Heal Your Gut

With Fermented Vegetables

About the author

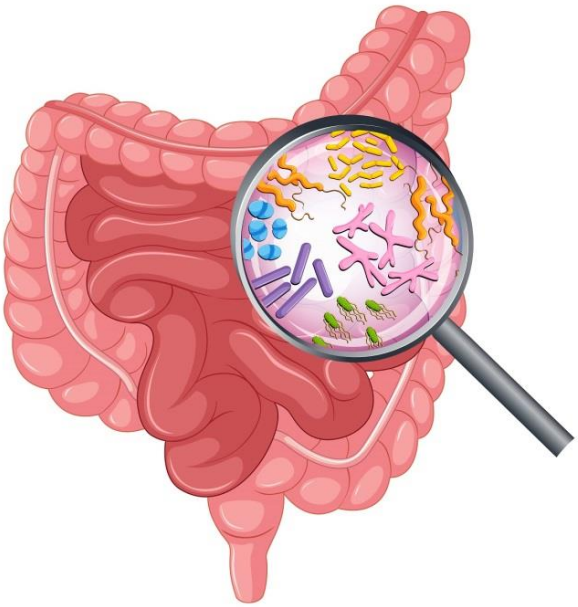
Eirik Garnas is a nutritionist (B.Sc. in Public Nutrition, M.Sc. in Clinical Nutrition), personal trainer, health coach, and science writer. Over the years, Eirik has worked with an assortment of clients, both in real life and over the web, and written for a variety of health & fitness websites and magazines, including Paleo Magazine, RobbWolf.com, and ThePTDC.com.

Fermentation and the therapeutic potential of fermented foods have long been high on the list of Eirik's main research interests. He was in charge of planning and conducting the first ever clinical research study on fermented vegetables and irritable bowel syndrome, and has written hundreds of articles that cover topics related to the human microbiome, fermentation, and gut health.

Eirik believes that the gut is the ground zero for human health and disease and that nutritional counseling and microbiome restoration should be a routine part of medical care. Many of the clients Eirik has worked with – and are currently working with – approached him specifically because he puts a lot of emphasis on gut healing and inflammation-reducing therapies.

Content

Your microbiome



You're never alone. Everywhere you go, you're accompanied by trillions of microorganisms. Collectively, these microbes, which colonize your skin, gut, lungs, and many other parts of your body, make up your *microbiota*. Together with your microbiota, as well as perhaps some helminths and/or other small eukaryotic organisms, you form a superorganism. This superorganism is very genetically diverse. Most of its genes aren't supplied by you though, it's supplied by the microbes that make up your microbiota, which collective genetic material comprises your *microbiome*.

Most of the microbes that inhabit your body are found in your gut. In particular your large intestine, AKA your colon, hosts a lot of bugs. The microbes that live deep down in this anaerobic part of your body regulate your immune system, digestion, and metabolism and produce short-chain fatty acids, neurotransmitters, and various other compounds that have widespread effects on your physiology, brain function, behavior, and mood. Hence, it goes without saying that you would be wise to pay attention to what's going on in the lower part of the long tube that runs through your body.

Unfortunately, as a result of the rapid and profound changes in our environment that have taken place over the most recent millennia, and in particular the most recent decades, the human gut microbiota is no longer as resilient and biodiverse as it once was.[9,]

[11, 12] A lot of contemporary humans have taken multiple courses of antibiotics, spend little time in nature, and eat mostly “clean” food; hence, they are out of synch with the microbial world and harbor a degraded, damaged microbiota.

Over the past couple of decades it has become increasingly clear that this is one of the main reasons why so many people in the world today are chronically sick. Gut dysbiosis (i.e., an imbalance of the microbial communities of the gut) has been shown to be an important underlying cause of a plethora of human diseases and health problems, including acne vulgaris, irritable bowel syndrome, depression, obesity, type-1 diabetes, and colon cancer.[3-6, 13, 15] Dysbiosis sets the stage for chronic inflammation, which in turn sets the stage for chronic illness.

Seeing as you’re reading this e-book, then chances are you’re not 100% happy with where you’re at health wise and that you suffer from one or more gut-related health problems. By working on enhancing the diversity and resilience of your microbiota, you can potentially make some significant headway towards combatting those problems.

The therapeutic potential of fermented vegetables

Fruits and vegetables are not just a source of vitamins, minerals, protein, and the like; they are also a source of bacteria. We've co-evolved alongside plant-associated microbial communities, which have contributed microbial diversity to the human microbiota. Over time, we've come to depend on a variety of different microbes to function correctly, some of which can be found on the surface of plants.

Fermented vegetables can help mend the now-troubled relationship between man and microbes by infusing friendly bacteria into the human gut. By utilizing the bacteria that are already present on the surfaces of vegetables, one can make delicious ferments that are not only packed with "good" bacteria, but also with a variety of phytochemicals and nutritional compounds. During the fermentation process, the bacteria break down the sugars found in the vegetables, which they utilize in their lactic acid-yielding metabolic processes.

Traditionally, fermentation was used to preserve food. Today, most of us have freezers and refrigerators and don't harvest our own food; hence, we don't *have to* ferment foods. That doesn't mean we can't benefit from doing it though.

If your gut is healthy, then you don't necessarily have to make or eat fermented foods. If it's not healthy, however, you should strongly consider doing so.

Most vegetables can be successfully fermented. In other words, it's possible to make many different varieties of fermented vegetables. Not only that, but by tweaking around with variables such as fermentation time, salt content, and temperature, one can change the microbiota composition, nutritional profile, and taste of one's ferments. This, in combination with the fact that fermented vegetables contain unique, diverse mixes of bacteria, is why you should strongly consider making and eating sauerkraut, kimchi, and the like.

Sauerkraut – Basic recipe

To a lot of people, fermented vegetables are synonymous with sauerkraut, AKA fermented cabbage. Part of the reason why sauerkraut is so popular and so widely made and eaten is that cabbage harbors a rich microbial ecosystem, and hence, is easily fermented. Its leaves are covered in lactic acid bacteria, which are needed to successfully produce fermented vegetables. This is also the reason why cabbage is used in the production of many fermented vegetable products besides sauerkraut.

It's not a complicated procedure to create sauerkraut. That said, there are some things you should be aware of. Also, you may find that you have to go through a phase of trial and error before you manage to produce kraut that tastes and looks perfect.

On the subsequent pages you'll find a step-by-step guide that can help you produce delicious kraut…

1) **Wash your hands**

2) **Gather the necessary ingredients and equipment.**

All you need is some cabbage (make sure it's kept in room temperature prior to when you get started, as opposed to in the fridge) and some salt, as well as a cutting board, a knife, a big bowl, and a container to ferment the cabbage in. If you prefer to let modern technology do some of the work for you, then you can bring out a food processor as well, which you can use to shred the cabbage. Make sure all of the equipment is clean and doesn't contain any soap residues.

3) **Remove the outer leaves of the cabbage.**

The outer leaves are typically dirty, so it's best to remove them.

4) **Remove the core of the cabbage**

5) **Shred the cabbage**

Slice/cut the cabbage into long, thin shreds. The shreds don't have to be a particular size; however, try to avoid making them very thick and/or very thin. If they are very thick, it can be difficult to extract the juices from the cabbage and ultimately pack everything tightly together. If they are *very* thin, on the other hand, the sauerkraut can become mushy. If you're fermenting in an open container, you may want to keep a few leaves of the cabbage that you can later use to push it down into the fermentation container.

6) **Transfer the shredded cabbage to a big bowl**

7) **Massage the cabbage in order to extract the fluids it holds**

Add salt to the cabbage (see the FAQ for information about how much salt you should use) and start massaging the cabbage. *Be patient*. If you keep at it, you'll start to see juices being released. Continue squeezing and massaging until significant quantities of liquid has been released. The time it will take you to get this done depends on the properties and age of the sauerkraut you're using, the amount of salt you've added, and the quantity of cabbage you're fermenting. Most likely, it'll take you at least 10 minutes (probably more). Preferably, you should extract enough liquid to fully cover the cabbage once it's in the fermentation container. If you feel like taking a break after a couple of minutes, then that's completely fine. The cabbage will continue to soften/release fluids when you're not doing anything, although not as rapidly as when you massage it.

It's also possible to massage salt into the cabbage, weigh it down with something heavy (optional), and then let it sit for some time (e.g., 1-2 hours). During that time, some of its juices will be released. You have to massage it as well to really get the juices flowing, but most likely for a shorter time than if you use the previously described method. The most important thing is that you eventually manage to release some fluids. It's not that important how you do it. If you prefer to use a vegetable tamper as opposed to your hands to massage the cabbage, then that's completely fine.

8) **Transfer the cabbage to the container you intend to ferment it in**

Don't transfer everything at once. Rather, gradually add cabbage to the fermentation container. Use your hands or some type of wooden or plastic spoon to push the cabbage into the container. Make sure the cabbage is tightly packed. You don't want there to be a lot of oxygen present. Don't fill the entire container; let there be some space left on the top. This is to ensure that there is some room for the ferment to expand in.

9) **Weigh the cabbage down and make sure it's covered in brine**

If you're using a container specifically made for fermenting foods, then chances are the container is made in such a way that the cabbage is pressed down. Fermentation crocks for example typically come with stones that are to be added on top of the food that is to be fermented. If you're just using a regular mason jar or some other similar type of container, then you'll need to get creative and figure out a way to weigh the cabbage down. One popular method is to add cabbage leaves on top of the cabbage and press those leaves down in order to submerge the cabbage in brine. That method isn't foolproof though. You may find that the leaves are unable to keep the cabbage down throughout the whole fermentation process.

What you could do to avoid this issue is to add something heavy (e.g., glass fermentation weights *(You can find them on*

Amazon), a small jelly jar filled with something heavy like stones) on top of the leaves, so as to push the leaves down against the shredded cabbage. You don't *have to* weigh down the cabbage; however, it's highly recommended, seeing as if you don't, then some of the cabbage shreds will most likely end up being exposed to oxygen.

Before you set the cabbage away to be fermented, make sure it's fully covered by brine. Preferably, none of the shredded cabbage should be exposed to oxygen. If there's not enough liquid, add some water.

10) Check on the ferment the first couple of days to see if everything looks okay

If you're fermenting in a fermentation crock and/or have a lot of experience with fermenting vegetables, then you can probably safely skip this step. If you're a beginner and/or is fermenting in an "open" container, however, then you should check on the sauerkraut the first couple of days to see that everything looks okay. If some of the shredded cabbage has risen above the surface of the brine, then gently press it down with your hands (make sure they are clean) or a spoon. If that's not sufficient to submerge the cabbage, then add a little water mixed with a dash of salt. If you're fermenting in a container that has a lid that's sealed in such a way that air isn't allowed neither in nor out of container, then you should occasionally open the lid so as to release some of the gasses that are released during the fermentation process.

11) Transfer the sauerkraut to your fridge when it has a consistency and taste that you like

Once the sauerkraut is done fermenting, simply transfer it to cold storage (i.e., a fridge). Preferably, it should be stored in containers that are suitable for holding fermented vegetables, such as jars made of ceramic or glass. That said, once the sauerkraut is in the fridge, the fermentation process slows down dramatically, so it's okay if you use plastic containers, if that's all you have.

Don't worry if your first couple of ferments don't turn out perfect. It's not at all uncommon to stumble in the beginning *(Even many experienced fermentistas are unsuccessful every now and then)*. If you don't succeed initially, don't despair, just try again. Ultimately, you'll most likely get a hang of it. And even if you don't, the world won't fall apart. You can always *buy* some fermented vegetables. That's not ideal, but it's certainly a lot better than being consistently beaten down by failures in the kitchen.

Mixed varieties

The basic sauerkraut recipe outlined earlier can be used to make a wide variety of different fermented vegetable products. You can simply expand the recipe to include other vegetables besides cabbage, such as carrots, parsnips, and onions. It's also possible to include fruits and spices. Note though that many fruits are very high in sugar and are used for the production of alcoholic beverages fermented with the help of yeasts. In other words, it's generally not a good idea to add a lot of sugary fruits to a vegetable ferment. An apple or two is usually fine though.

You should also be aware of the fact that some spices have potent antimicrobial properties. In other words, make sure you don't spice things up too much. It's common for people who harbor a dysfunctional gut microbiota to be sensitive to strong spices. This is one of the reasons why the focus of this eBook is on fermented vegetables that are made using exclusively whole foods and that are not very spicy. If you are going to spice up your ferments, you are better off using garlic, ginger, and the like than industrially-produced spice mixes.

Pretty much all vegetables can be fermented. That said, not all vegetables are equally tasty and appetizing in a fermented state. Moreover, many of the vegetables that line the shelves of modern grocery stores are fairly clean, in the sense that they don't harbor a lot of bacteria. That's one of the key reasons why cabbage is a part

of most fermented vegetable recipes. The bacteria it holds acts as a "starter culture" for the ferments. It's certainly possible to make fermented vegetables without cabbage though. You just have to know what you're doing.

The same principles apply when making mixed varieties of fermented vegetables as when making standard sauerkraut. Just follow the basic sauerkraut recipe, but this time, shred and add other vegetables besides cabbage to the mix. In your first mixed ferment, you could for example add onions, carrots, an apple, and some ginger.

The opportunities are endless. By experimenting with different vegetables, fermentation times, salt concentrations, and temperatures you can create many different fermented vegetable products that all have a unique microbiota and nutritional profile.

In the context of microbiome restoration, it's not necessary to make things more complicated than this. You don't need to use other ingredients besides vegetables or create very complex products. Stick with the basics ☺

FAQ

What kind of equipment do I need?

It's not expensive to make fermented vegetables. You don't need a lot of fancy equipment or costly tools. All you really need is a knife, a cutting board, a big bowl, and some type of container in which the vegetables can be fermented in. *With that said, it's typically worth the investment to buy somewhat better equipment.*

Many fermentistas prefer to ferment in crocks or jars specifically made for fermenting foods, in large part because it tends to make the whole fermentations process a lot smoother.

Avoid fermenting in containers made of plastic or other synthetic materials, seeing as they may give off noxious compounds when the material come in contact with acids that are generated by lactic acid bacteria during the fermentation process. Also, avoid metal. Stick with materials that are appropriate for fermenting foods, such as ceramic and glass. Alternatively, it's an option to use plastic containers that are specifically designed for fermentation.

Does the fermentation container have to be completely airtight?

No. It's certainly possible to ferment in a simple jar that can't be vacuum sealed. That said, it's easier to ferment in a container that has an air-tight seal, such as a fermentation crock with a water-lock. *That greatly limits the risk of mold growth and spoilage*.

If you're going to use a container that isn't air-tight, it's important that you keep an eye on the ferment, so as to keep watch for any molds that may start growing on the surface.

Does everything, with the exception of the vegetables, have to be "sterile"?

No. The equipment doesn't have to be sterile. It should be clean, but you don't have to wash it in boiling water or otherwise try to sterilize it. Wash your hands and the equipment you're going to use prior to making the fermented vegetables, but don't become overly stressed about hygiene. Keep in mind that humans have been making fermented foods for many millennia. Back in the day, nobody had access to antibacterial gels or dishwashers, but people managed to make living foods nonetheless.

When you make fermented vegetables, you're working in symbiosis with nature and the bacteria that are present in the natural world. It's obviously wise to try to keep any pathogens at a distance; however, it's certainly not a traditional custom to try to sterilize one's "fermentation environment".

Should I throw out the vegetables if they become infested with mold?

Mold is the no.1 nemesis of fermentistas. If you start making fermented vegetables on a regular basis, you will, with a high degree of certainty, run into mold at one time or another. *Don't let that bring your spirits down*. It's completely normal and is to be expected, at least if you don't use sealed containers. The question isn't really whether you'll run into mold or not, but rather what you'll do about it when you do.

The safest option is obviously to just throw out any ferments that turn moldy. That'll certainly keep you safe from mold. It can be a little sad and disheartening to throw fermented vegetables in the thrash though. If the mold growth is minor and only covers a small part of the surface of the ferment, then chances are you don't have to throw the whole ferment out. You could simply remove the mold. As long as you make sure there is no residual mold present in the container and that friendly bacteria are able to "take over" the ferment, and hence, squash any pathogens, then you're all good.

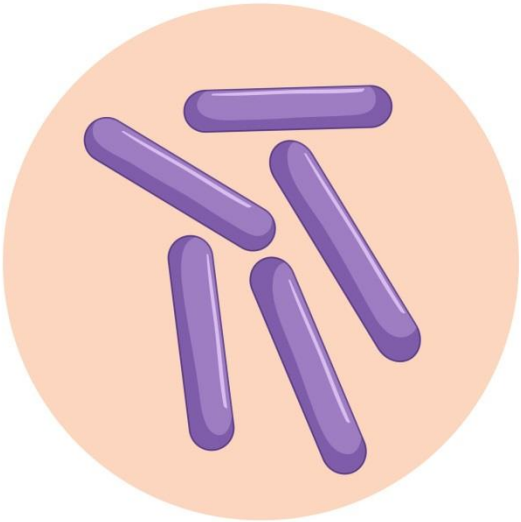
That said, the best option is obviously to make fermented vegetables in such a way that the risk of mold growth is negligible. If you use a fermentation crock with a water seal or another container with similar properties, mold will have a hard time growing on the surface of the vegetables, seeing as the environment is low in oxygen.

Do I have to use organic vegetables?

No. You don't *have to* use organic vegetables. It's generally best though. Not just because conventionally produced vegetables are more likely to contain residues of pesticides and other chemical agents that are often used in agriculture, but also because the microbiota composition of organic vegetables differs somewhat from that of conventionally produced vegetables.[10] There's also a difference with respects to the antioxidant content and pesticide levels, among other things.[1] This has to do with soil quality and production techniques (e.g., the types of chemical substances that are used to inhibit pathogen growth).

It's important to recognize that plants are no different from animals in that they express a suboptimal phenotype when they are exposed to environmental stimuli that don't agree with their evolved biology. Vegetables that are grown in healthy soil and aren't exposed to a lot of chemical agents are going to be healthier for you than vegetables that are grown in depleted, unhealthy soil and bombarded with pesticides. We evolved eating the former types of vegetables, not the latter.

Should I use a starter culture?



No. You should not use a starter culture. It's convenient to use a starter culture, seeing as it reduces the risk of spoilage and increases the likelihood that the fermentation process goes smoothly. It's not a good option from a health perspective though. Starter cultures contain carefully selected mixes of bacteria. If you use them, your ferments will have a more generic microbiota composition and you may inhibit the growth of some potentially beneficial bacteria.

This is the main problem with the industrially-produced fermented foods that are available at supermarkets and grocery stores. They were created using a specific set of bacteria, and all products of the same type have exactly the same microbiota composition. Regular consumption of those types of fermented foods may do more harm than good, in that it could block the development of a diverse, healthy gut microbiota.

By utilizing the bacteria that are already present on the vegetables you intend to ferment as the basis for your ferments, as opposed to a starter culture, you'll most likely be exposed to a greater diversity of microorganisms. *That's a very good thing!* That said, it's okay to use some juice from an old ferment to kick start a new one.

How much salt should I use?

Salt inhibits pathogen growth. Unfortunately though, it also inhibits the growth of many beneficial bacteria. If you use *a lot* of salt when you make fermented vegetables, the fermentation process will be slow – or it may not even start at all. If you use *very little* salt, on the other hand, bacteria will rapidly proliferate and start digesting the sugars in the vegetables. In both instances, the risk of spoilage will be fairly high.

The best result is usually achieved by using about 2% salt, which means that 2 grams of salt are added per 100 grams of vegetables. It is possible to make fermented vegetables with less salt than this; however, if you go very low on the salt, the risk of mold growth will be elevated, particularly if the temperature in the room you're fermenting in is high. Moreover, the vegetables will likely get somewhat mushy, as opposed to crispy.

Whether or not you're able to successfully make fermented vegetables with very little salt largely depends on what type of equipment you're using. If you're using an airtight container that is specifically made for fermenting food, then chances are you'll end up with a fairly good product. If you're fermenting in an open container, however, then chances are molds will take over the ferment and/or it will end up tasting weird.

Salt doesn't just act as a preservative; it also draws liquid out of the vegetables. In other words, if you use very little salt, you may find it difficult to squeeze the juices out of the vegetables you intend to ferment. That said, when it comes to microbiome restoration, it's

generally best to use as little salt as possible, seeing as salt is antagonistic to the growth of many microbes. In other words, don't use more salt than you have to. You may find that you can add less than 2 grams of salt per 100 grams and still end up with a perfectly fine product, particularly if the vessels you're using to ferment the vegetables are specifically designed for fermenting food.

Over time, as you get more experienced, you may find that you develop an instinctive ability to add appropriate amounts of salt. In other words, you may find that you no longer need to measure exactly how much salt you use.

Can't I just buy fermented vegetables at a store, instead of making some myself?

Most of the fermented vegetable products that are found in supermarkets and grocery stores are pasteurized and/or made using starter cultures. At some health food stores and farmers' markets you can find fermented vegetables of higher quality; however, the quality may not be as high as that of *homemade* fermented vegetables. This is particularly true if the products were produced in an industrial fashion, as opposed to in a traditional one.

If you decide to go out on a hunt for *real* fermented vegetables, then look for products that contain live bacteria and that haven't been made via the use of a starter culture. Products produced by local farmers or small, solicitous companies tend to be superior to products made by large, industrial corporations.

How many different varieties should I make?

When it comes to fermented vegetables, variation is good. Every container of homemade fermented vegetables is unique. The microbiota composition and nutritional profile of fermented vegetables vary depending on the types of vegetables that are used, the fermentation time, the source and nutrient composition of the vegetables, the temperature of the room in which the vegetables are fermented, and the amount of salt that's used, among other things.

All of this is to say that it's good to make and eat several different varieties. By eating many different types of fermented vegetables, as opposed to just one, you'll be exposed to a greater diversity of microorganisms.

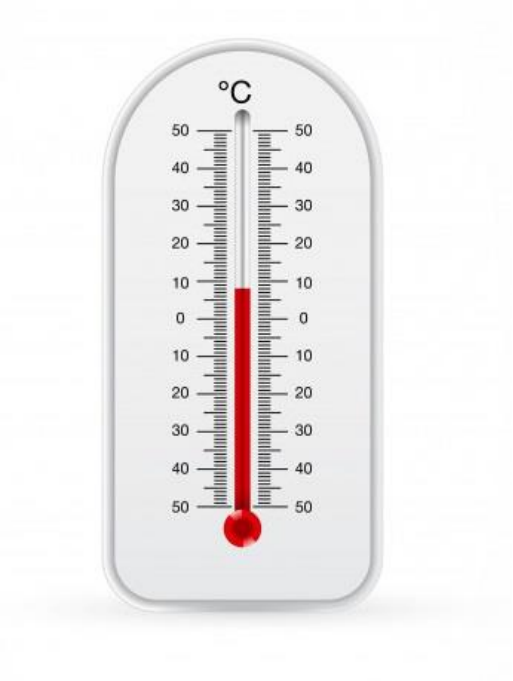
Should the vegetables be covered in brine?

Yes. The vegetables should preferably be completely submerged in brine at all times. It's important to recognize that anaerobic conditions are required to make fermented vegetables. If oxygen is introduced into the ferment, lactic acid bacteria such as *Lactobacillus plantarum* won't do so well and molds may start to grow.

By keeping the vegetables completely submerged in brine, you increase the likelihood that friendly bacteria proliferate, whereas bad bugs stay away. It's particularly important that you keep the vegetables submerged in brine if you use an open container (i.e., one that doesn't have a lid that can be sealed), seeing as oxygen can freely enter such a vessel.

Bear in mind that not all vegetables give off an equal amount of liquid when they are squeezed and that the brine level may decrease during the fermentation process. If you find that the liquid that you've managed to squeeze out of the vegetables don't fully cover the shredded vegetables (or barely cover them), you can add some non-chlorinated water to the mix, so as to make sure that the vegetables are completely submerged.

What should the temperature be in the room where I ferment the vegetables?



Room temperature (i.e., 18 degrees Celsius/64.4 degrees Fahrenheit – 22 degrees Celcius/71.6 degrees Fahrenheit) is appropriate for fermenting vegetables. It is possible to ferment vegetables under temperatures that fall outside of this range; however, if the temperature is very low (i.e., below ~16 degrees Celsius/60.8 degrees Fahrenheit) or very high (i.e., above ~25 degrees Celsius/77 degrees Fahrenheit), then the fermentation process will likely be less than smooth.

If the temperature is very low, then friendly lactic acid bacteria will either grow very slowly or not at all and the fermentation process may never get off the ground. If the temperature is very high, on the other hand, the fermentation process will be "rushed" and the risk of spoilage increased.

A common practice is to let vegetables ferment for about 7-10 days in room temperature before moving them to a somewhat colder environment (e.g., a cellar) for a few weeks before eventually moving them to a refrigerator. As long as the ferment is kept in a fairly cold environment (i.e., a cold cellar), it'll keep for a long time. Alternatively, you could just let the vegetables ferment in room temperature until they attain a taste that you like and then move them to a refrigerator. Don't ferment vegetables in moldy places or places that are otherwise rich in pathogens.

How long do fermented vegetables last in the refrigerator?

As soon as you move a ferment to your refrigerator, the fermentation process almost comes to a standstill. The bacteria it contains will go into “hibernation”. They won’t die overnight, but they’ll no longer be as active as they used to.

Fermented vegetables can last for many months when kept in a refrigerator. Some ferments are fine to eat even after one year or more. That said, the bacteria that drive the fermentation process of fermented vegetables favor “hot” temperatures over cold ones. They don’t thrive when they are kept in a cold environment for prolonged periods of time.

The fact that the metabolic activity of lactic acid bacteria such as *Lactobacillus plantarum*, the microbe that dominates vegetable ferments such as sauerkraut, is very low under cold conditions, in combination with the fact that fermented vegetables have a very low pH, which is antagonistic to pathogens, helps explain why fermented vegetables can be kept for a very long time in the refrigerator.

How long should I let the vegetables ferment?

It depends. If you have your vegetables placed in a fairly hot environment, then they'll ferment a lot quicker than if they are kept in a cellar or some other cold place. Also, it's important to point out that fermented vegetables made with "high" quantities of salt are slower to ferment than low-salt ferments. Vegetables that are fermented in room temperature and with normal quantities of salt typically start to taste somewhat acidic after roughly 1 week. That doesn't mean that you have to eat them after one week though. You can let them ferment for a lot longer if you want to.

If you like food that's very acidic, then you may want to keep your vegetables fermenting for a longer time than if you're not that into acidic-tasting food, seeing as the pH of fermented vegetables decreases throughout the fermentation time.

It's important to keep in mind that fermentation is an ancient *food preservation* technique. Traditional people certainly didn't move the fermented foods they were making to a refrigerator a few days after they'd started to ferment. Rather, fermentation is the traditional alternative to refrigeration.

With that said, you shouldn't let your ferments sit on the counter forever. The bacteria will eventually run out of food, and when they do, the ferment will start to turn bad. Move the fermented vegetables to cold storage as soon as they have a taste that agrees with you.

It is possible to start eating from a ferment prior to moving it to a cold compartment. One of the reasons why some people prefer to ferment in fermentation crocks, as opposed to in for example glass jars, is that it's easier to "eat out of" a fermentation crock during the fermentation process without ruining the ferment.

How much should I eat?

More isn't necessarily better. Actually, in most instances, less is more. If you bombard your gut with probiotics found in fermented foods, you'll destabilize the microbial community that's found there. If you harbor an imbalanced, pathogen-rich microbiota, that isn't necessarily a bad thing, as long as it is a temporary occurrence. Over the long-term, however, it's certainly not a good idea to consume a lot of fermented vegetables on a daily basis.

When you first start out, start slow. Only consume small amounts (e.g., one teaspoon-2 tablespoons a day initially). Gradually increase the dosage over time. Don't consume high quantities (>75 grams) daily for prolonged periods of time. Follow your appetite and experiment to see what dose works best for you. Keep in mind that the goal is not to get as many probiotics as possible into the gut, but rather to build and diversify the gut microbiota.

Fermented vegetables are not only useful for repairing a dysfunctional gut microbiota. They may also help restore balance to a gut that's been perturbed by food-borne pathogens, stress, or other things that are known to negatively affect gut health. In other words, if you ever eat some spoiled food or your gut acts up because you've slept poorly or have been under a lot of stress, then you may want to consider eating some fermented vegetables.

Will I feel worse before I get better?

It's not uncommon to experience mild gastrointestinal distress, fatigue, and/or other health issues when one first introduces fermented vegetables into one's diet. This is particularly true for people who harbor a dysfunctional gut microbiota/have poor gut health.

This isn't surprising, seeing as fermented vegetables are packed with microbes. If you infuse a lot of microbes into your gut, things are bound to happen to the microbes that are already there, particularly those who don't go along so well with the microbes that were brought into the system.

Many probiotics produce compounds that are toxic to other microbes, including certain human pathogens. This helps explain why the consumption of fermented vegetables sometimes induces a "die-off reaction". Additionally, fermented vegetables are rich in compounds such as histamines that some people are somewhat sensitive to.

What all of this is to say that when you first starting eating fermented vegetables, you should start slow. Only consume 1 tablespoon at the most the first few days if you have a very damaged gut. If that doesn't cause any issues, then you can gradually increase the dosage.

Do I have to continue eating fermented vegetables indefinitely?

No. You don't have to eat fermented vegetables indefinitely, unless you want to of course. The goal of any gut healing program should be to rebuild/repair the gut and its resident microbiota. The goal is not to bombard the gut with as many probiotics as possible. Actually, doing so will do more harm than good, in the sense that it may block the development of a healthy gut microbiota.[2, 8]

The practice of making fermented foods is an ancient one (it dates back many millennia). That said, it's important to point out that throughout the vast majority of our evolutionary history, no humans on this planet regularly consumed fermented foods. Hunter-gatherers consume primarily fresh food; they generally don't make or consume large quantities of fermented foods. This is important to keep in mind, as it implies that the human body is not well-adapted to a diet very high in fermented foods.

You shouldn't rely on fermented vegetables as a crutch. Rather, you should use them to enhance and diversify your microbiota!

Can't I just eat yoghurt?

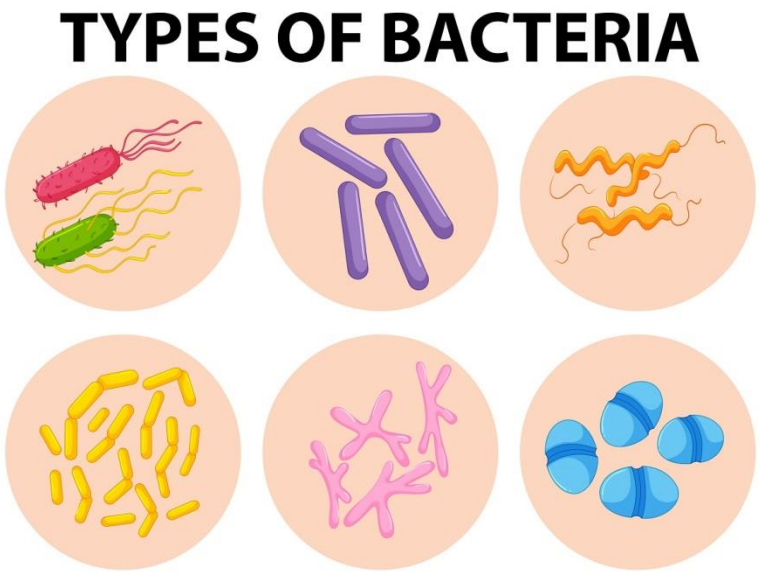
No. Yoghurt, as well as other fermented dairy products, don't contain the same mix of microbes as homemade fermented vegetables. The microbiota of yoghurt is less biodiverse than that of for example homemade sauerkraut. Moreover, the bacteria in youghurt are unlikely to be as beneficial with respects to microbiome restoration and gut healing as those found in fermented vegetables, in part because plants have been a part of the human diet for a much longer time than dairy foods. Over evolutionary time, we've developed a close relationship with the bacteria that cling to plants.

Yoghurt can help alleviate diarrhea for example induced by food poisoning; however, it doesn't do much in terms of repairing a damaged gut. Not only that, but yoghurt, as well as other dairy foods, contain a variety of problematic nutritional compounds (e.g., casein proteins).[7]

Can't I just take a probiotic supplement?

No. The probiotic supplements that are on the market today are greatly inferior to traditionally fermented vegetables. There are several reasons why this is the case. First of all, fermented vegetables contain fairly complex, natural ecosystems of bacteria. This is not the case for probiotic supplements. You simply won't be exposed to the same diversity of potentially beneficial microorganisms from stereotypical probiotic supplements as from fermented vegetables. Second, fermented vegetables contain a range of vitamins, minerals, phytochemicals, and so forth. Some of these compounds are released by microbes. Third, homemade fermented vegetable products are living systems that vary with respects to their microbiota structure and nutritional composition. Probiotic supplements, on the other hand, are very generic, in the sense that they are produced in such a way that all products of the same brand contain exactly the same bacteria.

What kinds of bacteria are found in fermented vegetables?

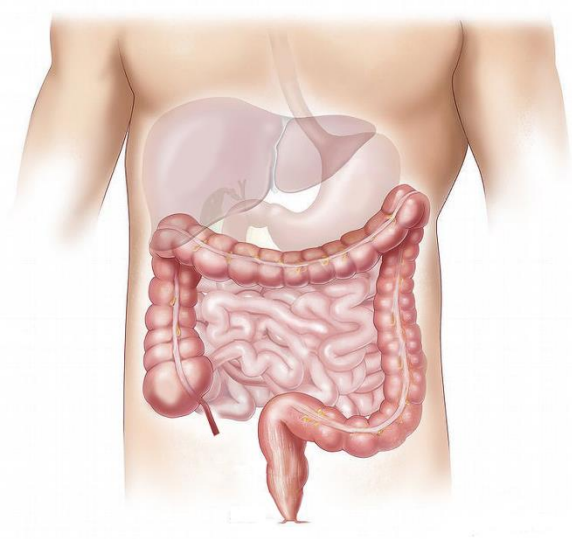


Fermented vegetables primarily contain lactic acid bacteria (i.e., bacteria that produce lactic acid), some of which are classified as probiotics (i.e., microbes that, when ingested in adequate amounts, are thought to be health-promoting). The exact types of bacteria that'll be present in the fermented vegetables you are going to produce depends on a number of things, including what type of vegetables you use, how long you let the vegetables ferment, and how much salt you use.

Typically, *Lactobacillus plantarum* is the dominant bacterium in sauerkraut ferments. Other critters, such as *Lactobacillus brevis*, *Leuconostoc mesenteroides*, and *Lactobacillus paraplantarum* are also commonly present.[14] By creating and eating a diversity of fermented vegetables, you'll maximize the number of different microbes you are exposed to.

It doesn't take millions of microbes to make a difference. A single microbe that is capable of getting through the acidic barrier in your stomach may become an important player in your gut if it finds an available niche to occupy.

Will fermented vegetables heal my gut?



It depends… If your gut is already fairly healthy, then fermented vegetables may be all you need to get where you want to be. If your gut is very damaged and harbors a dysfunctional microbial community, on the other hand, then you'll most likely have to incorporate other microbiome restoration strategies into your gut healing plan in order to make some significant headway towards your goals.

The reason why this is the case is that fermented vegetables don't contain the broad diversity of microorganisms that are needed to repair a severely damaged gut. A healthy human gut is home to hundreds of different microorganisms. Fermented vegetables can contribute some useful microbes and genes to a damaged gut ecosystem and suppress the growth of pathogens; however, they won't install a brand-new, biodiverse microbiota in your gut.

Other sources of beneficial bacteria that you may want to exploit are healthy people and pets (*think kissing, cuddling, etc.*) and raw plant foods. Moreover, if you're very sick, you may want to consider performing one or more fecal microbiota transplants or buying drugs/capsules that contain a wide diversity of microbes that are adapted to live in the human gut (if that's something you're able to get a hold of). It's also important to eat a healthy ancestral diet and avoid drugs with antimicrobial properties, such as broad-spectrum antibiotics.

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