



Krautsourcing: Fermentation: What, why & Who?

Fermentation is not just what hipsters are now doing on the weekend. Fermentation in general has been defined as “a biochemical change which brought about by the anaerobic (without air) oxidation of carbohydrates by either micro-organisms or enzymes.” Fermentation is **not** rotting or putrefaction. Rotting is a process whereby the proteins of a source are being broken down.¹ In sauerkraut, lactic acid-producing bacteria (LABs), primarily Lactobacilli, quickly proliferate through the cabbage and brine mix. These Lactobacilli cause the pH to be reduced, making the environment acidic and unsuitable for the growth of unwanted bacteria. Other fermented products have different bacteria and yeast which set up shop and digest the carbohydrates in different food sources, like the sugar in kombucha, eaten by particular yeast and bacteria that form the SCOBY floating at the top of a kombucha brew.



Fermentation: It's everywhere!

Fermentation occurs not only milk to make yogurt, and in a sour mash to make beer or in grapes to make wine. Fermentation processes actually even take place in your body. One example of this is lactic acid fermentation which occurs in muscles of animals. This is a normal function where cellular respiration breaks down glucose into water and carbon dioxide, producing energy that is used in combination with other compounds to produce the energy to contract the muscle. The water vapor and carbon dioxide are exhaled.²

Why do we ferment things?

People have been fermenting things for centuries all across the world. We have co-evolved with bacteria and fermentation, and probably were consuming fermented foods long before we deliberately fermented things. Fermentation does 4 main things to food:

1. Increase the nutrients in food - fermentation actually creates vitamins in the product. In the case of sauerkraut, Vitamin C and Vitamin Bs are actually created as bi-products of the fermentation process.³
2. Makes nutrients in the veg/fruit/grain/meat that are being fermented more “bio-available, meaning that our bodies can more easily absorb nutrients from the food we are consuming.
3. Fermentation helps break down things that might be hard to digest, like lectins, tannins and phytates and many other antinutrients.⁴ This allows us to digest things more easily and makes nutrients more available to be absorbed by our bodies.
4. Long before the age of the “refrigeration bubble”, fermentation extended the shelf-life of foods. For example, milk only lasts 1-2 days out of the fridge but yogurt can last up to weeks (depends on your climate!)

p2

Fermentation: Good bacteria.

We live in a world where bacteria have been harangued and downtrodden. But bacteria are essential to life, and not just life in the “environment”, but on your body too.

In and on a human body there is up to 2kg of bacteria! The newest information has the average 70kg person is composed of about 40 trillion bacteria and 30 trillion human cells.⁵... so who is living in who?

So what are all these bacteria doing in our body? Bacteria play so many varied roles in the body, from helping produce and regulate hormones, digestion and immune function.⁶

Coupled with the historical consumption of sour cabbage, the human microbiome project and mounting evidence that our gut microbiota (our unique colonies of bacteria on and in our body) is linked the of everything from depression and anxiety, autoimmune disease, diabetes and obesity, asthma and skin disorders, digestive issues, autism and much more. The Gut has so much to do with our general well being that it's being called the “second brain”, the “gut-brain axis” is being investigated extensively and we're, with much chagrin, realising the truth of the old saying *trust your gut* and *I have a gut feeling about this...*

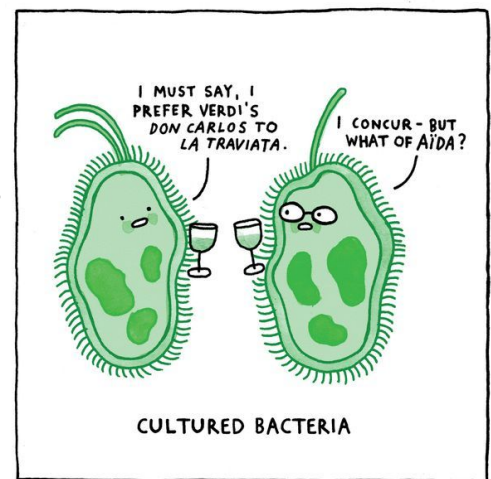
The bacteria in sauerkraut

The L. mesenteroides do most of their work in the first 3 days. They are the smallest of the three bacteria studied. They produce lactic acid, acetic acid (vinegar), ethyl alcohol and mannitol which create the flavours in sauerkraut. If the fermentation temperature is higher 22 degrees, these bacteria struggle to grow, which may affect the taste.

The L. mesenteroides also produce carbon dioxide. This causes bubbles at the surface of your ferment along with brine being pushed out of the jar. This is most active in the first 3-4 days of fermentation.

The L. plantarum does most of the work for the longest time period, from day 3 to day 16. It consumes sugars and produces lactic acid. It's the lactic acid in sauerkraut that acts as a preservative, supports digestion, inhibits growth of harmful bacteria, increases the bio-availability of Vitamin C, among others things Ideally, you don't want to stop the work of the lactic acid bacteria by putting your sauerkraut into cold storage before day 16 of fermentation.

The L. pentoaceticus is the bacteria final curtain for sauerkraut. It forms predominantly during days 16-20.



- [1. nourishingtreasures.com/wp-content/uploads/2012/07/TheScienceBehindSauerkrautFermentation.pdf](http://nourishingtreasures.com/wp-content/uploads/2012/07/TheScienceBehindSauerkrautFermentation.pdf)
- [2. honchemistry.wikispaces.com/Lactic+Acid+and+Alcohol+Fermentation+in+Humans](http://honchemistry.wikispaces.com/Lactic+Acid+and+Alcohol+Fermentation+in+Humans)
- [3. modernfarmer.com/2014/04/magical-sour-cabbage-sauerkraut-helped-save-age-sail/](http://modernfarmer.com/2014/04/magical-sour-cabbage-sauerkraut-helped-save-age-sail/)
- [4. sciencedirect.com/science/article/pii/S0963996994900965](http://sciencedirect.com/science/article/pii/S0963996994900965)
- [5. sciencenews.org/article/body%E2%80%99s-bacteria-don%E2%80%99t-outnumber-human-cells-so-much-after-all](http://sciencenews.org/article/body%E2%80%99s-bacteria-don%E2%80%99t-outnumber-human-cells-so-much-after-all)
- [6. stopcancerfund.org/pz-diet-habits-behaviors/bacteria-the-good-the-bad-and-the-ugly/](http://stopcancerfund.org/pz-diet-habits-behaviors/bacteria-the-good-the-bad-and-the-ugly/)
- [7. makesauerkraut.com/how-long-to-ferment-sauerkraut/](http://makesauerkraut.com/how-long-to-ferment-sauerkraut/)