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# Fermentation Basics

There are a lot of terms you'll come across when it comes to fermented foods and the more you practice making them, the more familiar these terms will become. Let's break some down now and begin to understand how they relate to each other.

## Probiotics: The Agents

These are live microorganisms and yeasts that have internal and external health benefits. They're also referred to as "beneficial" or "friendly" bacteria, microbes, or microorganisms. Probiotics are the agents responsible for the fermentation process. Probiotics eat a food source (mainly carbohydrates like starches and sugars) and convert it into acids, gases, and/or alcohol in the process. All of which are by-products of fermentation that preserve, create nuanced flavor, and can add effervescence.

The most known probiotics, responsible for fermented foods like sauerkraut, are a specific bacteria called *Lactobacillus*, which produces lactic acid as it metabolizes a food source. It's present in the air and on almost anything grown in the earth. It's already "there," and it's why making a batch of sauerkraut is as easy as packing cabbage in a jar filled with its own juices, adding some salt, and waiting.

**So, what's the difference between yeast and bacteria?** Well, scientifically, yeasts can reproduce sexually while bacteria cannot, yeasts are generally larger than bacteria, and yeasts belong to the fungi kingdom while bacteria belong to the bacterial kingdom. Unlike a mushroom however, which consists of many cells, yeast is a single-celled little fungi. And regarding fermentation, yeasts are often used and encouraged for bread fermentation and alcohol creation, while bacteria like *Lactobacillus* or *Acetobactor* are often used and encouraged to ferment vegetables or to make vinegar, respectively.

But due to the wild nature of fermentation, both can be present in many ferments along with other probiotics, and depending on the conditions you create, certain types will dominate.

For example, *Lactobacillus* metabolizes in anaerobic conditions (no- to low-oxygen), while *Acetobactor* flourishes when oxygen can flow freely. If left exposed to oxygen, cabbage in sauerkraut would mold, but submerged in the anaerobic environment with a little salt, and *Lactobacillus* have little competition and can therefore dominate, flourish, and ferment in peace.

Bacteria and yeasts are also unique to the environment from which they come—it's why sourdough bread from San Francisco will taste different than one baked in the UK.

There are many probiotics and variables to learn about and put into practice, and we encourage it, but in this course, we're keeping it simple, so be sure to check out our book recs and research the more involved avenues of fermentation.

## Fermentation: The Transformation

A metabolic process in which microorganisms, fungi, and the enzymes that they produce, break down a food source (mainly carbohydrates like starches and sugars) and convert it into acids, gases, and/or alcohol. Fermentation can occur naturally and/or as the result of introducing a culture containing beneficial microorganisms or fungi to a food source. Some of these methods and terms overlap in practice, so let's learn a bit about what distinguishes them from each other.

**Wild Fermentation:** bacteria and yeasts are naturally present in the air all around us and on foods used to ferment like raw vegetables and grains. These microorganisms initiate the fermentation process either spontaneously on their own or if provided the ideal conditions to ferment. If you provide a food source and environment to flourish, microbes will find their way to it and metabolically transform it. For example, grapes have yeasts and bacteria like *Acetobactor* on their skins and if crushed to reveal sugary insides, the microbes will initiate fermentation of the sugars into alcohol and acetic acid. Cabbage, and most raw vegetables, contain bacteria like *Lactobacillus*, and when crushed and submerged in liquid and protected from air, will ferment and create a lactic acid.

**Lactic Acid Fermentation aka Lacto-Fermentation:** refers specifically to fermentation dominated by *Lactobacillus*, which as we've said, is a wild bacteria that's in the air all around us and is on pretty much anything grown in the earth. As you now know, *Lactobacillus* breaks down carbohydrates into primarily lactic acid, but some species can also create alcohol, acetic acid, and carbon dioxide. *Lactobacillus* creates an acidic, self-preserving environment that discourages the growth of other microorganisms while encouraging the growth of beneficial bacteria. Sauerkraut is an example of lacto-fermentation and it's also an example of wild-fermentation since *Lactobacillus* is on the cabbage and in the air.

**Culture/Culturing:** a culture (aka a starter or mother) is a substrate (ex: flour and water or a probiotic capsule) containing a colony of yeast and/or bacteria that is often maintained and nurtured over a period of time. It's ultimately used in its entirety, or in part (usually reserving some for a later ferment), to inoculate ingredients and initiate fermentation. It's basically farming microbes and then using them to ferment a food they didn't originate in.

Culturing in the simplest terms is adding hungry microbes to a food source and letting them do their thing—eat. A great example of culturing is adding a sourdough starter (a culture of flour, water, and microbes) to a dough (fresh food source for microbes) and allowing the microorganisms to metabolize the starches and sugars in the dough (fermenting). The microbes release gases as they eat (which leavens the bread). They also release acids and alcohol that create delicious, nuanced sourdough flavor. A loaf of sourdough bread is a cultured food. If you created the starter culture by mixing flour and water and letting it sit on the counter, that starter was wild fermented. And the odds that *Lactobacillus* are in your sourdough dough are pretty good as well since it's in the air and on the grains, so while the dough is cultured with the starter, as it rises, it's likely going through some lacto-fermentation along with yeast fermentation. Lots of overlap but it's all fermentation.

Other common microbial cultures include a SCOBY for kombucha making, kefir grains for dairy or water kefir, powdered starter cultures to create sourdough starters, probiotic capsules for many uses, yeasts for alcohol, and molds for cheeses and tempeh.

As long as you understand that you're A.) either adding beneficial bacteria to a food source via a culture, or B.) you're creating the ideal environment for beneficial bacteria to naturally and spontaneously initiate fermentation on a food source, you can begin fermenting. Just follow the recipes in this course and read all the info we supply to help you succeed.

***Fermenting is fun, so let's get started.***