

Food DRYING



FOOD DEHYDRATION AND SAFE STORAGE

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Food Drying: Food Dehydration and Safe Storage

by R. Johnson

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Dedication:

This book is dedicated to my mother, my grandmother and my great-grandmother. Thanks for passing your love of food drying on to me.

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1.0 Quick Introduction to Food Dehydration

Food dehydration, known as food drying in some circles, is a method of preserving food by removing water from it.

Food dehydration is one of the oldest methods of drying foods. It's been in use since long before the invention of refrigeration systems designed to keep fresh foods cold. It's an easy method to use and is one of the safest food preservation methods known to man.

When done correctly, dehydration allows you to store foods for long periods of time without worry of the food going bad.

Removing the water from food creates an environment that's hostile to the growth of microorganisms and bacteria. Bacteria and mold needs water to thrive. Removal of this water creates an environment in which microorganisms can't survive, let alone grow into large colonies capable of wreaking havoc on your stored foods.

There are a handful of methods used to dry food, the most popular of which are:

Sun-drying.

Oven-drying.

Using a commercial food dehydrator.

Freeze-drying.

All four of these methods will be covered in more detail in later chapters.

There are a number of foods you can dry.

You name it, someone's probably found a way to remove the water from it. Here are just some of the foods people are dehydrating and storing:

Meat.

Seafood.

Fruit.

Vegetables.

Grain.

Herbs.

Foods typically take on a new texture and slightly different taste once they've been dried. They tend to shrink, darken a bit in color and the skin will

wrinkle up and take on a tougher texture. They're usually sweeter because the sugars present in the food are still there in the smaller dried food.

You're probably familiar with a few dried foods already. Thinly cut beef becomes beef jerky. Grapes become raisins when they're dried. You've probably tried other dried fruits as well. Apricots, bananas, papaya . . . the list goes on and on. There's an almost unlimited amount of foods that can be dried.

Drying foods instead of canning or freezing them as a means of preservation gives you more options when it comes to storage. Once dried, food can be stored at room temperature for a long time before you have to start worrying about it spoiling. Dried foods shrink down to a fraction of their pre-dehydration size, so it doesn't take as much space to store dehydrated foods as it does foods preserved using the other two methods.

Drying isn't going to completely replace canning or freezing because it changes the taste and appearance of the food, but it's a good change of pace. If you're looking to spice up your meals, try adding a dried food or two.

Hikers, backpackers and those looking to make a quick escape into the woods (yes, survivalists, I'm talking about you) all could do much worse than dried foods. They're light in weight and dense with nutrients, so they're a good choice while on the trail—or on the road for drivers looking to travel light.

Most people don't realize just how simple it is to dehydrate food. Buying food that's already been dried is going to cost you a small fortune compared to how much it costs to do it yourself. Learn how to dry food and you'll save a pretty penny. You'll also be able to avoid a lot of the additives and chemicals manufacturers add to foods when they dry them.

Once you've prepared the food, modern dryers do all the work for you. They dry the air and circulate it past the food, where the air absorbs the moisture. All you need is a little common sense and the ability to follow simple instructions.



Figure 1.0 : Dried fruit.

1.1 - The Benefits of Dehydration

Dehydration has a number of benefits. Here's a list of the benefits I can think of off the top of my head:

Safe storage of your foods.

All-natural. No need for chemicals or preservatives.

You can create a supply of food you can use in the event of an emergency where you're cut off from supplies.

Allows you to take healthy foods on the road with you.

The biggest benefit of drying foods is it allows you to save money—a lot of money if you play your cards right.

Here's how:

Seasonal foods are at their cheapest at the peak of the season. Fruits, grains and vegetables are cheapest right around the time they're locally harvested. Fish and seafood are seasonal and are cheapest during the catching season. Watch for supermarket specials around big holidays to get cheap meat.

Normally, when you get a good deal on food, you can only buy as much as your family can consume before it spoils. When a good deal comes around, you're only able to take advantage of it in small amounts.

Learning to dehydrate food lets you buy bulk quantities of your favorite foods when prices are at their lowest.

Buy as much as you have room to store, dry it and enjoy it long after prices go up to unaffordable levels. Instead of living on rice and beans, you'll be able to enjoy all your favorites year-round.

Another way you can save money is by growing your own food.

If you have room in your yard, you can grow a garden of your favorite fruits and vegetables. A garden is an inexpensive way to grow some of your own food. It's surprising just how much food you can get from even a small plot. Planting a tree or two is good way to grow your own fruit.

Even if you don't have room in your yard for a garden, you can take advantage of the local harvest. Farmer's markets and flea markets with produce sections are good places to find the best deals. You can also try contacting local farms to see if they're willing to sell direct to the general public. You'll probably get more mileage from smaller, family-owned farms. Hit the local docks for the

best deals on fish and seafood when it's in-season locally.

Yet another way to save money is to get together with a group of friends, family or like-minded people to buy food in bulk. Large amounts of food can be bought from co-ops at low prices. When it comes to meat, you can buy an entire slab and get it at a discount. Come to an agreement beforehand as to who gets what and you'll all end up getting a great deal.

Those with a bit of property can raise their own livestock. Even if you don't have the stomach to butcher it yourself, you can send it out to be butchered for a nominal fee. It's still significantly cheaper than buying your meat from the store.

Hunters often have more meat than they know what to do with. Most animal meats can be dried into delicious jerky. If you know a hunter (or are a hunter), you have a source of inexpensive meat that can be dried.



Figure 1.1: Take advantage of the local harvest for the best deals.

1.2 - Heat and Humidity

To properly dry food, you need to control two things: heat and humidity.

Heat pulls the moisture from your food, while humidity determines how fast the air around your food will absorb the moisture as it's pulled out.

One might surmise you could simply turn up the heat and push low-humidity air past the food to speed up the process. That assumption would be incorrect. Turning the heat too high pulls moisture from the outer layer of the food you're drying, creating a "shell" that will trap moisture inside the food. What happens is similar to what happens when you cook eggs over-easy. The outside thickens up and traps the moisture on the inside.

Keep the heat higher at the beginning of the process, but not too high.

You can set the heat as high as 150 to 160 degrees F. This will remove a lot of the moisture from the food. Once the surface begins to feel rough to the touch, cut the temperature back to 140 degrees F. The idea is to keep the food at a high enough temperature to continue pulling moisture from it without actually cooking it or creating a hard shell that traps moisture.

Every food is different in regard to how long it can be dried and the temperature that must be used, so make sure you pay close attention. *Allowing your food to reach a heat at which it cooks will result in a burnt or scorched taste if it's left at this temperature for too long.*

The humidity level is determined by a number of factors, only some of which we have control of.

There's always a certain level of moisture in the air. Humidity is higher on a hot, muggy day than it is on a cool, crisp day. You can't do much about the level of moisture in the air you're using. What you can control is how fast that air is circulated past the food you're drying. You want to keep fresh air circulating past the food. If the air you're using is trapped inside the dehydrator, it will fill with moisture to the point that it's unable to absorb any more. This will stall the drying process and moisture may be absorbed back into the food.

The idea is to get the heat and humidity at optimum levels. *The heat needs to be warm enough to pull moisture from the food without causing it to harden and the humidity needs to be low enough to where the water being pulled from the food will evaporate into the air.*

To assure your food dries evenly, you need to make sure the heat and humidity is applied as evenly as possible to all of the food being dried.

Depending on the method you're using, this may require frequent stirring of the food, flipping the pieces over or occasionally switching which rack the food is placed on.

The drying process isn't an exact science. You'll find there are a number of recipes and opinions on how long and at what temperature foods need to be dried at. None of them will one hundred percent accurate one hundred percent of the time. There are a number of external factors acting on the drying process and it's impossible to take them all into account to get an accurate time. You're going to have to watch the food as it dries to determine when it's done.



Figure 1.2.1: Heat and humidity both play roles in drying time.

2.0 – The Nutritional Value of Dried Foods

Let me begin this section by telling you the dehydrated foods you buy in the store have a fraction of the nutritional value of the foods you dry yourself. The commercial process of drying large amounts of food is harsh—and that's not to mention the chemicals and preservatives used.

Here's an example to show just how much of the good stuff is eliminated: A cup of fresh apricots contains almost 3 times as much vitamin A as a cup of commercially dried apricots. The vitamin C present in fresh apricots is completely gone by the time the commercial drying process is complete and the fiber has been cut in half.

In addition to the nutrients being removed, sweeteners are often added. *The manufacturers know people like sweet foods and will add sugar to dried fruits even though they don't need it.* They almost always add it to tart fruits like cranberries to sweeten them up and have been known to add it to fruits that don't need it to make them sweeter.

The good news is the home dehydration process is much easier on your food.

The harsh chemicals and processes used to rapidly dry food on a production line are much harder on your food than the dry air used at home. While a small amount of the nutrients will be lost, it isn't enough to be concerned with. In order to minimize the lost nutrients, a carefully controlled environment should be used to dry your foods.

Certain vitamins are more susceptible to loss during the drying process than others.

Vitamin C is water-soluble and some is lost in the water as it dries and evaporates. On the other hand, vitamin A is largely retained during the dehydration process. Fiber is unaffected by home drying, as are most minerals.

Once dried, store your dried food in a cool, dark place. Certain foods begin to break down and lose nutrients when exposed to light for any given period of time.

There is one thing you need to keep in mind when consuming dehydrated foods:

When you're eating them, you're eating compact versions of larger foods.

The compact versions have the same amount of sugar and same amount of calories in a smaller package. You're still getting close to the same amount of nutrients in the smaller package, so there's no need to eat more to make up for it.



Figure 2.0: The commercial drying process is harsh and removes valuable nutrients.

3.0 - Are Dried Foods Safe?

If you've spent any time researching canning or other food preservation methods you've probably heard the term *botulism* bandied about. This bacteria is one of the biggest fears when it comes to canned foods, because improperly-canned foods can create an environment in which botulism can thrive.

Botulism is a rare, but potentially deadly bacteria that grows in the water in food as it goes bad.

Since dehydrated foods have most of the water removed, there isn't much worry of botulism. That is, unless you add water to the food to rehydrate it and leave it sitting out.

Certain types of food require special care to ensure they're safe for consumption if you intend to dry them and store them for long periods of time. Meat and poultry, for example, have to be *pasteurized*, or heated to 160 and 165 degrees F, respectively, during the drying process in order to kill off microorganisms.

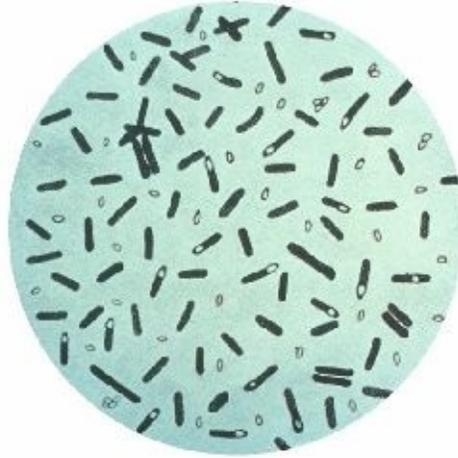


Figure 3: Botulism, up close and personal. You won't see this, but if it's in your food, you're going to feel it.

3.1 - Golden Rules of Dehydration

In addition to special handling requirements for some foods, there are a couple rules you need to keep in mind for all foods.

The following two rules are the *Golden Rules of Dehydration*:

The process you use must remove most of the water from the food.

Leaving too much water will allow bacteria and other microorganisms to grow, so make sure you dry your food for a long enough period of time.

The process you use has to dry the food as quickly as possible. An extensively long drying process might give microorganisms a chance to gain a foothold in your food. Keep the drying process as short as you can.

While the two items above appear at first glance to mutually exclusive of one another, the next paragraph should help you make sense of the Golden Rules.

You want to dehydrate food for a long enough period of time to remove enough water from them to create a situation where bacteria and mold is going to have a tough time finding enough water to grow. The drying process you use needs to dry your food quickly in order to minimize the chances of microorganisms having a chance to grow during the drying process.

It's a fine balance between not drying enough and drying for too long. There's always going to be a little water left in the food. You just want to make sure it isn't too much.



Figure 4.0.1 : Dry fruit for long enough to remove most of the water, but don't leave it out to dry too long.

5.0 - Methods of Drying

You can get started drying using items you probably already have in your kitchen.

The following items are essential to the drying process:

Food.

A source of heat.

Trays or racks to dry the food on. The trays should be slotted wood or mesh trays. Avoid using solid trays because they block air from circulating all the way around the food. *In a pinch, you can cover a wood frame with cheesecloth and use it as a drying rack.*

Containers to store the food in.

That's it. That's all you need to get started drying. There are other items you can use to make life easier on yourself, but the above items are the only absolute necessities.

You want to avoid trays made from the following materials because they can add harmful substances to your food during the drying process:

Fiberglass.

Vinyl.

Aluminum.

Copper.

Plastic.

Galvanized metal.

The following items aren't required, but will make life easier on you:

A commercial food dehydrator.

A fan.

A blancher.

A sulfur box.

A scale.

A thermometer.

Now that we've established the items you need and the items you can buy to

make life easier, let's take a look at the various methods used to dehydrate food.

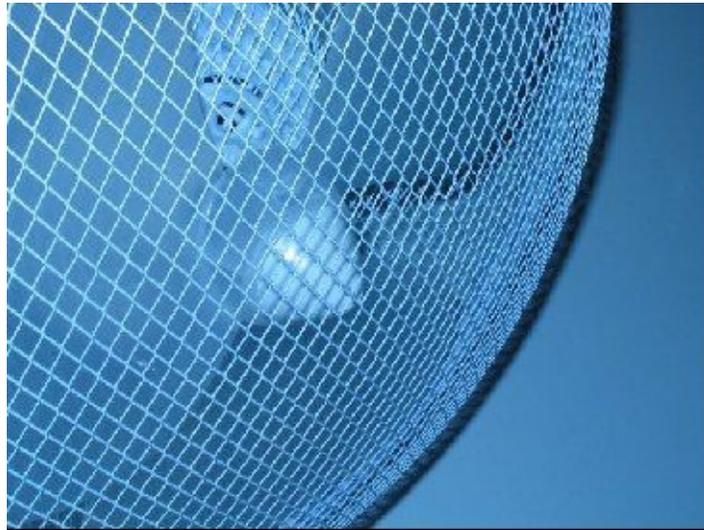


Figure 5.0.1: Use a fan to circulate fresh air into the area where the food is drying.

5.1 - Using Your Oven

If you have an oven (and who doesn't?), you have a tool you can use to dry foods.

It isn't the best choice when it comes to drying, but it'll work in a pinch. The upside to using this method is it's one of the fastest methods of drying food. The downside is you can easily burn or scorch the food you're drying because it's difficult to keep the heat as low as you need it.

You can only dry small amounts of food in a normal kitchen oven. If you're planning on drying large amounts of food, buy a dehydrator and save yourself a lot of work.

You need to keep your oven temperature somewhere between 140 and 160 degrees F. To check oven temps, place an oven thermometer on the top rack and leave it there so you can monitor it. The temperature needs to be checked every 15 minutes to make sure it isn't getting too hot.

Place the food in a single layer on the drying trays. You can usually fit a couple pounds of food on each tray. Since most ovens have two racks, you're only going to be able to dry around 4 pounds of food at a time.

Here's a little trick you can use to fit more food in the oven: Place a couple 1 1/2-inch tall wood blocks on the bottom tray and set the next drying tray on the blocks. Then add a couple more blocks to the second tray and place another tray on it. You can fit up to four racks in your oven using this method, which will effectively double the amount of food you're able to dry at once. Since you're not heating the oven up too hot, you don't have to worry about scorching or burning the wood.

You need to prop the door open so there's a gap of 2 to 6 inches during the drying process. If you have a fan, set it up so it's blowing air into the oven through this gap. You need to keep the air inside moving so the oven doesn't fill full of humid air.

Set your oven at its lowest temperature.

If you have a gas oven, you may be able to get away with just using the heat from the pilot light. Monitor the temperature to ensure it stays above 140 degrees F and below 160 degrees F.

The top rack is going to be a little cooler than the bottom rack. Additionally, the air isn't going to be the same temperature in the front of the oven as it is in the back, especially if you're using a fan to circulate air. **For this reason, it's important to rotate the trays every 20 to 30 minutes.** Rotate the

top trays to the bottom and flip the trays around so the food that was in the front is now in the back. You're also going to want to periodically flip your food over or stir it on the tray because the side of the food that's facing down will dry at a slower rate than the side that's facing up.

I've already mentioned the temperature you need to keep your food at a couple times, but it's important enough that I'm going to mention it again. It's tough to keep your temperature between 140 and 160 degrees F in a conventional oven, so you need to monitor it closely. **Too low of a temperature and your food won't dry out. Too high and you're cooking your food instead of drying it.**

If you have a toaster oven, it can be used to dry small amounts of food, leaving your oven open for other tasks. I wouldn't run out and buy one just for dehydrating foods, because you can get a dedicated dehydrator for close to the same price.

The process used to dry foods in a toaster oven is same as with a conventional oven. Place the food on a tray and put it in your toaster oven. Set the oven on its lowest setting and prop open the door. If you have a fan, use it to circulate new air into the oven.

Since this sort of oven is smaller than a conventional oven, it's going to dehydrate the food you're drying faster than the larger oven. Make sure you watch it closely and soon you'll have a small batch of dried foods.

Here's a quick tip you won't see in too many other books about drying: Open the door of your oven every few hours to let out all the damp air trapped inside. Sure, it will cause the temperature to drop inside, but it will let all the moist air inside escape, replacing it with dry air. The hit you take in temperature is temporary and it's worth it to fill the oven with fresh air.



Figure 5.1.1: If you only dry occasionally, your oven will do the trick nicely.

5.2 - Sun-Drying

Sun-drying foods is the oldest method used to dehydrate foods, predating ovens by thousands of years. This method is all-natural and doesn't require use of electricity or gas (to preserve the food or store it).

All you need is a nice, sunny day or two (or 5) in a row and you can use the power of the sun to dry your food.

In warmer climates, you can dry food using this method year-round. In cooler places or in areas where there's typically a lot of cloud cover, there may only be a handful of days a year this method can be used.

You need dry, clear weather with temperatures of at least 90 to 100 degrees F to sun-dry food.

If you live in an area where it's typically cloudy or there's a lot of moisture in the air, you're probably better off using one of the other methods of dehydrating. It's OK to move foods you've started sun-drying in and finishing the process in the oven or a dehydrator if it looks like inclement weather is on its way.

To sun-dry your foods, spread a layer out on a wood frame covered in cheesecloth. If you're worried about bugs or other animals getting to your food, you can place a layer of cheesecloth over the top of your food as well. Turn your foods regularly to assure even drying or the side left exposed to the sun will dry at a faster clip.

Alternatively, you can run a piece of string through your food items and hang them out to dry. Items like meat can be hung from hooks.

Spread food out in a single layer with at least a couple millimeters space between each piece so air can flow around it. Set the tray out in an area that gets sun for most of the day and has good circulation. Now, all you have to do is leave it there until the food is dry.

Leave the food out during the heat of the day, then move it inside during the evening and night hours.

This accomplishes two things. It prevents the food from rehydrating due to condensation and it keeps the critters away. Animals enjoy dehydrated foods as much as you do and have been known to raid backyards at night. You don't want all of your hard work to be wasted at the hands of a marauding deer or raccoon.

Flip the food partway through each day. The bottom side gets less air and sun and will lose less moisture. Flip the food you're cooking over regularly so both side get equal amounts of sun.

There's no set time you need to leave food out to dry. All times shown in books and on the Internet are approximations of what it takes under "normal" conditions.

What exactly constitutes normal conditions is anyone's guess. What's normal in one place would be out of the ordinary somewhere else. That's probably why there's such variation in the dry times in different literature. I've tried to provide ranges in this book, but even the ranges can be off. The only way to make sure you dry your food correctly is to keep a close eye on it. When it gets close to the bottom end of the range, check it periodically.

The drying time varies based on the heat applied to the food, the humidity and the circulation of air in the area you're doing the drying. The hotter it is, the faster food is going to lose moisture. The more humidity there is, the slower moisture is going to be absorbed.

If you live in an area with a lot of vehicle traffic or high pollution levels, you shouldn't air-dry your food outside. Pollution particles can land on your food and contaminate it. Over time, the particulates you're eating can build up in your system and make you sick.



Figure 5.2.1: Looks like a great day for drying.

5.3 - Building an Inexpensive Sun-Dry Rack

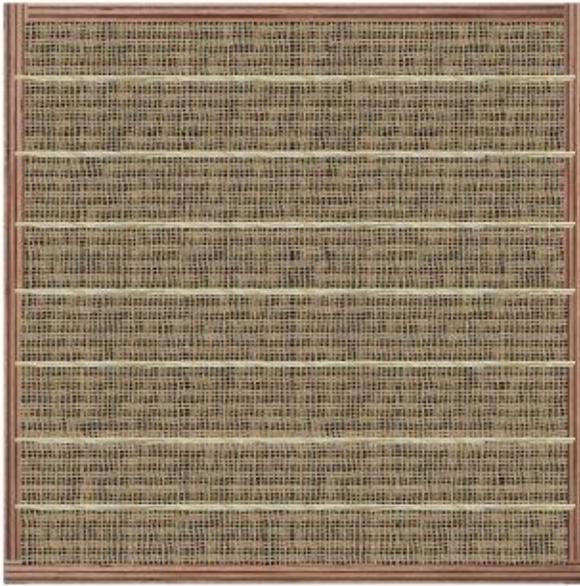


Figure 5.3.1: View of the backside of a homemade sun-dry rack.

For those looking to dry large amounts of food in the sun, buying enough racks to hold all of the food you want to dry at once is cost-prohibitive.

Luckily, you can build your own racks and save a lot of money. The supplies needed to build a decent rack can be purchased for less than 10 bucks a rack. Get them on sale and you can get the cost down to around 5 bucks a rack.

Take a look at the rack in the picture above. It's a very simple rack that's easy to build on the cheap. Here are the items you'll need to build this rack:

Cheesecloth.

Twine.

4 pieces of wood of equal length.

Staples.

Screws or nails.

Follow these steps to build a rack just like the one in the picture:

1. **Determine how big you want your rack to be, then purchase or cut 4 pieces of wood that are the size you want the drying rack to be.** For

smaller racks, you can use thin pieces of wood. For larger racks, use sturdy pieces like 2 X 4's.

2. **Build a square or rectangular frame from the 4 pieces of wood.** If you're using screws to connect the pieces to each other, drill small pilot holes using a bit that's smaller than the screws you plan on using. This will go a long way toward preventing the wood frame from cracking.
3. **Once the frame is complete, spread cheesecloth across the length of the frame and staple it down.** Staple one side of it to the frame, then stretch it tight and staple it to the other side of the frame. It should be tight enough so that a pebble dropped onto the cloth bounces a bit.
4. **Once the frame's been covered with cheesecloth, stretch lengths of twine out tight and staple them along the backside of the screen.** This is to keep the screen from sagging under the weight of the food placed on it. Small screens will only need a couple lengths of twine, while larger screens will need more.

There you have it. A simple and inexpensive drying tray you can use to sun-dry your food. I didn't include any size specs because these screens can be made as large or as small as you want them to be.

5.4 - Solar-Drying Box

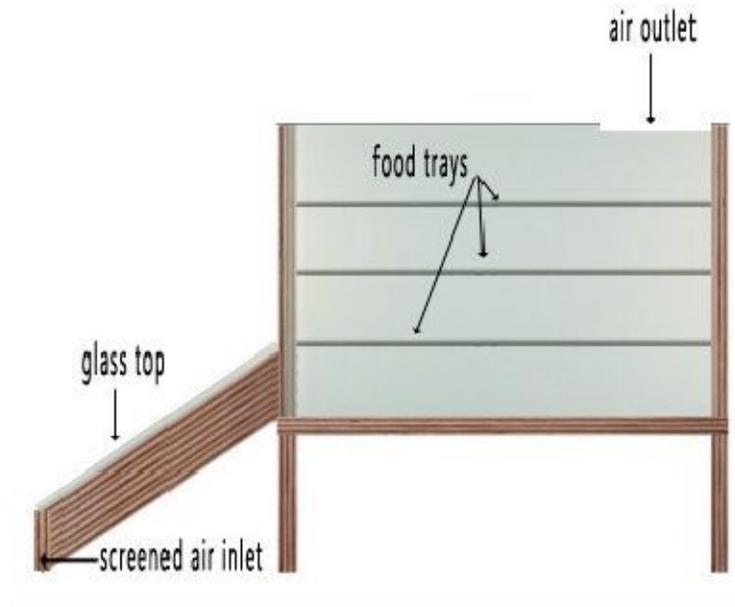


Figure 5.4.1: A solar-drying box.

If you're feeling industrious, you can build your own solar-drying box. This box will speed up the drying process by introducing warm air through the air collector at the bottom while allowing the moisture-filled air to vent from the top.

The solar air collector should have a screened air inlet at the bottom and a glass top to allow the sun to heat the box. The inside of the air collector should be painted black.

The angle of the air collector in relation to the box is important. Assuming the bottom of your box is parallel to the ground, your air collector should enter the bottom of the box at as close to a 45 degree angle as you can get it. It doesn't have to be exact. Just make sure it's angled enough to allow rain water to drain away from it and is at an angle that will allow it to absorb as much of the midday sun as possible.

The box itself can be made of a wood frame with wood, glass or plexi-glass sides. Make sure you leave a vent at the upper corner of the box at the opposite end of the box from where your air collector is attached.

Here's how it works: The air collector will heat up from the warmth of the sun. The black paint and window both help raise the temperature. Air is pulled

into the box from the vent at the bottom. The hot air rises up the angled collector and into the box. Once in the box, it warms the food and pulls the moisture from it. As more hot air is pushed into the box, the moist air that's already in the box is forced out the vent at the top.

You can cover the vents with mesh or cheesecloth to keep bugs out.

Place your box in a location away from shadows and obstructions that could block the sun. If you live in the Northern hemisphere, your collector should face south. Those in the Southern hemisphere should face their collector to the north. This will allow for the maximum amount of sunlight to be absorbed throughout the day.

Solar dryers offer an advantage over regular sun-drying in that the solar dryer is a more efficient method of drying food. The temperatures inside the box are higher, which results in quicker drying times. In addition to drying faster, more moisture is removed from the food being dried because the air is constantly circulating through the box.

They also offer some level of protection from dust, rain and particulate contaminants because the box is largely enclosed. Screening off the openings protects the food from insects and all but the most determined of animals.



Figure 5.4.2: A solar food-dryer in action.

6.0 - Commercial Dryers

Planning on doing a lot of drying at home? You'd do well to invest in a commercial dryer. These dryers are built to handle large amounts of food and the heat and humidity can be controlled with little effort on your part.

Commercial dryers are as close to set and forget as you're going to get when it comes to dehydrating foods.

The cost isn't as prohibitive as you might think. You can get a small dehydrator with 4 or 5 trays for less than a hundred bucks. These smaller dehydrators work well, but don't allow you to dry a lot of food at once.

If you're looking to dry large quantities of food at once, you can get dehydrators with 10 trays or more for anywhere from a couple hundred bucks for a personal dehydrator to thousands of dollars for a large commercial dehydrator. For all but the most dedicated of food dryers, the smaller dehydrators will work great.

Another upside to using a commercial dryer is that they use less electricity than you'd use to dry food in a conventional oven.

Drying food in a commercial dehydrator isn't the fastest method. It takes less time to dry food in your conventional oven because the temperatures are usually higher. It's faster than solar drying. It can take days to use the heat of the sun to dry your food.

Commercial dryers are easy to use. Remove the racks from the dryer and place the food on the racks. Preheat the dryer to 125 degrees F and place the racks in the dryer. Bump the temperature up to between 140 and 160 degrees F and leave the food in the dryer until it's dry.

Some people attempt to build their own commercial dryers using space heaters, floor heaters or even furnace vents or clothes dryers.

While these methods will work to dry out your food, you're running the risk of contamination with dust and all sorts of bad stuff. *Unless you want a mouthful of dirt and dust, it's best to invest in a dedicated unit for drying your food.*



Figure 6.0.1: Electric commercial food dehydrator drying peaches and plums.

7.0 - Freeze-Drying

Freeze-drying is a process used to remove water from food by freezing and reheating it until all of the water has been removed.

This method is more complicated than the other drying methods and requires use of expensive machinery, but can be used to dehydrate pretty much any food you can imagine.

Freeze-drying preserves food in a form that's structurally close to its original form. The heat used in the process is minimal when compared to other drying methods, so the structure of the food isn't altered as much.

Freeze-dryers are expensive and probably aren't a viable option for those looking to preserve foods at home. The only way I could see this working is for a group of like-minded families to go in on one. As of the writing of this book, the cheapest freeze-dryer I could find was in the \$1000 price range, with most machines costing 5 to 20 times that.

While the process differs slightly from machine to machine, here's how it generally works:

- 1. The food is placed on racks and put in the machine.**
- 2. The machine freezes the food solid.**
- 3. A vacuum pump forces all of the air from the chamber while a heating unit applies a small amount of heat to the racks the food is sitting on.** This causes the frozen water in the food to turn into a gas.
- 4. The water vapor flows into a second chamber that has a freezing coil in it.** The vapor condenses in the cold and freezes onto the coils.
- 5. The process continues and repeats itself until all of the water has been removed from the food.**
- 6. The food is then sealed in an airtight package, free of moisture.**

Food that's been freeze-dried and packaged in an air-dry container has a longer shelf life than any of the other preservation methods. It can last years without any degradation whatsoever. Freeze-dried foods are used by the military, NASA and are staples for campers and hikers looking to travel light.

In order to consume freeze-dried foods, all you have to do is add water to them. They return to their original form!

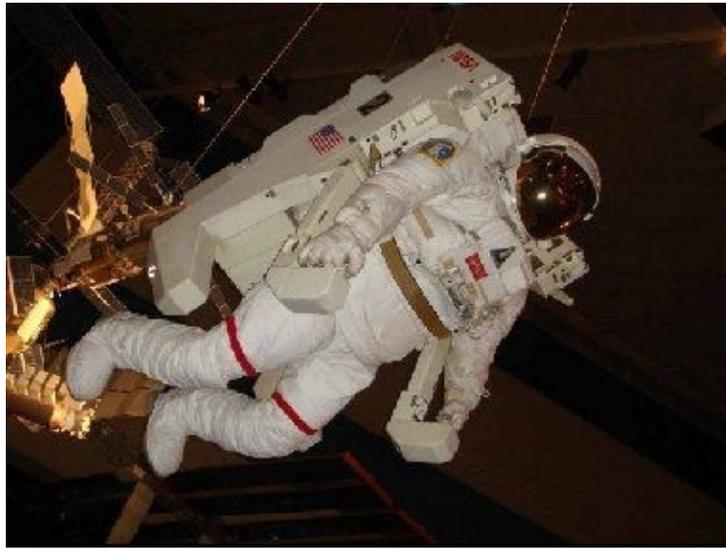


Figure 7.0.1: Astronauts eat freeze-dried foods in space.

8.0 - Pretreating Food Before It's Dried

Most types of food need some sort of pretreatment prior to dehydration for best results. Let's take a look at some of the more popular pretreatments.

8.1 - Skin Cracking

Fruits and berries with tough skins may need to have the skins cracked prior to the drying process in order to allow moisture to be pulled from within the fruit.

Here are steps required to crack skins:

- 1. Bring a pot of water to a boil.**
- 2. Dip fruit into the boiling water for 15 seconds.**
- 3. Remove from boiling water and immediately dip in ice-cold water.**
- 4. Drain water off fruit before drying.**

The following fruits need to be split:

Plums.

Grapes.

Cherries.

Prunes.

Figs.

Blueberries.

Cranberries.



Figure 8.0.1: Berries with tough, waxy skins need to be "cracked" prior to drying.

8.1: Ascorbic Acid (Vitamin C)

Ascorbic acid is a fancy name for vitamin C.

This treatment is used to keep fruit from darkening while drying and kills more bacteria than regular drying alone. It adds vitamin C to the fruit and helps offset any losses of vitamin C associated with the drying process.

You can create an ascorbic acid bath for your food using one of the following techniques:

Pure ascorbic acid crystals can be purchased from most supermarkets. Mix 2 tablespoons of the crystals into a quart of water.

Crush up 12 vitamin C tablets and dissolve in a quart of water.

As you cut the fruit, submerge it in the bath for 8 to 10 minutes. Drain the solution from the fruit and it's ready to go in the dehydrator.



Figure 8.1.1: Ascorbic acid can be used to keep light colored fruit from discoloring.

8.2 - Blanching

Blanching is a treatment typically reserved for vegetables. It's a process in which vegetables are scalded with boiling water or steam in order to cleanse them and stop enzymatic action.

It's important to blanch vegetables for the correct amount of time. *Underblanching* (not blanching enough) a vegetable can actually stimulate enzymatic activity and make the food more likely to go bad during and after the drying process. *Overblanching* (blanching too much) causes the food to lose nutrients and flavor.

There are two types of blanching used to prepare vegetables for drying: *Boiling water blanching* places the vegetables in boiling water for a certain amount of time. *Steam blanching* places the vegetables in a blancher a few inches above the water. They never touch the water using this method. Instead, the steam scalds the vegetables. Steam blanching takes longer than boiling water blanching.

After blanching is complete, bathe the vegetables in cool water immediately to stop them from cooking too much. Drain excess moisture from the vegetables before drying.

The following chart can be used to determine the time needed to blanch various vegetables:

Vegetable	Minutes to Blanch (boiling water)
Artichoke	5
Artichoke heart	8
Asparagus	2 - 5 (depends on size)
Beets	Boil until cooked
Brussel sprouts	2.5 - 5 (depends on size)

Carrots	4
Cauliflower	3
Celery	3
Corn	5 - 12 (depends on size)
Eggplant	5
Green beans	3
Greens	3
Lima beans	2 - 5 (depends on size)
Mushrooms	3 (sliced) or 5 (whole)
Okra	4
Onions	4 - 8 (depends on size)
Peas	2
Peppers	3
Pinto beans	2 - 5 (depends on size)
Potatoes	4
Squash	3
Turnips	2



Figure 8.2.1: Blanch veggies by dipping them in boiling water.

8.3 - Citric Acid Bath

The citric acid bath is similar to the ascorbic acid bath, in that it's used to prevent darkening and to kill bacteria.

To create the bath, you can add a teaspoon of citric acid to 2 1/2 cups of water or you can mix equal parts water and lemon juice.

Let it sit for 8 to minutes and drain the liquid off the fruit and you're good to go.

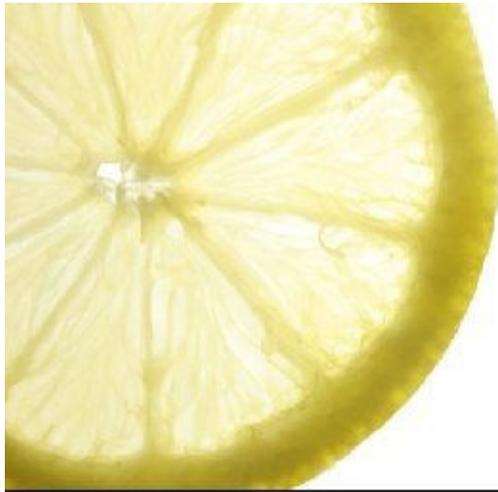


Figure 8.3.1: Lemon juice can be used to make a citric acid bath.

8.4 - Sulphur treatment

Sulphur has been used for hundreds of years to treat a number of different foods. It's traditionally been used to keep foods from spoiling during the drying process and to prevent discoloration.

There's just one problem with this treatment method. *It can cause allergic reactions in some people. The resulting asthma attacks are so dangerous, it's led the FDA to disallow sulfites from being used on commercially sold fresh produce.*

You can use it at home if you want to. Make sure you purchase food grade sodium metabisulfate if you plan on adding it to your food. All it takes is a single tablespoon stirred into a quart of water to treat produce. Soak it for 8 to 10 minutes and make sure you drain it off before drying.

I've seen some recipes that call for use of burning sulphur. *This is an arcane method and it can negatively impact your health and the health of those around you.* Avoid this method in favor of one of the safer methods on this list. If you do decide to use burning sulphur, do it outdoors in a well-ventilated area.

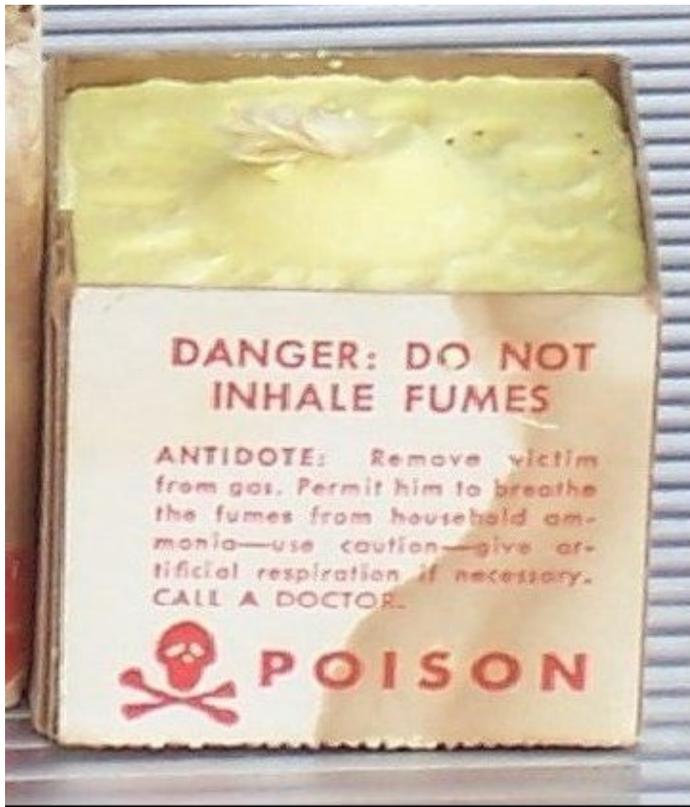


Figure 8.4.1: Do you really want to burn this stuff and put it on your food?

9.0 - Drying Fruit

Fruit is one of the easiest foods to dry, so it's where most people start when trying to learn the ins and outs of dehydration. It's a good way to preserve extra produce and allows you to buy it when it's at its cheapest during the local harvest season.

9.1 - Selecting the Best Fruit

The fruit you buy is critical part of the process. It's important you select only the freshest, ripest fruits.

For this reason, it isn't a good idea to buy your fruit from most grocery stores. By the time fruit (and vegetables, for that matter) hits grocery store shelves, it's usually at or near the end of its life cycle.

A much better option is to get your produce from a local farmer's market or straight from a local farm.

You want food that's at the peak of its maturity. Underdeveloped produce will be lacking in both color and flavor. Older produce will be too ripe and will be too sweet and squishy after drying.

Don't use damaged fruit. Make sure you select fruit that's free of decay, bruises and cuts or scrapes that compromise quality. It's important to keep in mind that drying fruit isn't going to make fruit that going bad more edible. It's just going to make bad dried fruit.



Figure 9.1.1: Only use high-quality fresh fruit.

9.2 - Preparing the Fruit

Once you've selected the fruit, it's time to get it ready for the drying process. The following chart lists various fruit you can dry and how to prepare it for drying:

Fruit	Preparation Needed
Apples	<ol style="list-style-type: none">1. Remove skin and core, then cut into slices of desired size.2. Blanch for 5 minutes.3. Treat with ascorbic acid, citric acid or sulfite bath.
Apricots	<ol style="list-style-type: none">1. Remove pit, then cut into slices of desired size.2. Blanch for 4 minutes.3. Treat with ascorbic acid, citric acid or sulfite bath.
Bananas	<ol style="list-style-type: none">1. Choose ripe bananas with no green. You don't want them to be bruised or overripe.2. Peel the banana and slice it into coins.3. Treat with ascorbic acid, citric acid or sulfite bath.
Blackberries	No treatment needed.
Blueberries	<ol style="list-style-type: none">1. Wash berries.2. Crack skin.
Boysenberries	No treatment needed.
Cherries	<ol style="list-style-type: none">1. Remove stems and pit.2. Cut in half or leave whole.3. If left whole, the skins have to be cracked.
Cranberries	<ol style="list-style-type: none">1. Wash berries.

	<ol style="list-style-type: none"> 2. Crack skin.
Figs	<ol style="list-style-type: none"> 1. Use ripe figs only. 2. Crack skins.
Grapes	<ol style="list-style-type: none"> 1. If grapes have seeds, cut in half and remove the seeds. 2. If grapes are left whole, they need to be cracked.
Huckleberries	<ol style="list-style-type: none"> 1. Wash berries. 2. Crack skin.
Nectarines	<ol style="list-style-type: none"> 1. Pit and halve. 2. Blanch for 3 minutes. 3. Treat with ascorbic acid, citric acid or sulfite bath.
Peaches	<ol style="list-style-type: none"> 1. Pit and halve. 2. Blanch for 3 minutes. 3. Treat with ascorbic acid, citric acid or sulfite bath.
Pineapple	<ol style="list-style-type: none"> 1. Use ripe pineapple. 2. Cut off thorns. 3. Slice and core. 4. Slice into 3/4-inch slices for drying.
Plums/Prunes	<ol style="list-style-type: none"> 1. Leave whole. 2. Crack skins.
Raspberries	No treatment needed.
Strawberries	No treatment needed.
Tomatoes	<ol style="list-style-type: none"> 1. Scald and chill, then remove peel. 2. Slice



Figure 9.2.1: Shop at the farmers market to get the best fruit.

9.3 - Drying the Fruit

Ok, the fruit is prepared and ready to be dried. Now comes the hard part. Deciding how long you need to dry it. Dehydrating food isn't an exact science and there are a lot of variables that can change the amount of time needed to dry your food.

The following chart lists approximate dry times for various fruits using solar drying, a conventional oven and a dehydrator:

Fruit	Dehydrator	Conventional Oven	Solar
Apples	Up to 12 hrs	Up to 24 hours	1 to 6 days
Apricots	8 to 24 hours	1 to 2 days	1 to 6 days
Bananas	8 to 12 hours	10 to 24 hours	1 to 6 days
Blueberries	12 to 24 hours	1 to 5 days	1 to 6 days
Cranberries	12 to 24 hours	1 to 5 days	1 to 6 days
Huckleberries	12 to 24 hours	1 to 5 days	1 to 6 days
Boysenberries	12 to 24 hours	1 to 5 days	1 to 6 days
Blackberries	12 to 24 hours	1 to 5 days	1 to 6 days
Strawberries	12 to 24 hours	1 to 5 days	1 to 6 days
Raspberries	12 to 24 hours	1 to 5 days	1 to 6 days
Cherries	12 to 24 hours	1 to 5 days	1 to 6 days

Figs	6 to 12 hours	12 to 24 hours	1 to 6 days
Grapes	6 to 12 hours	1 to 2 days	1 to 6 days
Nectarines	1 to 4 days	1 to 6 days	1 to 6 days
Peaches	1 to 4 days	1 to 6 days	1 to 6 days
Pineapple	12 hours to 1 day	1 to 2 days	1 to 6 days
Plums/Prunes	1 to 2 days	1 to 4 days	1 to 6 days

Since drying is an inexact science, you're going to have to check your fruit from time to time to see if it's ready. Ideally, you want to shoot for pulling it out when there's approximately 20 percent moisture left in the fruit. This will prevent it from becoming too brittle.

To test your fruit, pull pieces from various areas of the drying device. Cut the pieces in half and squeeze the fruit. If you're able to squeeze liquid from the fruit, it isn't dry enough. The fruit shouldn't be sticky to the touch.

If you don't get enough of the moisture out, you're at risk of contaminated food later on down the road.



Figure 9.3.1: Mmmmm...dried banana.

9.4 - Cooling, Conditioning and Packaging

Once you're confident the fruit is done drying, you're going to be tempted to package it and be done with it. There are still a couple important steps left before you're finished. It's time to start the cooling and conditioning process.

First, cool the fruit by letting it sit out in a cool, dark place for a half hour to an hour. You don't want to package your food warm because it can reintroduce moisture into the food due to condensation. Be careful not to leave your fruit out for too long because that can also cause moisture to get back into the fruit.

Fruit that's been dried outdoors or in a polluted environment should be pasteurized. Place it into an oven heated to 160 degrees F for 30 minutes. Alternatively, you can put it in freezer bags and freeze it for a couple days.

The last step in the conditioning process is to take the dried fruit and place it in loose packaging. Seal it up and let it sit for a week. *This ensures the moisture will be evenly distributed throughout the food instead of there being some pieces with more moisture than others.*

Packaging dried fruit is easy. All you need is to do is package it in containers that are airtight and free of moisture. If you've treated your food with sulphur, you need to keep it away from metal because the sulphur will cause the metal to rust. Store your containers in a cool, dark area. Dried foods can be stored for 6 months to a year.



Figure 9.4.1: Store dried foods in airtight containers.

9.4 - Fruit Leathers: A Tasty Treat

Did you know you can make your own snacks that are like fruit roll-ups at home?

Instead of throwing overripe fruit away, it can be used to make fruit leathers. While really ripe fruit doesn't lend well to drying, it works great for leathers.

All you need is a blender or food processor to blend up your fruit. Apples, peaches, nectarines and pears need to be cooked prior to blending them. Most other fruits can be blending without cooking them. Once you've blended the fruit, pour it onto a drying tray or a tray specifically designed for making fruit leathers. Either way, you want to shoot for a uniform thickness around the edges of the tray of 1/4-inch. Thin it down to about half that near the center.

Dry it until there are no wet spots and the fruit is the texture of leather.

You can experiment with the type of fruit you use and the quantities. You can mix up batches of tropical, passion fruit or berry fruit leathers or you can stick to single flavors. Add a bit of lemon or lime juice for added flavor and to prevent discoloration of light-colored fruits.

I prefer to keep my fruit leathers all-natural, but some people add sugar to them to make them sweeter. If you so desire, you can add granulated or cane sugar, to taste.



Figure 9.4.1: Mix-and-match fruits to discover the best fruit leather flavors.

10.0 Drying Vegetables

Dried vegetables are great for making soups and stews and can be used as garnish for a number of food dishes. You can reintroduce water to some dried vegetables and they'll return to a form similar to what they were before drying.

Avoid drying vegetables with a strong taste or odor with other fruits or vegetables at the same time. The strong-scented vegetables will impart some of their scent to the weaker vegetables and the taste may even be transferred. Do you know what garlic-flavored banana chips taste like? Trust me, you don't want to find out. Learn from my mistakes.

10.1 Blanching

We discussed blanching previously in the section on food preparation. Here's a quick recap. Vegetables need to be blanched to kill enzymes. The blanching process involves either steaming or boiling vegetable for a certain period of time in order to ensure the harmful enzymes have been deactivated.

Here's the chart showing blanching times from the section earlier in the book where we discussed the blanching process:

Vegetable	Minutes to Blanch (boiling water)
Artichoke	5
Artichoke heart	8
Asparagus	2 - 5 (depends on size)
Beets	Boil until cooked
Brussel sprouts	2.5 - 5 (depends on size)
Carrots	4
Cauliflower	3
Celery	3
Corn	5 - 12 (depends on size)
Eggplant	5
Green beans	3

Greens	3
Lima beans	2 - 5 (depends on size)
Mushrooms	3 (sliced) or 5 (whole)
Okra	4
Onions	4 - 8 (depends on size)
Peas	2
Peppers	3
Pinto beans	2 - 5 (depends on size)
Potatoes	4
Squash	3
Turnips	2

Most vegetables need to be blanched. There is literature out there indicating some of the items I've included on the list above don't need blanching. I'd go ahead and blanch them just to be safe. It isn't going to change the taste and texture and it safeguards you against harmful enzymes.



Figure 10.1: No matter what vegetable you choose, it's best to blanch it first.

10.2 - Preparation

After blanching, drain the vegetables and slice them into pieces the size you want to dry. Here's a chart showing the required preparation of various vegetables you might want to dry:

Vegetable	Processing
Asparagus	1. Wash and cut large tips in half.
Beets	1. Boil beets and peel. 2. Cut into thin slices.
Broccoli	1. Cut into pieces of the desired size.
Cabbage	1. Remove the tough outer leaves. 2. Cut in half and remove core. 3. Cut into strips or dice.
Carrots	1. Peel carrots. 2. Slice or shred.
Cauliflower	1. Cut into pieces of the desired size.
Chili pepper	1. Wash and slice. 2. Smaller red chilies can be left whole. 3. For green peppers, scald in boiling water and remove the skin before drying. 4. Remove seeds.
Corn	1. Remove corn from cob prior to drying.
Green	1. Cut into pieces of the desired size.

beans	
Mushrooms	<ol style="list-style-type: none">1. Remove tough stalks.2. Dry at extremely low temperature (90 to 100 degrees F) for a couple hours.3. Bump temp up to 120 to 135 degrees F and finish drying.
Onions	<ol style="list-style-type: none">1. Peel and slice.
Peas	<ol style="list-style-type: none">1. Remove from pod before drying.
Peppers	<ol style="list-style-type: none">2. Remove seeds if you want.3. Chop or leave whole.
Potatoes	<ol style="list-style-type: none">1. Clean and peel.2. Cut into slices.



Figure 10.2.1: A perfect tomato slice for drying.

10.3 - Drying Times

It's time to dry your veggies. Consult the following chart for approximate dry times:

Vegetable	Dehydrator	Conventional Oven	Solar
Asparagus	6 to 12 hours	Up to 24 hours	1 to 6 days
Beets	10 to 20 hours	Up to 24 hours	1 to 6 days
Broccoli	10 to 15 hours	Up to 24 hours	1 to 6 days
Cabbage	12 to 16 hours	Up to 24 hours	1 to 6 days
Carrots	6 to 12 hours	Up to 24 hours	1 to 6 days
Cauliflower	12 to 16 hours	Up to 24 hours	1 to 6 days
Chili pepper	12 to 24 hours	Up to 24 hours	1 to 6 days
Corn	6 to 12 hours	Up to 24 hours	1 to 6 days
Green beans	8 to 12 hours	Up to 24 hours	1 to 6 days
Herbs	4 to 8 hours	Up to 24 hours	1 to 6 days
Mushrooms	8 to 12 hours	Up to 24 hours	1 to 6 days
Onions	6 to 12 hours	Up to 24 hours	1 to 6 days
Peas	6 to 12 hours	Up to 24 hours	1 to 6 days

Peppers	8 to 12 hours	Up to 24 hours	1 to 6 days
Potatoes	6 to 12 hours	Up to 24 hours	1 to 6 days

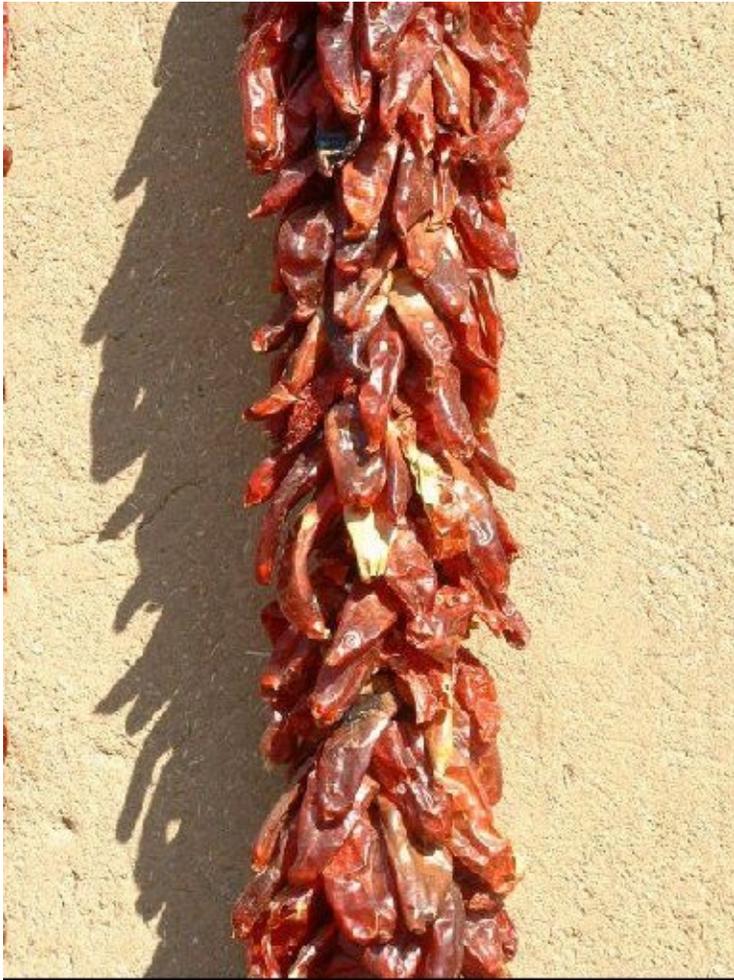


Figure 10.3.1: Peppers can be hung and dried.

10.4 - Cooling, Conditioning and Packaging

Vegetables are done drying when they're brittle to the touch. Cool vegetables for 24 hours.

Since vegetables are dried until they're brittle, there's no need to condition them like you have to condition fruit. Once vegetables are cool, they're ready for packaging.

Veggies should be stored in an airtight plastic container. The best container to store vegetables in is a lidded glass jar. They can also be placed in an airtight plastic bag and stored in a metal container.



Figure 10.4.1: Dry vegetables until they're brittle to the touch.

11.0 - Dried Herbs and Spices

There's a bunch of different herbs you can grow yourself and dry using any of the drying methods. Herbs can be used to enhance the flavors of your foods are a healthy alternative to salt or MSG.

The following herbs and spices are good choices to dry:

Basil.

Bay leaves.

Celery leaves.

Chervil.

Chives.

Cloves.

Dill.

Marjoram.

Onion.

Oregano.

Parsley.

Rosemary.

Sage.

Tarragon.

Thyme.

Garlic.

Ginger.

This is a partial list and is intended to show you a small sampling of the most popular herbs. There are a lot more herbs available, some of which can be used to add exotic flavors to your foods.



Figure 11.0.1: Create your own homemade spice rack.

11.1 - How To Dry Herbs and Spices

You can use any of the previously discussed methods to dry herbs and spices. *It's easy to tell when they're done because all you have to do is check to see if they crumble in your hand.*

Leafy herbs and spices can be removed from the stems to speed up the drying process. Smaller stems can be left intact.

There are three additional methods you can use to dry herbs and spices.

Place the herbs in a paper bag and tie the top closed. When you tie it closed, you want to tie the bags around the stems so the stems are the only thing touching the bag. The leafy parts of the herbs should be hanging free in the middle of the bag. Now, hang the bag in a warm area of your house where the air is relatively dry. This drying method takes a week or two before the herbs completely dry out.

If you need to quickly dry your herbs, use the microwave. Set the herbs on a paper towel and place a paper towel over the top of them. Nuke them for 3 minutes. If they aren't dry, microwave them for a minute at a time until they dry out and are brittle to the touch.

You can dry herbs and spices in your refrigerator, too. Get some tulle netting from your local arts and crafts store. Place the herbs on the netting and roll them up inside it. Tie both ends of the netting closed and leave in your fridge for a couple weeks. When you open the netting the herbs should be dry.



Figure 11.1.1: You don't need much space to create your own herb garden.

11.2 - Storage

Herbs can be stored in one of two ways. You can store the whole leaves, which will keep them fresh and help them retain their flavor for longer, or you can crush them up before storing them, which will allow you to quickly use them when you're cooking a recipe that calls for the herbs you have on hand.

I recommend crushing up a small jar of them for easy access and storing the rest as whole leaves. Store the whole leaves in an airtight container. Glass jars with airtight lids work best. Use a black marker and record what you're storing on the jar. You don't want a cabinet full of herbs and spices with no labels.



Figure 11.2.1: Store herbs and spices in airtight containers.

11.3 - Making Garlic and Ginger Powder

The process for making garlic and ginger powders is pretty much the same, so I'm only going to go over it one time.

Here are the steps required to make garlic and ginger powder:

1. **Peel the garlic or ginger.**
2. **Cut it into small pieces.**
3. **Place in food processor or blender and pulse.**
4. **Spread the resulting "paste" out in a thin layer on the bottom of the drying tray.**
5. **Set the temperature to somewhere between 120 and 130 degrees F.**
6. **Dry for up to 12 hours or until the paste crumbles when you rub it between two fingers.**
7. **Take the dried garlic or ginger and put it into a food processor and run it until it turns into a smooth powder.** If you don't have a food processor, a coffee grinder can be used.
8. **Push the powder through a strainer to remove any clumps and reprocess the clumps.**
9. **Continue steps 7 and 8 until all of the garlic or ginger is in dry powder form.**



Figure 11.3.1: Make your own garlic powder at home.

12.0 - Dried Meats

Drying meats is an age-old preservation method that's been in use for thousands of years. This ancient technique of preserving meat used to be one of the only ways to preserve meat if you wanted to take it on the road with you.

Meat can be dried naturally, oven dried or you can use your commercial dehydrator. Dried meat takes on a tougher texture and is commonly called "jerky." When people hear the word jerky, the first thing they think of is beef jerky.

While beef jerky is good, there are a number of other meat you can turn into jerky.

Here are some of them:

Chicken.

Turkey.

Pork.

Lamb.

Venison.

Buffalo.

Alligator.

Snake.

Fish.

Cat.

Dog.

OK, maybe not the last two. I was just checking to see if you're still paying attention. Regardless of the type of meat you use, jerky makes a tasty snack. Making jerky at home allows you to save a pretty penny—homemade jerky costs half of what jerky in the store would run you.



Figure 12.0.1: Lean meats make the best jerky.

12.1 - Preparation

Pretty much any lean meat you can imagine can be turned into jerky.

Fatty cuts of meat are going to need to be trimmed. You don't need to remove all of the fat, but cut off as much as you can. Fat is more likely than the rest of the meat to go rancid during the drying process, so it's important to remove as much of it as you can.

Rancid fat will ruin the taste of your jerky and can make you sick.

Once you've trimmed the meat, cut it into strips.

You can either hang your meat from a hook and cut strips from it or just put it on a cutting board. I've found it's easier to hang it from a hook. Keep in mind the end product will be approximately a quarter of the size of the original cut so your strips should be a little bigger than you think you need. You want each strip to be approximately the same size and length.

Treat each piece of meat with a brine made of 1/2 cup salt mixed with 4 cups water. Dip it into the brine and let it sit for 5 to 10 minutes. This will help prevent bacteria from gaining a foothold during the drying process.

I've seen some tutorials on creating jerky that calls for the salting to be done *after* the drying process. *This is unsafe on multiple levels.* In addition to creating a hostile environment for harmful microbes, salting also keeps insects away. Flies love meat and unsalted meat left out to dry will attract flies looking to feed and lay eggs. Salt keeps them away. Need I say more?

The following safety precautions need to be followed when drying meats:

Only use clean equipment and always clean your equipment right after removing dried meat from it.

Wash hands thoroughly before handling meat.

Keep meat refrigerated and use within a couple days.

Thaw frozen meat out in the fridge.

If making jerky from wild game, don't use cuts of meat that may have come in contact with fecal matter from the animal.

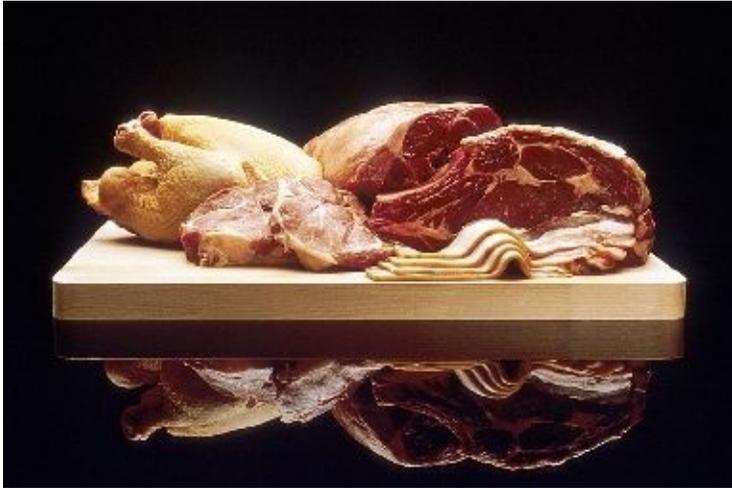


Figure 12.1.0 – Cut it into strips, dip it in brine and it's ready to go.

12.2 - Drying

Meat can be dried using the following techniques:

Solar: Requires a series of days with temps over 100 degrees F. Place meat on drying tray and leave sitting out until meat is dry. Bring it inside at night. Keep meat covered with cheesecloth to keep the bugs away. Drying outside can take 4 to 5 days.

Conventional oven: Place meat directly on the rack or on a tray. Set oven to 150 degrees F and dry for 12 to 14 hours. Flip the strips of meat once an hour. Leave the oven partially open and use a fan to circulate fresh air into it.

Commercial dryer: Place meat directly on racks and set to 150 degrees F. Dry for 12 to 16 hours, flipping meat once an hour.

Smoking: This is a new technique, not discussed in the other section. To smoke your meat, you're going to need a *smoker*. A smoker is a device in which you place wood chips in the bottom and light them on fire. The smoldering chips create smoke, which imparts a smoky flavor to the meat as it dries. Hardwood like hickory works best for smoking. Smoking creates a semi-dry meat product that doesn't last as long a meat dried using the other methods—but it tastes great.

To check if jerky is done, let a piece cool and bend it.

It should be pliable, but should break before it's folded in two. If you're able to fold it in two, there's too much moisture. Jerky that snaps immediately or crumbles in your hands has been dried for too long.

Here's a tip I've used to keep drying jerky out of the reach of enterprising animals. Take 100-pound test fishing line and tie it off so it's high enough off the ground that animals can't get to it. String a bunch of large barbless hooks onto the line. Tie the other end of the line off somewhere of equal height. The meat can be hung from the hooks out of reach of any animals that may smell it and come calling. Make sure you don't hang it too low or you may return to an angry animal with a hook stuck in its face.

Once your jerky is done, heat your oven to 160 degrees F and place the jerky in the oven for 5 to 10 minutes. This will help kill off any bacteria that may have grown during the drying process.



Figure 12.2.1: Beef jerky.

12.3 - Storage

Cool the jerky and store it in an airtight container. Properly dried jerky can last up to 6 months if stored in a cool, dry place.

12.4 - Drying Fish

Fish is dried in a similar manner to how you dry meats. Fish should be prepared and dried the same day it's caught.

Here's the drying process for fish:

- 1. Gut the fish and remove the parts you don't want to dry.**
- 2. Wash in cold water.**
- 3. Soak for a half hour in a brine consisting of 2 cups of salt water mixed into a gallon of water.**
- 4. Rinse the fish off.**
- 5. Coat with pickling salt.**
- 6. Dry using either a solar drying rack or a commercial food dryer. Outdoor drying can take 5 to 7 days. A commercial dryer takes 1 to 2 days.**

Dried fish should be stored in the refrigerator. It will keep for a couple months.



Figure 12.4.1: Catching the fish you plan on drying is half the fun.

13.0 - Drying Your Own Popcorn

You can grow and dry your own popcorn at home.

The following types of corn can be used to make popcorn:

Crème-puff hybrid.

Dynamite.

Hybrid South American mushroom.

Japanese hull-less.

White cloud.

The easiest way to dry your own popcorn is to leave it on the stalk until it's almost completely dry. Once the husks feel like thin sheets of paper, it's time to harvest your popcorn.

Remove the husks. Cook them for 30 minutes at 300 degrees F before starting the drying process.

Dry the ears of corn using either a commercial dehydrator or your oven set to 160 degrees F.

This will take a day or two. Test to see if the popcorn is ready by removing a handful of kernels and placing them in a paper bag. Fold the bag shut, put the bag in the microwave and nuke it on high for 2 minutes. If the popcorn pops, it's ready. If it doesn't, it needs to be dried more.

Store dried popcorn in the freezer. It will last for a couple years.



Figure 13.0.1: Make your own popcorn.

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