



Freeze Drying 101

Preparing and Storing Your Freeze Dried Products for Best Use

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To ensure the highest quality freeze dried product, there are recommended steps for preparing food before starting the freeze drying process. The information that is being shared is based on personal use and tests of the machines and freeze dried products.

Recommended Preparation for Fresh Fruits and Vegetables

Choosing fruits and vegetables at their peak ripeness will result in the highest quality product with the best taste and the most nutrient value. The steps for preparation are similar to those used when preparing produce for dehydration.



- Step 1: Thoroughly wash produce under cold running water. Soaking the produce may cause it to become waterlogged, thus lengthening the time it takes to complete the freeze drying process.
- Step 2: Peel, trim, pit (as needed), and cut or slice into uniform pieces. Be sure to remove any bruised or damaged areas. The recommended thickness for slices is between $\frac{1}{4}$ inch and $\frac{1}{2}$ inch thick. If you try to use thicker slices, there may be pockets of moisture in the middle of the food. This will also increase the time needed to complete the freeze drying cycle. Small fruits like blueberries and raspberries can be done whole. However, berries with skins such as cranberries or blueberries need to be punctured to prevent them from bursting.
- Step 3: Use an appropriate pre-treatment method. For fruits, this may include using citric acid or ascorbic acid dip¹. Refer to the directions on the package for proper water-to-product ratios. For vegetables, it

is recommended to use either a steam blanch or water blanch to inactivate the enzymes. Blanching recommendations can be found in Pacific Northwest (PNW) 397-Drying Fruits and Vegetables² (publication from the University of Idaho, Washington State University, and Oregon State University) or in other similar publications³. For other foods please see the examples found below.

- Step 4: Place all food pieces as flat as possible on the tray so they may evenly dry. Do not overlap or stack food and be careful not to overfill trays, food should not be higher than the lip of the tray. For shorter processing times, place trays in the freezer and pre-freeze for at least 24 hours before putting them in the freeze drying appliance.

Recommended Preparation for Other Foods

Many other types of foods can be freeze dried. The preparation steps for each food can vary.⁴

¹ Lanting, R., Wittman, G., Gillespie, D. (2013). PNW 651 Drying Project Manual. Pacific Northwest Extension Publication. <https://www.lib.uidaho.edu/digital/uiext/items/uiext32185.html>

² Swanson, M.A. & McCurdy, S.M. (2015). PNW 397 Drying Fruits and Vegetables. Pacific Northwest Extension Publication. <https://extension.oregonstate.edu/catalog/pub/pnw-397-drying-fruits-vegetables>

³ Jude, J., Adu, E. A., Maiyanga, I. E., & Kamaldeen, O. S. (2023). Application of Freeze-Drying in Food Processing and Storage - A Review. Badeggi Journal of Agriculture Research and Environment, 05(02), 21–35. <https://doi.org/10.35849/BJARE202302/97/003>

⁴ Harvest Right (2024). Benefits of Freeze Drying. <https://harvestright.com/how-it-works/?shelf-life>

- **Commercially Canned or Frozen Fruits and Vegetables:** No pretreatment is necessary. Drain to remove as much excess water as possible. Then spread out evenly on the tray.
- **Meat:** Remove as much bone and/or fat as possible. Cut into serving size pieces no thicker than $\frac{3}{4}$ of an inch. Most meats can be either cooked or left raw before freeze drying. High fat meats such as bacon need to be cooked and as much grease removed as possible using paper towels.
- **Eggs:** For cooked eggs, scramble them as you would for eating then transfer them to the tray. For raw eggs, beat the whites and yolks thoroughly and pour them directly onto the tray.
- **Dairy Products:** It is recommended to pre-freeze milk before placing it in the freeze dryer to avoid it bubbling and creating a mess. For creamier products such as yogurt, sour cream, or cottage cheese, it is best to spread it in a thick, even layer in the tray. Blocks of cheese can be cut into small, thin pieces or shredded.
- **Beans/Grains:** Cook before freeze drying. Use a silicone spatula, or similar utensil, to spread out evenly across the bottom of the tray and no deeper than the lip of the tray.
- **Complete Meals:** Casseroles or mixed foods will freeze dry well if they are not overly greasy. Spread the food out in the tray as evenly as possible, trying to keep the thickness within $\frac{1}{2}$ inch thick.

Some foods should not be freeze dried due to their high sugar and/or high fat content. These foods include peanut butter, jam/jelly, butter, honey, syrup, chocolate, and oils. These foods can usually be freeze dried if they are an ingredient in a recipe but should not be freeze dried as the sole ingredient.

Foods with similar flavor profiles can be freeze dried in the same cycle but should still be placed on separate trays. For example, many fruits and vegetables can be freeze dried at the same time. However, you want to process food with strong flavors or odors by themselves. These types of food include, but are not limited to, onions, garlic, broccoli, and spiced dishes (chili, etc.).

Freeze Drying Process

There are currently at least three different companies that produce freeze dryers for home food preservation. While these appliances all have the same essential function, each manufacturer has programmed their models with slight differences. This is why it is important to read the owner's manual that comes with your machine before running your first batch of freeze dried food.

Some models have an easy start process with the consumer only needing to push start and make sure the



door and drain valve are completely closed before walking away and leaving the freeze dryer to complete its cycle. Other models have different steps such as pre-starting the machine before placing the trays on the shelves or allow consumers the option to customize certain steps in the freeze drying process. Each company has resources available to help you learn how to best use your appliance for success.

Testing for Dryness

The freeze dryer will let you know once the cycle is complete. Most of them have a certain noise or beeping sound to notify you that the batch has finished. The freeze dryers have a sensor that tells the appliance when the food is thoroughly dry. However, you still need to test the food and not just rely on the accuracy of your machine.

To test the food, find one of the larger pieces and crack it in half. It should snap crisply and have a dry texture in the middle. If you feel any coldness or moisture in the middle of that food the entire batch needs returned to the freeze dryer and dried for a few more hours. Once your food is thoroughly dried, remove it from the machine and let your freeze dryer defrost before starting the next cycle.

Storing Freeze Dried Food

As with all types of food preservation, it is necessary to follow the best practices for storage to have a safe, high-quality product. The length of time you plan to store the food will determine what types of containers you should use.

- **Resealable Jars or Containers (Short-Term Storage):** Airtight resealable jars or similar containers can be used if you plan to consume the food within a month. No oxygen absorber is needed for this type of storage. Be aware that your local weather can affect your freeze dried products, more moisture in the air will contribute to faster spoilage if not sealed.

- **Canning Jars (Medium or Long-Term Storage):** Glass canning jars with two-piece lids are suitable for storage when coupled with an oxygen absorber or a vacuum sealer with a lid attachment. Exposure to light will cause the breakdown of fats, proteins, and vitamins in your food. This is why if you choose to use clear jars for storage, they need to be kept in a dark area such as a pantry, basement, or cellar.
- **Mylar Bags (Long-Term Storage):** Mylar bags work well for long-term storage because light cannot penetrate them. For best results, add an oxygen absorber to the bag with the food and evacuate as much air as possible from the bag. Then use an impulse sealer to securely close the bag and create an airtight seal. Mylar bags need to be placed in a food-safe tote or bucket to protect them from pests such as mice or insects. Most mylar bags range in thickness from 4 millimeters-7 millimeters. The longer you plan to store your food, the thicker the bag should be.
- **#10 Cans (Long-Term Storage):** This type of storage does require an investment in a can sealer, which may be quite costly. However, this type of storage does have the benefit of being impenetrable by light and safe from pests. Oxygen absorbers would also need to be used with this storage method.

Regardless of the storage method you choose, there are a few things to keep in mind to protect the quality and shelf-life of your freeze dried foods.

- Keep your food sealed until you are ready to use it. If you only use a partial amount of the food in the container, either reseal it or vacuum seal it immediately.
- Store food containers in a dark, dry, cool place. Any exposure to light or moisture can cause harm to your stored food. The optimal storage temperature for freeze dried foods is between 32° F and 75° F. Exposure to heat can compromise the quality of the food so make sure the storage containers are not placed near a heat source such as a furnace or a stove.

The table below demonstrates the amount of oxygen absorbers to use for various container sizes.

Container Size	Oxygen Absorber Amount
1 quart	100 cubic centimeters (cc)
1 gallon	1 - 300 cc
2 gallons	2 – 500 cc or 1000 cc
5 gallons	3 – 1000 cc



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This information has been reviewed by University faculty.
extension.arizona.edu/pubs/az2097b-2025.pdf

Other titles from Arizona Cooperative Extension can be found at:
extension.arizona.edu/pubs

⁶ Harvest Right (2024). Benefits of Freeze Drying. <https://harvestright.com/how-it-works/?shelf-life>

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