Fermentation

Fermentation is the process of extracting energy from the oxidation of organic compounds by organisms such as bacteria, moulds and yeasts.

Fermentation is used around the world since at least 7000BC, primarily as a way to preserve foods. The process played a role in human survival in the days before stoves and refrigerators, allowing preservation of foods in a nutritional and safe way.

However, fermentation is a high-risk process and needs to be done correctly with a high degree of caution, to ensure the final product is safe for consumption. Fermented food must have a pH level of 4.6 or lower to be considered safe for human consumption. It is important to ensure that a pH of less than 4.6 is achieved within 24 hours of the start of the fermentation process and that the alcohol content of the final product does not exceed 0.5%.

Fermented foods

A wide array of fermented foods are consumed in Australia. Examples are included in table 1.

Table 1.

<table>
<thead>
<tr>
<th>Common fermented foods</th>
<th>Less common fermented foods</th>
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<tbody>
<tr>
<td>Beer</td>
<td>Tofu</td>
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<tr>
<td>Yoghurt</td>
<td>Fish sauce</td>
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<tr>
<td>Sourdough bread</td>
<td>Worcestershire sauce</td>
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<tr>
<td>Pickles</td>
<td>Kefir</td>
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<tr>
<td>Salami</td>
<td>Tempeh</td>
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<tr>
<td>Coffee</td>
<td>Miso</td>
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<td></td>
<td>Tabasco sauce</td>
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<td></td>
<td>Sauerkraut</td>
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<tr>
<td></td>
<td>Kimchi</td>
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<td></td>
<td>Kombucha</td>
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</tbody>
</table>

Fermented or brewed soft drinks

Under the Australia New Zealand Food Standards Code (the Code) Standard 2.6.2-2:

A **brewed soft drink** means a food that:

(a) is the product prepared by a fermentation process from water with sugar and one or more of:

(i) fruit extractives or infusions; or

(ii) vegetable extractives or infusions; and

(b) contains no more than 1.15% alcohol by volume.

Labelling and licensing requirements

In accordance with Standard 2.7.1 of the Code, a statement of the alcohol content (declaration) is required for a beverage that contains 0.5% or more alcohol by volume.

Products with an alcohol content of greater than 0.5% are classified as liquor in Queensland and the producer will also require a licence with the Queensland Office of Liquor and Gaming.
Excessive alcohol production

Fermented/brewed soft drinks pose a risk of undeclared alcohol (most commonly, kombucha tea and kefir). As fermented foods contain live cultures, they can continue fermenting on the shelf after leaving the producer, resulting in increased alcohol content.

If alcohol content of 0.5% or greater is not declared on the label, or the level of alcohol declared on the label is incorrect, the product will be non-compliant with the Code. Undeclared alcohol also poses a potential health risk for certain people, for example, pregnant and lactating women and people taking certain medication.

Food safety risks

The main risks of fermented foods arise from the use of contaminated ingredients, including water and milk. Problems can occur in the fermentation process as a result of:

- Not following a proven recipe – deviation from a proven recipe can cause changes that lead to failed fermentation.
- Insufficient use of starter culture, if relevant (not all fermentations need a starter culture). Starter cultures help ensure a high level of ‘good’ bacteria.
- Cross contamination, as a result of, for example, poor hygiene practices, a damaged container harbouring harmful bacteria, or contaminated food.
- Unwanted mould – Moulds can infect a person, cause an allergic reaction or chemical toxicity that can have severe chronic and acute health effects.
- Using decayed vegetables, which have higher levels of spoilage bacteria than fresh vegetables.
- Fluctuating temperatures:
  - too warm – can kill ‘good’ bacteria and promote unwanted bacteria and/or mould
  - too cool – can stall the fermentation process.
- Not enough, or too much, oxygen – depending on what is being fermented.
- Exposed product - keep solids below the liquid surface – vegetables that aren’t submerged in their anaerobic environment will be in an oxygenated environment where mould can thrive.
- Insufficient salt in the fermentation of vegetables.
- Insufficiently, or delayed, low pH – fermentation that fails to bring the pH down quickly or low enough to prevent harmful bacteria reproducing.
- Chemicals or pesticides in water or ingredients could interfere with the fermentation process.

Food safety tips

- Use proven recipes – don’t experiment or ferment too short or too long.
- Do not use metal containers, as they can react with fermentation-produced acids. Use only glass or food-grade plastic containers.
- All fermentation equipment should be thoroughly washed and disinfected before use.
- Fermentation of vegetables – thoroughly wash vegetables before use.
- Fermentation using milk – only use pasteurised milk.
- Check that the pH is lower than 4.6 within 24 hours of the start of fermentation.
- Maintain appropriate temperature control of the finished product - refrigeration is recommended.
Further information

The Queensland Department of Health has a variety of fact sheets with detailed information on food safety. These can be accessed at www.health.qld.gov.au/public-health/industry-environment/food-safety.

If you have any further questions relating to fermented food, contact the Department of Health Food Safety Standards and Regulation Unit on phone (07) 3328 9310 or email foodsafety@health.qld.gov.au.