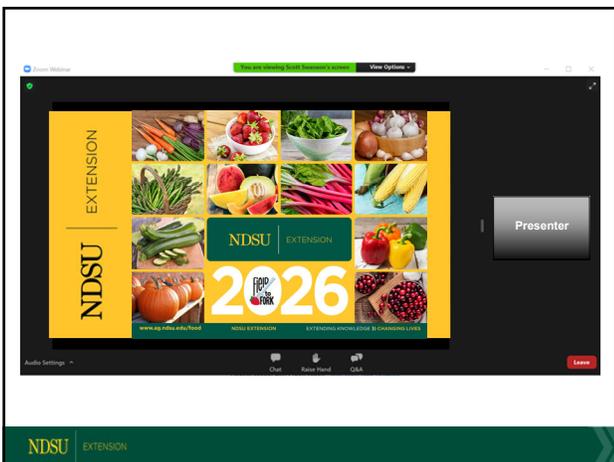


Upcoming Webinars

- **March 11 - Debunking common vegetable gardening myths**
 Esther McGinnis, NDSU Extension horticulturist and associate professor
- **March 18 - To sous vide or not to sous vide: Safety of long-term, low-temperature cooking for vegetables**
 Byron Chaves, Rutgers's University associate professor



- Please complete the short online survey that will be emailed to you after today's webinar. It will take just a couple minutes!
- Be sure to sign up for an opportunity to win a prize in the drawing. After submitting the survey, a form to fill out with your name/address will appear.

Acknowledgement: This project was made possible with funding from the North Dakota Department of Agriculture through the U.S. Department of Agriculture's Specialty Crop Block Grant program. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the USDA.



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March 4

**Food preservation all year –
Fruit leathers, apple chips,
jerky and more!**

Julie Garden-Robinson, NDSU Extension food and nutrition specialist



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Outline

- History of drying
- Dehydrating equipment and what to look for
- Fruits and vegetables that rate well for drying
- Fruit leathers
- Drying meat
- Freeze drying

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History

Dried Meat
Predates recorded history!

Dried Fruit
Dates back to 12,000 BC in Mesopotamia

One of the oldest methods of food preservation using the sun and wind to naturally dry foods.

Created portable, calorie-dense food source vital for survival during migrations and winter months.

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Indigenous peoples

Examples of drying foods

- Bison meat
- Venison
- Salmon
- Corn
- Berries
- Squash
- Pemman ("wasna"): dried meat, fat, berries



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In the chat, name some widely available dried foods today.



Dried food examples



- **Fruits** (bananas, apples, cranberries, raisins, prunes “dried plums”, mango, apricots)
- **Vegetables** (tomatoes, mushrooms, herbs, carrots, corn, potatoes, herbs)
- **Meat** (jerky)
- **Dairy** (powdered milk, eggs, cheese)
- **Coffee** (freeze-dried)



Dehydrating Equipment

Electric dehydrators come in different sizes and shapes



Dehydration Equipment Cost

Examples - no endorsement implied.

Magic Mill - \$199.99

Magic Mill Premium - \$249.00

Magic Mill Pro - \$199.00

Fondia - \$326.98

Cosori - \$159.99

Hoperan - \$149.99

Ostba - \$49.99



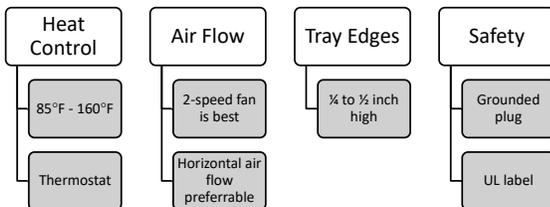
Freeze Dryer Example

- Harvest Right - \$1,595 to \$2,495

- Available in some retail stores

(No endorsement implied.)

Things to Look for in Food Dehydrators

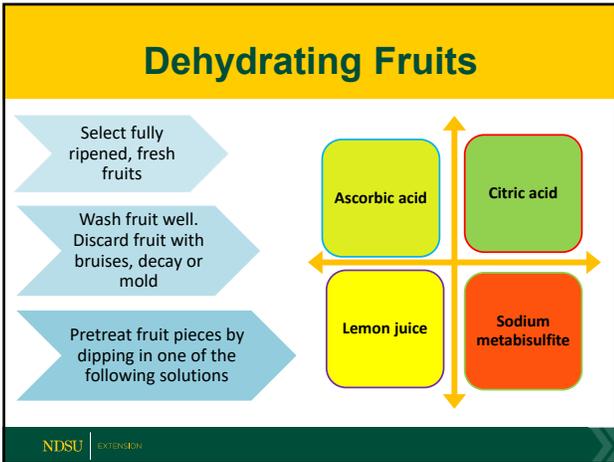


Fruits Rated as "Excellent," "Good," "Fair," or "Not Recommended" for Drying

Excellent	Good	Fair	Not Recommended
Apples	Bananas	Blueberries	Berries (w/ seeds)
Apricots	Plums	Strawberries	Citrus fruits
Cherries	Rhubarb		
Citrus peel			
Grapes			
Peaches			
Pears			
Pineapple			

Source: So Easy to Preserve; Cooperative Extension, University of Georgia

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Test for Dryness

Dried fruits should be leathery and supple.

Cool to room temperature.

Squeeze a handful of fruit with clean, dry hands. If your hands stay dry and fruit springs apart when released, it is dry.

Storage

Once dry, "condition" for 4 to 10 days

Place dried fruit loosely in container 2/3 full

Lightly cover and store in a warm dry well-ventilated area

Shake containers daily for 4 to 10 days to separate pieces

Return to dehydrator if moisture forms inside container

Store in a tightly sealed containers in a cool dry place

Fruits Rated as "Excellent," "Good," "Fair," or "Not Recommended" for Making Fruit Leather

Excellent	Good	Fair	Not Recommended
Apples	Plums	Bananas	
Apricots		Grapes	
Berries (w/ seeds)		Rhubarb	
Cherries			
Peaches			
Pears			
Pineapple			
Strawberries			

Source: So Easy to Preserve; Cooperative Extension, University of Georgia

Fruit Leather

- Fruit leather is prepared by drying thin layers of pureed fruit.
- Most fruit combinations can be blended and dried.

Exceptions: Lemons and grapefruit become bitter during drying





Prepare the Fruit

1. Select 2 cups of ripe or slightly overripe fruit.
2. Thoroughly rinse and remove blemishes and any seeds, pits, or cores.
3. Cut fruit into chunks.
4. Fruit needs to reach 160°F. Put fruit pieces in glass casserole and cover. Place in microwave oven. Cook on high for 6 to 8 minutes per 2 cups of fruit, stirring every 2 minutes.





Prepare the Fruit

5. Put cooked fruit in a blender
6. Add 2 Tablespoons of lemon juice per 2 cups of fruit if using fresh apples. (Not needed for canned fruits.)
7. If desired, add 1 to 2 tablespoons of honey per 2 cups of fruit. Can also add ¼ teaspoon of cinnamon or nutmeg.





Drying the Fruit

- Spray tray with vegetable spray**
- Be sure tray has an edge to prevent spillage**
- Spread puree evenly over pan to a depth of 1/8 to 1/4 inch**

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Drying the Fruit

- Set temperature control at 140 F to 145 F
- Drying time is 4 to 10 hours



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Test for Dryness

- Translucent and slightly tacky, but easily peeled from pan or plastic**
- No indentations evident when touched in several places**
- Adheres tightly to surface of tray, but peels readily**
- Cracking or chipping indicates it has dried too long, but it is still edible**

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Storing Fruit Leather



Loosen edge of the leather from the plastic wrap or pan

Loosely roll the leather in fresh plastic wrap or waxed paper in one piece

Store the roll in one piece or cut into 1-inch strips

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Prevent Spoilage

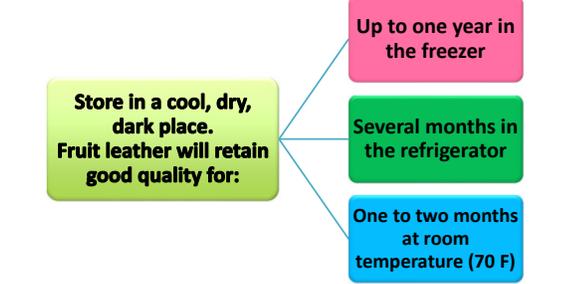


Place rolls or strips of leather in a glass container, paper bag or plastic bag.

Keep container lid or bag opening *loosely* closed until the leather is completely dried. If tightly sealed too early, it may become sticky or develop mold growth.

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Maintain Quality



Store in a cool, dry, dark place. Fruit leather will retain good quality for:

- Up to one year in the freezer
- Several months in the refrigerator
- One to two months at room temperature (70 F)

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Freeze Drying

- Last longer and more lightweight than dehydrated food
- Retains color and shape better than dehydrating
- Some manufacturers claim you can dehydrate ice cream, milk, eggs and other high-protein foods



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Freeze Drying Process

- Machine freezes the food to between -30 and -50 degrees F
- Vacuum pump pulls air out and the trays are heated
- Leads to sublimation of ice to vapor
- Removes 98% of water in the food

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Appliance specifics

- Vacuum pump: 35 pounds (some require oil changes; others do not)
- Freeze dryer: 100 pounds
- Therefore, need a sturdy table
- Makes noise from pump and beeping

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Preparing food for freeze-drying

- Active enzymes can lead to color changes (E.g. apples)
- Food should be equal in size and have a similar drying time
- Even spacing is important on tray

Information credit: Penn State University

Applications of Freeze Drying

Cottage food industry

- Freeze-dried snacks
 - Candy corn
 - Banana chips
 - Fruit roll-ups
 - Fruit chips
 - Strawberry shortcase
 - Apples
 - Ice cream, marshmallows, cotton candy, etc.

Jerky - How to Start

- 1 Pre-freeze meat to be made into jerky so it will be easier to slice.



Prepare Meat

2 Cut partially thawed meat into long strips no more than ¼-inch thick. Remove as much visible fat as possible to help prevent off flavors.

**For chewy jerky, slice along the grain.*

**For tender jerky, cut the meat at right angles to long muscles (across the grain).*

**Meat should be placed in the refrigerator to partially thaw.*



Prepare Marinade

3 Prepare 2 to 3 cups of marinade of your choice in a large saucepan.

- 2 cups soy sauce
- 1/2 cup Worcestershire sauce
- 2 teaspoons black pepper
- 2 teaspoons garlic powder
- 1 tablespoon plus 1 teaspoon onion powder
- 2 tablespoons plus 2 teaspoons hickory smoke-flavored salt



Boil Strips

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 full boil.

Note: this step is essential to get the meat up to an internal temperature of 160 F to kill disease-causing microorganisms.

**Due to thinness of meat, an instant-read digital thermometer is recommended.*



Prepare Drying Racks

5 Remove pan from range. Using tongs, remove strips from hot marinade (work quickly to prevent overcooking) and place in single, nonoverlapping layers on drying racks.



**Repeat steps 4 and 5 until all the meat has been precooked.*

**Add more marinade if needed.*

Dehydrate

6 Dry at 140 to 150°F in a dehydrator, oven* or smoker. Test for doneness by letting a piece cool. When cool, it should crack but not break when bent. The meat should not have any moist or underdone spots.

**Many conventional home ovens do not have a temperature setting this low.*



Test Doneness

7 Refrigerate the jerky overnight in plastic freezer bags, then check again for doneness. If necessary, dry further.



**Use home-dried jerky within 2 months*

Resources



Drying Fruits

FN1587 Drying Fruits
<https://www.ndsu.edu/agriculture/sites/default/files/2022-12/fn1587.pdf>



Making Fruit Leathers

FN1586 Making Fruit Leathers
<https://www.ndsu.edu/agriculture/sites/default/files/2022-12/fn1586.pdf>



Jerky:

A Native American-inspired snack we all can enjoy today

FN2266 Jerky: A native American-inspired snack we all can enjoy today
Jerky: A Native American-inspired snack we all can enjoy today (FN2266)



Pinchin' Pennies in the Kitchen

Cooking on a Budget



Pinchin' Pennies Series
[Cooking on a Budget | NDSU Agriculture](#)



Make Your Own Snack Mixes

FN1753: Make Your Own Snack Mixes
<https://www.ndsu.edu/agriculture/sites/default/files/2024-08/fn1753.pdf>



See the free Food Preservation 101 online course and the Field to Fork resources.

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Julie Garden-Robinson, NDSU Extension food and nutrition specialist
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Thank you! Any questions?

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