

Chuck Wagons on the Trail – Science



The cook that was responsible for the chuck wagon and fed the cowboys on cattle drives was often called ‘Cookie’. He often made sour dough biscuits for the cowboys to eat.

Sourdough is as old as bread itself and was made simply by mixing flour and water. The mixture would ferment and turn sour and full of gas. The resulting mixture, known as starter, is thick with wild yeasts and bacteria.

1. What is fermentation?

The famous scientist, Louis Pasteur discovered that fermentation was caused by living cells. Fermentation is a metabolic process in which an organism converts a carbohydrate, such as starch or a sugar, into an alcohol or an acid. For example, yeast performs fermentation to obtain energy by converting sugar into alcohol. Bacteria perform fermentation, converting carbohydrates into lactic acid.

2. What is yeast?

Yeast is a fungus, a one-celled life form which digests sugars (such as those contained within the starch in flour) and produces a bit of ethanol (alcohol) and some carbon dioxide (which is what causes the bread to rise).

Sourdough is teeming with bugs—some 50 million yeasts and 5 billion lactobacilli bacteria are in every teaspoon of starter dough!

3. There are bacteria in my bread?

Almost all the bacteria are lactobacilli, cousins of the bacteria that curdle milk into yogurt and cheese. In sourdough, these bacteria outnumber the yeasts by 100 to one. The bacteria are the ones that make the acids that give the sourdough its tart flavor. They also contribute to the carbon dioxide levels that make the bread smell delicious.

4. More sourdough is made from the old stuff?

A little starter is always set aside for the next batch of sourdough. It is already loaded with the “bugs of the first batch. Those “bugs” speed up the fermentation process when more flour is added to make

another batch of dough. Some bakeries have kept their sourdough batches alive for more than 100 years!

Keeping a sourdough starter mixture alive actually requires a little maintenance since the starter is actually a living ecosystem.

5. Sourdough Ecosystem

Water is mixed with flour and left to ferment.

There are swarms of yeasts and bacteria everywhere—in the flour, in the environment, and on the cook.

The “bugs” will sort themselves out, and the "bread friendly" ones will win any battles.

As lactobacilli convert sugars to lactic and acetic acid, the dough noticeably sours, going down to the pH of mayonnaise, around 3.8.

Most microorganisms drop out of competition at this point, but yeasts that tolerate acid come into their own and convert sugars into carbon dioxide and ethanol.

Gas bubbles and fruity smells signal that fermentation is under way.

Fun Fact:

The discovery of fermentation and the sourdough process led to commercial production of Baker’s Yeast. Baker’s Yeast makes the process of carbon dioxide loading into dough, which makes it rise, much faster.