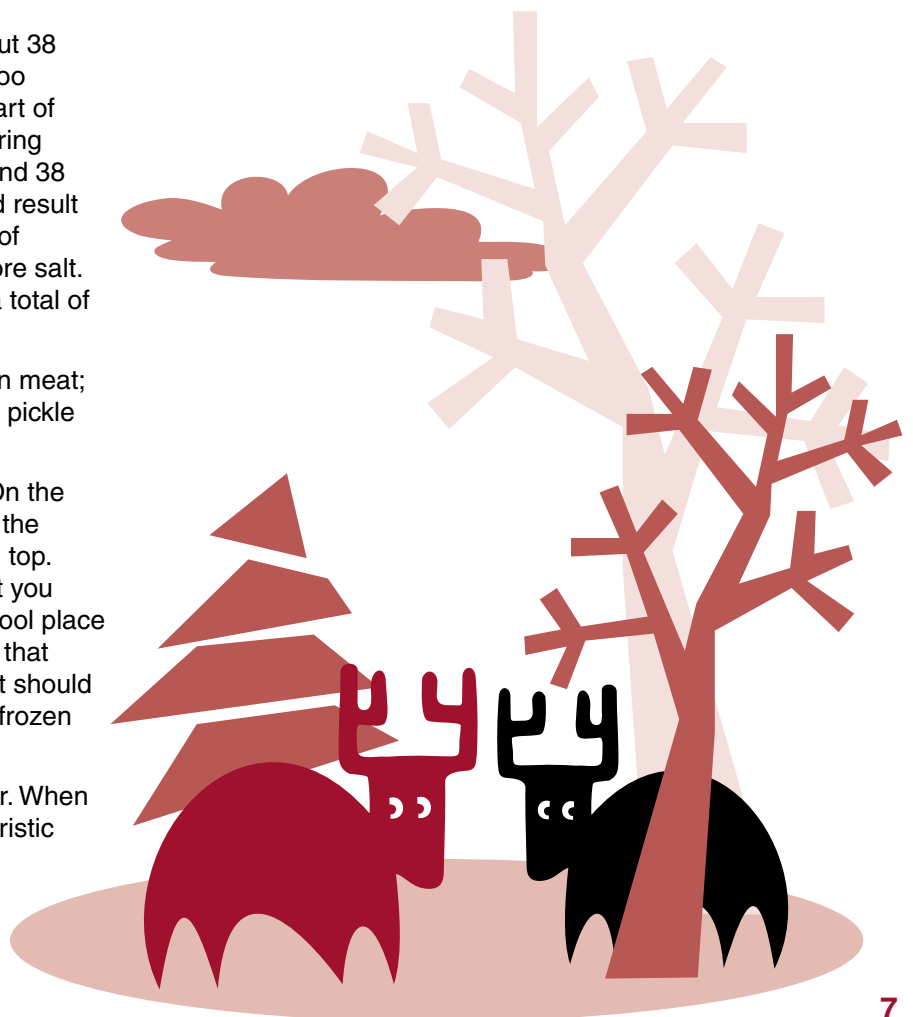
Leave the meat in corning liquid for 15 days. On the fifth and 10th days, stir the liquid well, remove the meat and put it back so the bottom piece is on top. After the 15th day, remove the meat. Use what you want immediately and store the balance in a cool place refrigerated at 38 degrees. It is recommended that after meat is removed from the corning liquid it should be cooked and consumed within one week or frozen for up to one month.

The meat at this stage has a grayish pink color. When cooked, corned meat changes to the characteristic pink color associated with a cured product.



## Cooking Corned Meat

Place the corned meat in a pan with a cover. Add cold water to cover meat. Bring to a boil and remove the scum from the water. Reduce the heat and simmer for about five hours or until tender. Season to taste and serve as the main meat dish.



# CANNING GAME

Only good quality, properly cleaned and cooled game should be canned. To ensure safety of canned meats, meat *must* be processed in a pressure canner to reach a sufficiently high temperature for a long enough time to kill all bacteria that cause spoilage or food poisoning. Large game animals are canned like beef. Small game animals and birds are canned like poultry. Either type of meat can be raw packed or hot packed.

## Small Game Animals and Birds

**Procedure:** Choose freshly killed and dressed, healthy animals or birds. Dressed meat should be soaked one hour in water containing 1 tablespoon of salt per quart and then rinsed. Remove excess fat. Cut meat into suitable sizes for canning. Can with or without bone.

**Hot pack** – Boil, steam or bake meat until about two-thirds done. Add 1 teaspoon salt per quart, if desired. Fill jars with pieces and hot broth, leaving 1¼ inch headspace.

**Raw pack** – Add 1 teaspoon salt per quart, if desired. Fill jars loosely with raw meat pieces, leaving 1¼ inch headspace. Do not add liquid.

Adjust lids and process as shown in Table 1.

## Large Game Animals

(strips, cubes or chunks)

**Procedure:** Choose quality chilled meat. Remove excess fat. Soak strong-flavored wild meats for 1 hour in brine water containing 1 tablespoon of salt per quart. Rinse. Remove large bones.

**Hot pack** – Precook meat until rare by roasting, stewing or browning in a small amount of fat. Add 1 teaspoon of salt per quart, if desired. Fill jars with pieces and add boiling broth, meat drippings, water or tomato juice, leaving 1-inch headspace.

**Raw pack** – Add 1 teaspoon of salt per quart if desired. Fill jars with raw meat pieces, leaving 1-inch headspace. Do not add liquid.

Adjust lids and process as shown in Table 1, using “without bone” recommendations.

## Ground or Chopped Meat

(bear, beef, lamb, pork, sausage, veal, venison)

**Procedure:** Choose fresh, chilled meat. With venison, add one part high-quality pork fat to three or four parts venison before grinding. Use freshly made sausage, seasoned with salt and cayenne pepper (sage may cause a bitter off-flavor). Shape chopped meat into patties or balls or cut cased sausage into 3- to 4-inch links. Cook until lightly browned. Ground meat may be sautéed without shaping. Remove excess fat. Fill jars with pieces. Add boiling meat broth, tomato juice or water, leaving 1-inch headspace. Add one teaspoon of salt per quart to the jars, if desired.

Adjust lids and process pints for 75 minutes and quarts for 90 minutes in a pressure canner with pressures listed in Table 2.

**Table 1. Canning Time Table For Game**

Pack	Jar Size	Time (min.)	Pounds Pressure – Dial Gauge		
			0-2,000-ft.*	2,001-4,000 ft	4,001-6,000 ft.
<b>Without bone</b> hot or raw	Pints	75	11	12	13
	Quarts	90	11	12	13
<b>With bone</b> hot or raw	Pints	65	11	12	13
	Quarts	75	11	12	13

Pack	Jar Size	Time (min.)	Pounds Pressure – Weighted Gauge	
			0-1,000 ft.	Above 1,000 ft.
<b>Without bone</b> hot or raw	Pints	75	10	15
	Quarts	90	10	15
<b>With bone</b> hot or raw	Pints	75	10	15
	Quarts	90	10	15

\*Local altitude

**Table 2. Canning Time Table for Ground or Chopped Meat**

Pack	Jar Size	Time (min.)	Pounds Pressure – Dial Gauge		
			0-2,000-ft.*	2,001-4,000 ft	4,001-6,000 ft.
Raw	Pint	75	11	12	13
	Quart	90	11	12	13

Pack	Jar Size	Time (min.)	Pounds Pressure – Weighted Gauge	
			0-1,000 ft.	Above 1,000 ft.
Raw	Pint	75	10	15
	Quart	90	10	15

\*Local altitude





## MAKING SAUSAGE

The lean trimmings from wild game make an excellent meat for sausage production. Try one of your favorite recipes and substitute wild game or fowl trimmings for the beef portions.

### Venison Summer Sausage

- 15 pounds venison
- 10 pounds pork trimmings  
(5 pounds lean, 5 pounds fat)
- 7 ounces ( $\frac{2}{3}$  cup) salt
- 1 ounce (2 Tbsp.) commercial cure
- 1 ounce (2 Tbsp.) mustard seed
- 3 ounces ( $\frac{1}{2}$  cup) pepper
- 3 ounces ( $\frac{1}{2}$  cup) sugar
- $\frac{1}{2}$  ounce (3 Tbsp.) marjoram

Mix salt and cure with coarsely ground venison and pork trimmings. Pack in shallow pan and place in cooler for 3 to 5 days. Then add rest of ingredients and mix well.

Cure is optional. It is used to develop a pink color and as a preservative.

**Note:** This sausage recipe is quite spicy. If you like less spice, cut down proportions of spices. Smoke sausage as described in the following method.

**Smoking Sausage:** Stuff prepared sausage into 3-inch diameter fibrous casings. Smoke at 140 F for 1 hour, 160 F for one hour and 180 F until internal temperature reaches 152 F (insert a calibrated meat thermometer in the thickest part of the sausage to check internal temperature). Remove from smokehouse and rinse/spray with hot water for 15 to 30 seconds. Follow with cold rinse/spray or place in ice water until internal temperature is reduced to 100 F. Let dry 1 to 2 hours. Refrigerate.

### Wild Game Polish Sausage

- 25 pounds 50/50 pork trimmings  
(50% lean and 50% fat)
- 20 pounds wild game (lean meat)
- 1 quart water
- 14 ounces ( $1\frac{1}{3}$  cups) salt
- 2 ounces (4 Tbsp.) cure
- $\frac{1}{2}$  ounce (6 tsp.) marjoram
- $1\frac{1}{2}$  ounces (3 Tbsp.) mustard seed
- 3 cloves garlic
- 2 ounces ( $\frac{1}{4}$  cup) pepper

Mix all ingredients together and grind the product through a coarse plate and follow this with a fine grind. Stuff in hog casing and smoke at 120 F for one hour, 150 F for one more hour, then at 170 F two hours or until internal temperature of 141 F is reached. Follow same procedure as described for smoking venison summer sausage.

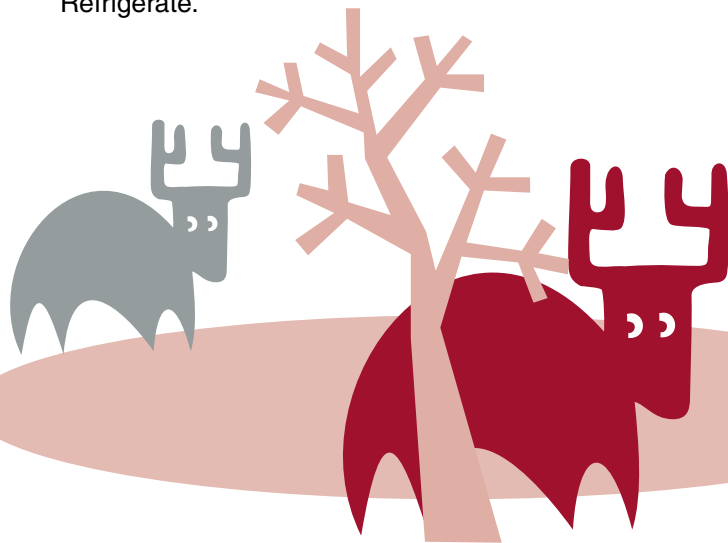
### Quick Sausage

- 2 pounds hamburger or deerburger mix
- $\frac{1}{2}$  tsp. pepper
- $\frac{1}{8}$  tsp. garlic powder
- $\frac{1}{4}$  tsp. onion powder
- 2 Tbsp. curing salt
- 1 Tbsp. liquid smoke
- 1 cup water
- 1 Tbsp. mustard seed (optional)

Pack mixture in a water glass to within  $\frac{1}{2}$  inch of the top. Use large glass container or enough glass tumblers. Cover and freeze overnight. Run warm water on glass to release. Plastic containers will not crack and are safer, but may pick up flavors from the sausage. Wrap in cellophane wrap. Tie ends. Simmer 1 hour in water. Slice thin.

**Note:** Hamburger or pork sausage can be mixed with ground venison.

More information and recipes on sausage making are available in FN-176 (revised), "The Art and Practice of Sausage Making" available from the NDSU Extension Service.



# FREEZING, PICKLING AND CANNING FISH

## Freezing Fish

Special care should be taken with fish because it tends to dry out more quickly than other meats. Glazing with ice or freezing in water are good methods of freezing fish.

For ice glazing, place cleaned, eviscerated fresh fish in a tray in freezer. When frozen, dip in near-freezing ice water. Place fish again in freezer to harden the glaze. Repeat dipping fish until about 1/8 inch of ice coating has been formed. Overwrap with film, freezer paper or foil.

To freeze in water, fill freezer container (clean milk cartons can be used) with water. Add whole fish or fish fillets. Completely cover fish with water, then seal and freeze. Whole dressed fish probably freezes best this way.

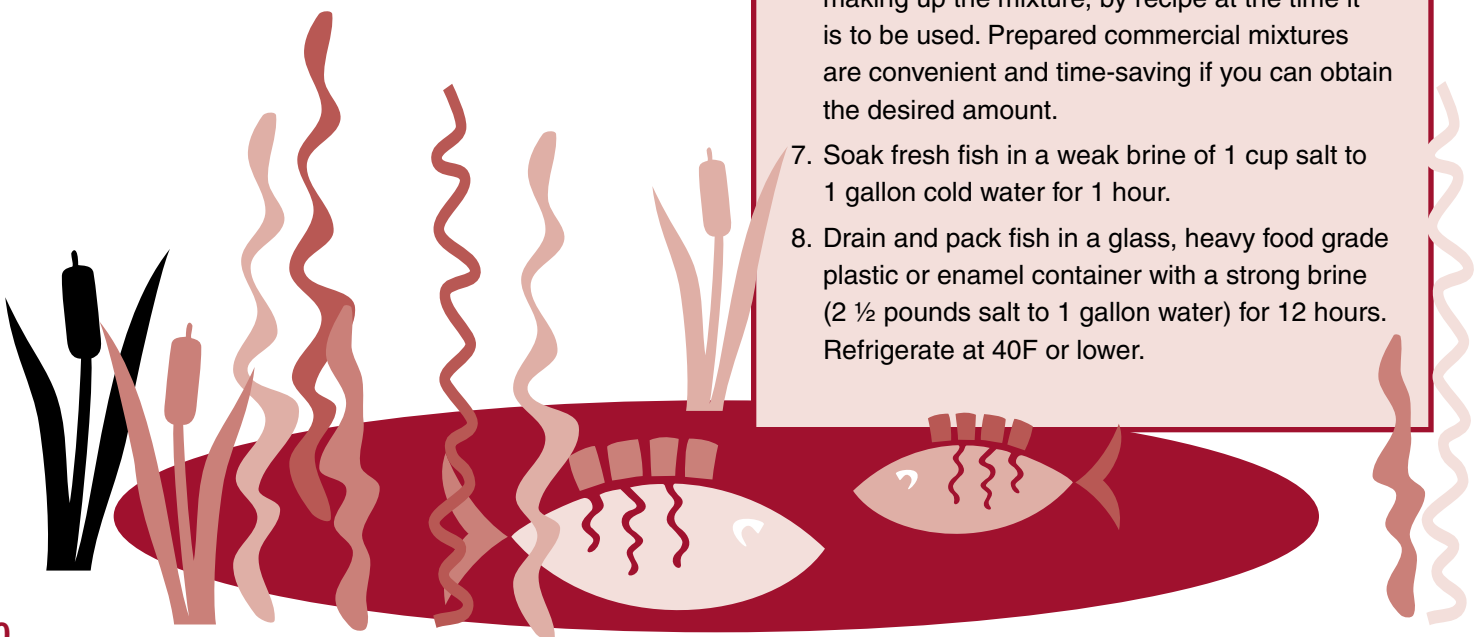
**Note:** The authors have had good results freezing fish for long periods of time by wrapping dressed fresh fish in plastic wrap and then wrapping again in aluminum foil.

## Pickling Fish

While the term “pickled fish” sometimes is used to include fish cured in brine, it should be applied only to those products in which vinegar is used. Only a few types of fish are preserved commercially by pickling, but almost any species may be prepared for home use.

## A Pickling Checklist

1. When using the vinegar-spice cure, preserve only the freshest and best quality fish. The flavor, texture, color and keeping quality also are affected by the water, salt, sugar, vinegar, herbs and other miscellaneous ingredients.
2. Use drinking water or water approved under all sanitary codes. “Hard” waters are unsuitable, especially those with a high iron, calcium or magnesium content. The minerals interfere with the curing process and can cause rancidity and off-flavors.
3. Use high-quality white distilled vinegar of 5 percent acidity (50 grain). Acidity is usually listed on the label. Do not use vinegars of unknown acidity. Ciders and other fruit vinegars may give the fish an off-flavor and color.
4. Use a high-quality, pure granulated dairy or canning salt. The salt must be as free as possible from magnesium compounds, as these impurities give a bitter flavor to the cured product and may cause discoloration of the fish. Non-iodized salt is best for pickling.
5. Use table (cane or beet) sugar.
6. Use fresh, high-quality spices. Best results are secured by buying fresh, whole spices, and making up the mixture, by recipe at the time it is to be used. Prepared commercial mixtures are convenient and time-saving if you can obtain the desired amount.
7. Soak fresh fish in a weak brine of 1 cup salt to 1 gallon cold water for 1 hour.
8. Drain and pack fish in a glass, heavy food grade plastic or enamel container with a strong brine (2 ½ pounds salt to 1 gallon water) for 12 hours. Refrigerate at 40F or lower.



## Pickled Fish

(Recipe is spicy\*)

- 10 pounds fish
- 1 ounce whole allspice
- 1 ounce mustard seed
- 2 ounces regular mixed pickling spice
- ½ pound onion, sliced
- ½ ounce bay leaves
- 1½ quarts distilled (white) vinegar
- 2½ pints water
- 1 ounce white pepper
- 1 ounce hot ground or dried peppers (optional and to taste)

Rinse fish in fresh water. Combine the recipe ingredients in a large pan or kettle. Bring to a boil and add fish. Simmer for 10 minutes, or until fish is easily pierced with a fork. Remove fish from the liquid and place in a single layer on a flat pan and refrigerate for rapid cooling to prevent spoilage. Pack cold fish in a clean glass jar, adding a few spices, a bay leaf, freshly sliced onions and, if desired, a slice of lemon.

Strain the vinegar, bring to a boil, and pour into jars until the fish are covered. Cover jars with lids.

*This product must be stored in the refrigerator at 40 F or lower and should be used within 4 to 6 weeks.*

*\*For a less spicy product, use less white pepper and hot or ground pepper.*

## Pickled Smelt

- 2 pounds cleaned smelt
- 3 cups water
- 1 tsp. salt
- ¼ tsp. white pepper
- 2 bay leaves
- 1 cup onion, sliced
- 3 cups white vinegar\*

Cook fish in water, salt, pepper and bay leaves and onion in a covered pan for 12 minutes. Drain and measure fish stock; you will need about 2 cups. Add the vinegar to the stock and bring to a boil. Cook 5 minutes and cool in refrigerator at 40 F or lower.

Pour over fish, let stand in refrigerator for several hours. Serves four to six.

*\*If the taste of vinegar is too strong, offset it by adding ¼ to ½ cup sugar.*

## Norwegian Pickled Herring

- 3 salted herring
- 3 Tbsp. sugar
- 1¼ cups water
- ¾ cup vinegar
- ⅓ tsp. white pepper
- A few whole peppers
- 1 red onion

Be sure to use properly salted herring (see “Pickling Checklist”). Clean and cut herring into fillets. Soak in water (to cover completely) 12 to 15 hours. Skin and remove all bones. Dissolve the sugar in water, add vinegar, pepper and thinly sliced onion. Add herring and refrigerate a few hours before serving.

*Store in the refrigerator at 40 F or lower and use within 4 to 5 weeks.*

## Canning Fish

(Blue, mackerel, salmon, steelhead, trout and other fatty fish except tuna)

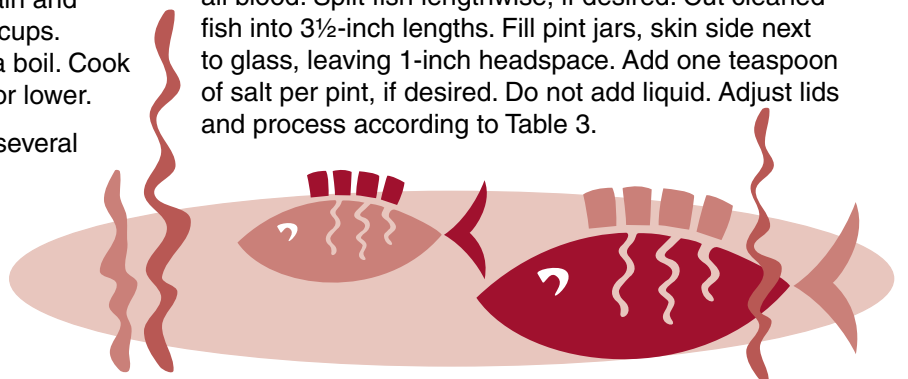
Although freezing is the easiest way to preserve fish, canning does offer some advantages, particularly if one lacks freezer space. The only safe way to process fish is in a pressure canner. Fish that has been frozen can be safely canned; thaw fish in a refrigerator and can promptly. Follow recommended canning procedures carefully.

**Caution:** Eviscerate fish within two hours after they are caught. Keep cleaned fish on ice until ready to can.

Fish may be canned with its bones. They add to the flavor and nutritive value of the product; however, it is recommended only pint or smaller containers be used.

## Canning Procedure

Remove head, tail, fins and scales. Wash and remove all blood. Split fish lengthwise, if desired. Cut cleaned fish into 3½-inch lengths. Fill pint jars, skin side next to glass, leaving 1-inch headspace. Add one teaspoon of salt per pint, if desired. Do not add liquid. Adjust lids and process according to Table 3.



## “Mock” Salmon

Allow 2¼ to 3 pounds of whole fish for each pint of canned fish. Clean and prepare fish. Remove head, fins and tail. Remove skin, if desired. If the fish is slimy, a solution of 1 tablespoon vinegar to 2 quarts water helps remove the slime. The color of some fish can be improved by soaking the fish in cold water containing ½ cup salt to 1 gallon water for 30 minutes; *do not reuse salt water*. Rinse fish in clean water. Cut fish into jar-sized lengths. Make sauce.

### Sauce

- 1 cup catsup
- 1 cup vinegar
- ½ cup water
- 3 Tbsp salt
- ¼ cup minced onion
- 2 bay leaves, crumbled

Combine and heat the above ingredients. This makes enough sauce for about 8 pints. Pack fish into jars to within 1 inch of the top. Cover with sauce, leaving 1-inch headspace. Remove air bubbles, wipe jar rims, place prepared lids on jars and tighten the screw bands. Process according to Table 3.

## Quick Pink Salmon

To each pint of fish add:

- 1 Tbsp. vinegar
- ¼ tsp. salt
- 2 Tbsp. tomato juice

Leave 1 inch headspace. Adjust lids. Process according to Table 3.

**Note:** Glass-like crystals of magnesium ammonium phosphate sometimes form in canned salmon. There is no way for the home canner to prevent these crystals from forming, but they usually dissolve when heated and are safe to eat.



**Table 3. Canning Time Table For Fish (except tuna)**

Pack	Jar Size	Time (min.)	Pounds Pressure – Dial Gauge		
			0-2,000-ft.*	2,001-4,000 ft	4,001-6,000 ft.
Raw	½ pint or pint	100	11	12	13

Pack	Jar Size	Time (min.)	Pounds Pressure – Weighted Gauge	
			0-1,000 ft.	Above 1,000 ft.
Raw	½ pint or pint	100	10	15

\* Local altitude

## More information available from the NDSU Extension Service

“The Art and Practice of Sausage Making” (FN-176) provides directions and recipes for making sausage.

“Food Freezing Guide” (FN-403) provides procedures and recommendations for freezing a wide variety of foods.

“Jerky Making: Then and Now” (FN-580) provides directions and recipes for making jerky products at home.

“Wild Side of the Menu, No.1, Care and Cookery” (FN-124) provides information on nutrient content, food safety and preparation of wild game.

“Wild Side of the Menu, No.2, Field to Freezer” (FN-125) provides information on field dressing, skinning and muscle boning game meat.

These publications and information about wild game and other food safety/nutrition topics are available on the NDSU Extension Service Web site:

**[www.ag.ndsu.edu/food](http://www.ag.ndsu.edu/food)**

The NDSU Extension Service does not endorse commercial products or companies even though reference may be made to tradenames, trademarks or service names. NDSU encourages you to use and share this content, but please do so under the conditions of our Creative Commons license. You may copy, distribute, transmit and adapt this work as long as you give full attribution, don't use the work for commercial purposes and share your resulting work similarly. For more information, visit [www.ag.ndsu.edu/agcomm/creative-commons](http://www.ag.ndsu.edu/agcomm/creative-commons).

County commissions, North Dakota State University and U.S. Department of Agriculture cooperating. North Dakota State University does not discriminate on the basis of age, color, disability, gender expression/identity, genetic information, marital status, national origin, public assistance status, race, religion, sex, sexual orientation, or status as a U.S. veteran. Direct inquiries to the Vice President for Equity, Diversity and Global Outreach, 205 Old Main, (701) 231-7708. This publication will be made available in alternative formats for people with disabilities upon request, (701) 231-7881.

4M-10-03, 1M-7-04