

Brighton & Hove



# Micro-processing using a dehydrator

A guide based on lessons learnt by the Brighton & Hove Food Partnership in making dehydrated vegetable packs to extend the shelf life of gluts/ surplus veg.



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## Introduction

The Brighton & Hove Food Partnership is a not for profit organisation helping people learn to cook, eat a healthy diet, grow their own food and waste less food [www.bhfood.org.uk](http://www.bhfood.org.uk).

The idea to dehydrate surplus vegetables to make veg kits for people experiencing food poverty was initiated as part of a Interagg 2Seas knowledge exchange project (Flavour). The idea was tested and developed as part of a National Lottery Community Fund project Ready Healthy Eat which sought to find ways to make 'ready meals' healthier for those relying on food banks and pantries for their meals.

This guide is aimed at other community and voluntary sector organisations that are interested in extending the shelf-life of gluts and surplus fruit and vegetables through dehydration. Our target market was always food bank users and people who use the city's affordable food pantries. Our processing team is a pool of volunteers in our Community Kitchen who come for social connections as well as veg chopping at our Chop and Chat session and this is reflected in our product as well as our processing capacity.

## Things to consider before you start

### How much time and investment do you have? What equipment do you have already?

There is a full list of equipment which we use later on in this document - if you already have equipment is it of a good quality (the chopping of veg needs strong knives / good chopping boards)

### Size of dehydrator

We have a three-chamber dehydrator, MODEL XXX which takes around 11kg of raw food waste. Consider your options and go for the largest machine you can afford / accommodate because without water content the fruit and veg shrinks. We can process 11kg every 10-14 hours which only gives us 1.1kg.

### Processing capability

The size of your kitchen, how often you can use it and the number of people involved are also factors in what and how much you can produce. Management of expectations is covered later in this document.

Ensuring you have a team that is healthy and prepared for food production is a key element of preparing safe food. Managing a team of volunteers or staff comes with responsibilities. Induction training, before handling products, should be delivered and signed off with explanation of the bulleted points within the list below, as well as fire and safety-related instructions. Before you have a new volunteer or staff member starts production, a 'Fitness to work' form should be completed (see link below) Your team should also be aware of their responsibilities as a food handler and yours as the food operator.



## Packaging

Which packaging do you need? Does it display the product effectively? Is there space for labels? Does it add a huge cost to the product? Is it as environmentally friendly as it seems? Even though it says that it is compostable, check that your council accepts it, remember home compostable isn't the same thing and packaging can be misleading. Most importantly, will it seal tightly and keep the dehydrated produce dry?

When we have taken our packs out to projects to gain feedback, people often say how attractive they look which is important when you are asking people to try something new. Our packaging has a window which people like as they can see what is inside to better understand the product.

## What problem are you trying to solve

Knowing this will help you decide what is best for your group. Are you about tackling food waste? Maybe you're trying to encourage a group of people to add more vegetables to their diet, maybe you are trying to help people who can't afford fresh produce or can't carry heavy fresh veg a long way without transport?

We developed our Flavour Packs (the dehydrated vegetable packs) to reduce food waste by extending shelf life of veg that can't be redistributed as fresh produce, provide people living in food insecurity with a source of veg that doesn't need storing in a fridge and providing an opportunity to learn kitchen skills and connect with others for participants at our chop and chat sessions.

## Who are your customers?

It is important to have a clear idea of who is receiving this produce and how they will be using it. Because we were aiming our product at domestic settings we created 4 'Flavour packs' which are combinations of ingredients which can be used to add to different meals and in different ways.

These are;

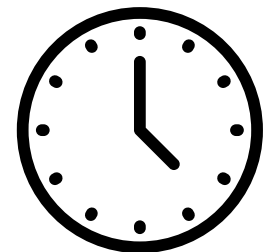
- Puttanesca - ideal for pasta sauces or rehydrated to go with cooked rice or pasta.
- Minestrone - always a mixture of whatever we have with some staples such as tomatoes, to make a chunky soup where beans, pasta and meat can be added.
- Asian broth - a more fragrant soup with the addition of ginger and garlic.
- Stew pack - a root veg medley, great to add to slow cookers and stews.

You could create bags of just one ingredient for venues to use and add to their cooking, such as affordable cafes and soup kitchens.

You may also consider dehydrated produce for a scoop and weigh.

## Challenges to consider

- Space and infrastructure
- Time/Budget
- Supply and logistics
- Formal Market Research and engagement in surveys
- Logistics for distribution



# Health and safety

## Procedures

As we are dealing with food, it is really important that procedures are in place to ensure the food is safe – pathogen free and free of unwelcome material organic or inorganic. Having a daily, weekly and monthly check list is a way of ensure procedures are embedded into your processes. Having clear, concise lists that are followed also avoids anything being missed. Templates can be found online, but it's good practice to create one personalised to your setting and team, for example, you may not be using fridges and freezers at all, so you won't need to have them on the checklist to clean but you may have a compost bin that needs to be emptied and cleaned regularly.

## HACCP - what is it?

If you run a food business, you must have a plan based on the Hazard Analysis and Critical Control Point (HACCP) principles.

The HACCP plan keeps your food safe from biological, chemical and physical food safety hazards.

To make a plan you must:

- Identify any hazards that must be avoided, removed or reduced
- Identify the critical control points (CCPs) - the points when you need to prevent, remove or reduce a hazard in your work process
- Set limits for the CCPs
- Make sure you monitor the CCPs
- Put things right if there is a problem with a CCP
- Put checks in place to make sure your plan is working
- Keep records

## Food Safety

If you are serving food for public consumption you need to be registered as a food business (your Food Safety team at the Council can help).

If your business deals in food you must:

- Make sure food is safe to eat
- Make sure you do not add, remove or treat food in a way that makes it harmful to eat
- Make sure the food is the same quality that you say it is
- Make sure you do not mislead people by the way food is labelled, advertised or marketed

Employers are responsible for staff hygiene training. It can be either a formal programme or informal training, such as on the job training or self study.

All above information is from: [www.gov.uk/food-safety-your-responsibilities](http://www.gov.uk/food-safety-your-responsibilities). It is your responsibility to check what is needed for your setting.

## Health & Hygiene - guidelines

Individuals should keep themselves and the workplace clean and wear suitable, clean protective clothing. Store, prepare and display food at safe temperatures. Do everything possible to protect food from contamination. Inform the employer if experiencing symptoms of a foodborne illness, contact with anyone who has been unwell, been unwell returning from being abroad, suffering skin infections, or heavy colds/flu. Wear designated protective clothing to protect food from risk of contamination. Make appropriate use of hand-washing facilities. Safeguard food so that it does not cause illness or harm. Have appropriate training related to food handling being undertaken.

## Documenting

Remember, it is a legal requirement to operate a documented system to record and monitor requirements for food safety. These systems are based on the HACCP (Hazard Analysis Critical Control Points) principles and are required for all businesses. The complexity of the system employed will be determined by the nature and size of the business. For simple catering systems the Food Standards Agency has provided a pack that can be tailored to individual operations and is downloadable at <https://www.food.gov.uk/business-guidance/safer-food-betterbusiness-for-caterers>. For manufacturing and larger enterprises, it will be necessary to provide a fuller system and further details are available in the 'Record keeping' document included within this series.

## The difference between detergents, disinfectants and sanitisers

Knowing what role your cleaning products do and how they work is important for maintaining a safe production space. The FSA outlines the differences as:

- Detergents Clean and degrease a surface, but do not kill bacteria
- Disinfectants Kill bacteria - they should be used on surfaces that are already visibly clean or used after a detergent.
- Sanitisers Can be used instead of a detergent and disinfectant but used as a two-stage process - to first clean a surface and then re-applied and left for the stated contact time to provide a sanitising effect and to kill bacteria.

## Process of creating 'Flavour packs'

For our flavour packs we have to:

- **CHOP** the raw produce then we have to
- **LOG** the dried produce and then we have to
- **PACK** the bags.

It is important that we stick to this order as much as possible as it helps to keep the process safe and efficient. Produce can't be packed if it isn't chopped, dehydrated safely and logged. This sounds like it may be obvious, but when there are gluts of produce and busy diaries to fit in with, it can become quite complicated. It is however, important to stay flexible where possible to avoid food from going to waste.

## Management of expectations and efficiency of production

The ratio of fresh produce to dehydrated produce is pretty low - for example, using our three-chamber dehydrator, 11kg of fresh produce equates to 1.1kg of dehydrated produce - just 10%.

Other limiting factors including how often you can use your kitchen to fill and empty the dehydrator. The kitchen we use is a busy shared space, where we are fitting around different activities. If you have a dedicated space, the machine could be running constantly with a fresh batch going in every day and maybe even two batches depending on produce and thickness it is cut (see below).

## Produce, thickness and timings

Cherry tomatoes cut in half - 10-12 hours on 60-65

Mushrooms cut into slices - 10-12 hours on 60-65

Onions cut into 5mm rounds - 10-12 hours on 60-65

Peppers sliced 5mm - 10-12 hours on 60-65

Carrots sliced in a machine with a 2mm blade 8-10 hours 60 degrees

Swede sliced in a machine with a 2mm blade 8-10 hours on 60 degrees

Wetter items generally took longer on a lower temperature and root vegetables were better cut thinner through a machine for speed. See tips later on.

An example of some of our processing step and how we take action - check gov.uk for full and up to date information

Processing step	Hazard source/cause	Control measure	Target Value/ critical measure	Frequency	Corrective action
Storage of raw material	Growth of food poisoning bacteria and spoilage of food	Correct temperature control	4 (max 5°C)	Daily	<ul style="list-style-type: none"> <li>Discard any food &gt;8°C for longer than 4 hours</li> <li>Discard out of date food</li> </ul>
Drying in the dehydrator	Cross contamination	Keep raw materials in separate compartments during drying	N/A	When Dehydrating	Dehydrate in separate chambers where possible
Drying in the dehydrator	Not dry enough	Aw-measurements	Aw = 5 (0,4<Aw<0,6)	After the dehydration of every batch	If aw >0,6 put back in dehydrator and re-check every hour until desired value is attained



## **Batch codes & labelling**

It is critical to include batch codes on your dehydrated produce to have a trail of processing, so that if anything does go wrong, that it can be traced back.

### **How a batch code can help you if there's a problem**

If a complaint or safety issue with your product is raised a batch code can help you refer back to records

to be able to trace where products from a particular production day or run has gone, how it can be recalled or withdrawn from sale to prevent harm to health, or to inform customers to limit damage to reputation. This can also link to the actual batch numbers for ingredients that were used on the production date.

### **Keeping a log of customers who receive each batch codes**

When sending out products to retailers, keep a record to record which batches have gone to which customer so in the event of needing to recall the products they can quickly be traced and any issue brought quickly under control.

### **What information should a batch number refer back to?**

Keeping records from your production run that also lists the batch number is important to be able to help trace a problem if an issue arises and is important to demonstrate a robust food management plan.

### **Date of production**

For a manufacturer, batch numbers of ingredient raw materials and packaging will be recorded and are therefore available as linked to each production date. Should there be a defective raw material batch, or production issue when the product is made, these systems will enable tracing the customers who received the defective batch and enabling withdrawal or recall.

By linking to the date of production, linkage is possible to confirm team members and supervisors working on the day, ingredient batches and suppliers, allergens in recipes and any recipe amendments from the production day, and the time of day made. Any taste notes, linkage to equipment, temperature

checks during production and any chilling methods and records can be assured. There will also be a record of how many units were made in that particular batch and how many cases.

### **Where to include a batch number on a product**

There is no legislation around where a batch number should be situated on a product, but it should be legible and easy to identify. If there is an outer case that products are delivered to then the batch code should be repeated on the outer case.

<https://realfarming.org/resource/batch-codes/>

<https://realfarming.org/resource/allergens-control-and-production/>

<https://realfarming.org/resource/info-sheet-1-14-labelling/>

## **Nutrition**

The dehydrating process retains a food's nutritional value - this is one of the reasons we chose this method of preserving. When rehydrating the veg if you use the water that has been used to rehydrate the veg you keep the water soluble vitamins too.



## Allergens and labelling

It is now law for any food business that produces prepacked for direct sale (PPDS) food is required to label it with the name of the food and a full ingredients list, with allergenic ingredients emphasised within the list. It is good practice to label all allergens, even if the product is not a PPDS product. A PPDS is a product which are pre-packaged on site ready for sale. The presence of allergens can vary in mixed dry items such as curry powders. If for example you are using one brand of curry powder you have been donated and then change to another brand, check the ingredients very closely to ensure that you are not adding a new allergen and that your recipe information on the packaging is correct. The requirements for pre-packed foods to include allergen details for the consumer will also continue to be required

Consumers and the Food Standards Agency identify 14 allergens that are found in foods and are required to be labelled where present. The 14 allergens are:

1. Celery
2. Cereals containing gluten (such as barley, wheat and oats)
3. Crustaceans (such as prawns, crabs and lobsters)
4. Eggs
5. Fish
6. Lupin
7. Milk
8. Molluscs (such as mussels and oysters)
9. Mustard
10. Peanuts
11. Sesame
12. Soybeans
13. Sulphur dioxide and sulphites (if at a concentration of more than ten parts per million)
14. Tree nuts (such as almonds, hazelnuts, walnuts, brazil nuts, cashews, pecans, pistachios and macadamia nuts)

### Italian penne pasta in tomato and basil sauce, topped with mozzarella and mature cheddar

#### Ingredients:

Tomato sauce (55%) [Tomatoes 51%, Water, Onion, Olive oil, Tomato purée (2.5%), Cornflour, Garlic purée, Demerara sugar, Basil, **Celery** salt, Marjoram, Pepper], Cooked Italian Pasta (30%) [Durum **wheat** Semolina, Water], Cheese mix (10%) [Mozzarella cheese (from **milk**) (7%) Mature cheddar cheese (from **milk**) (3%)]

## Information to consumers

There have been a number of recent changes in the allergen labelling regulations and you need to ensure you keep up to date with any changes. Allergen information should be readily available to your customers to include any of the 14 allergens that are added as part of the recipe and also possible allergen traces, in the form of 'May contain traces of ...'. One of the recent changes relates to 'Natasha's Law' and has meant that pre-packed products for direct sale to the consumer (such as sandwiches, pastas and bakery products which are packed on site before a consumer selects or orders them are also required to have a label with the name of the food and the ingredients list with the 14 allergens emphasised within it. Please see example above.

## Links & further reading

<https://www.food.gov.uk/business-guidance/allergen-guidance-for-food-businesses#allergens>  
<https://www.food.gov.uk/business-guidance/allergy-training-for-food-businesses>



# Supply – vegetable sourcing

**As an organisation do you;**

- **Have regular access to surplus produce?**
- **Is it nearby?**
- **How will you collect it/or will it be delivered?**

Logistics of your supply is a complicated affair, due to the very nature of surplus produce. Our recommendation is to put the dehydrator as close as possible to the source of the surplus/gluts

## **FareShare or donated foods through charities**

Using donated foods is also a possibility but this does come with some issues. If you are manufacturing a ready meal to a set recipe you cannot guarantee a regular supply of the same item. Also check use by dates on donated products in case they will go out of date before your ready meal product will. However if you can make use of donated products, it will save a considerable amount of money.

## **Gleaned vegetables**

Gleaning groups are usually run by volunteers who pick unharvested vegetables left by farmers. This food is then donated to charitable organisations so it is another way of sourcing fresh and seasonal vegetables. There is however the same problem of regular supply if following a dedicated recipe. Usually gleaned vegetables come straight from the fields and will not have been quality controlled, washed, or checked for pests so you will need to include these steps in your manufacturing processes and have a dedicated washing area and cleaning processes to deal with any soil and pests that may contaminate your production area.

## **Consistency and regular supply**

Donated food comes in fluctuations and supply cannot always be predicted, both in terms of what is on offer and what amounts you'll receive. Planning for the supply of products using donated produce can be problematic especially when retailers and customers may expect a certain product or recipe and your packaging is already printed.

## **Seasonality**

Autumn will see a glut of pumpkins and squashes/gourds, winter will inevitably mean root veg and some exotic fruits, the summer will see gluts in tomatoes and courgettes. You can dehydrate what you have and store for later in the year.

# Equipment

## Dehydrator - we call ours Dennis.

The most important piece of kit to decide on is the dehydrator – once you have roughly estimated the amount of produce you want to process

At BHFP we have a 30 CUD dehydrator. Its capacity is between 10-14kg of fresh produce – which equates to 1 kg – 1.4kg of dried produce. The benefit of a three chamber dehydrator is you can set the three chambers to different temperatures and times. This can be useful if you have something that is delicate and needs less time on a lower heat, like garlic or something more robust or need to ideally cut thicker, like a courgette.

## AW meter

The water activity metre is a crucial piece of equipment that ensures that the dehydrated goods are safe.

If there is too much water – mould will eventually develop and pathogens will form

The device is small and simple to use, you take a small random sample of each dehydrated good, place it in a petri dish and put to the side, it will give you a reading between 0.0-1 in under 5 minutes.

The safe parameter is between 0.5-0.6, interestingly if the water activity is too low (ie less water) it is also a pathogen risk. Once water activity is measured, and the goods stored in a vacuum seal, it is still important to have regular stock check and do visual checks.

[LANDTEK WA-60A Water Activity Meter](#)

## Vacuum sealer

A vacuum sealer is a great piece of kit to have, it will help with your storage options for your stock. These range in price and are simply to use. We suggest getting one with a manual vacuum option. The seal ensure that there is limited oxidisation, and absorption of moisture in the air.

## Tray liners

Tray liners are worth investing in as it will mean the trays will last longer and produce won't stick to the trays. It also makes the cleaning up process much quicker. We also discovered that they improved the quality of the produce as it made it more uniformed.

## Storage

We currently use repurposed crates and boxes with lids for our stock/ our finished packs. The storage advice is to store in a dry, cool and dark place.

You will also need normal kitchen equipment such as knives and chopping boards

## Food processor for slicing

## Vacuum bags

## Printer & labels

## Things we have learnt along the way and top tips

Our chefs have tested almost every vegetable which you can think of which has been delivered as surplus or some odds and ends left in the Community Kitchen's fridge. That's not to say there haven't been some unsuccessful trials and some stinky, chewy products, hopefully we can prevent you from experiencing them.

### Thickness

We found that most vegetables work best if they are cut into half cm thicknesses such as onions, courgettes or cherry tomatoes cut in half, or even thirds if they are plump ones. Produce needs to be a similar size so that it dehydrates at a similar time & temp, otherwise you could have some very wet pieces and some burnt pieces.

### Root vegetables

Are best cut thinly through a 4mm blade using a food processor. We found that with potatoes incl. sweet varieties, it was best to soak them once sliced in cold water for about 15 minutes to remove some of the starch. Celeriac, swede and turnips don't need to be soaked. You could also use a thinner blade (2mm) however this would create some waste in some slices being too thin.

### Starchy vegetables eg potatoes?

Best to cut thinly and soak in cold water for ten minutes to release the starch, they are also better peeled and leaving the skin on can taste quite earthy when rehydrated.

### Organic vs 'regular' vegetables

Vegetables which are organic or homegrown tend to have a lower water content which means they will take less time to dehydrate and tend to be a better final product. It's not to say that supermarket vegetables aren't good to dehydrate. We found that it is better to cut thinner and space out slightly more.

### Courgettes and marrows

Are wetter so cut them a bit thicker so they don't disintegrate when rehydrated.

### Fruits

We stopped using fruit because we had a problem with fruit flies. Our kitchen space is quite warm. If you are in cooler location fruit works really well and we have had a lot of feedback that people would enjoy the product.



- **Wash** - All produce first in a bicarbonate solution to remove bacteria or at least in water.
- **Swede** - Can be smelly when dehydrating.
- **Carrots** - Are best to peel first and then put through a machine, we found that 'coins' work best for our packs. They can also have a strong smell.
- **Peppers** - Work well when they are cut into long slices rather than cubes. Their flavour intensifies so be careful with chillies



# Production flow chart

