# Food safety program template

# Supplementary practices section

Acidification and fermentation for class 2 retail, food service and manufacturing businesses, FoodSmart food safety program template version 2

VICTORIA State Government | Health and Human Services

To receive this publication in an accessible format phone 1300 364 352, using the National Relay Service 13 36 77 if required, or email foodsafety@dhhs.vic.gov.au

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Available at <https://www2.health.vic.gov.au/public-health/food-safety/food-businesses/food-safety-program/foodsmart>

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# Why do I need this template supplement?

As a food business owner, you are legally required to ensure that the food you sell is safe and suitable for human consumption. The legislation governing the sale of food in Victoria is the *Food Act 1984* (the Act), which incorporates the Australia New Zealand Food Standards Code (the Code).

Businesses using this supplement must be using the food safety program (FSP) template for class 2 retail and food service businesses, no.1, version 3 or FoodSmart. Your food safety program will help you meet your legal responsibilities.

This supplement is for businesses manufacturing high-risk foods using various acidification methods, following the parameters that are set out in this document. If you plan to manufacture food outside these parameters, do not use this template. You need to have a third-party audited FSP in place instead.

## What are my responsibilities?

This supplement outlines the requirements for food businesses using acidification processing practices. If you wish to use acidification practices outside the scope of this supplement, you will need to use an independent FSP which must be audited annually by a food safety auditor approved by the Department of Health and Human Services. Discuss this with your local council environmental health unit before commencing any acidification processes.

## How do I use this template supplement?

You must keep a copy of your FSP at your business. If you use this template supplement, you must add it to your FSP folder.

## Compile records

Keep your completed records at your business to demonstrate you are processing and handling food correctly and safely. These must be available for review by your food safety supervisor, your staff, and at the request of an environmental health officer.

| To check | Record | How often |
|---|---|---|
| Finished product temperature | Record 2: My temperature checks of food in hot and cold storage | Daily |
| pH measurement | Record 12: My pH checks | Validation and ongoing monthly checks |
| Alcohol strength in brewed soft drinks | Record 13: Alcohol strength in my brewed soft drinks. | Per batch |
| Alcohol strength at end of shelf life | Record 14: Alcohol strength in my brewed soft drinks for the duration of shelf life. | Annually |
| Method of measurement for brewed soft drinks | Record 15: How I measure the alcohol strength in my brewed soft drinks. | Once |
| Ebulliometer accuracy | Record 16: My ebulliometer accuracy checks for measuring alcohol strength in brewed soft drink. | Annually |

## Where can I get more help?

The following organisations can assist you:

- Speak with an environmental health officer from your local council.
- Visit the Food Safety Unit website <www2.health.vic.gov.au/public-health/foodsafety>.
- Call the Food Safety Unit help line: 1300 364 352 or email foodsafety@dhhs.vic.gov.au
- Visit DoFoodSafely <dofoodsafely.health.vic.gov.au>, the Department of Health and Human Service's free online learning program recommended for food handlers. It covers basic knowledge of food safety and develops food-handling skills.
- Business Victoria can assist you with information about setting up a business in Victoria; call 13 22 15 or visit their website <www.business.vic.gov.au>.

# Preparing food using acidification

**Goal: Ensuring food is safe to consume when acidified or fermented**

## What is acidification?

Acids can be used in food processing for flavour development or preservation (food safety). This template supplement addresses the use of food acid as a food safety mechanism.

Although acidified and fermented foods are generally considered safe, process failures and contaminated raw materials have resulted in food poisoning outbreaks.

Food acids, such as lactic, acetic, citric, malic, tartaric and propionic, may:

- be naturally present
- be added to the food
- result from microbial activity, such as fermentation.

**Note**: The principles in this supplement do not cover all foods processed by acidification, such as:

- uncooked meats (that is, smallgoods)
- uncooked seafood
- sushi (refer to the FoodSmart sushi practices section).

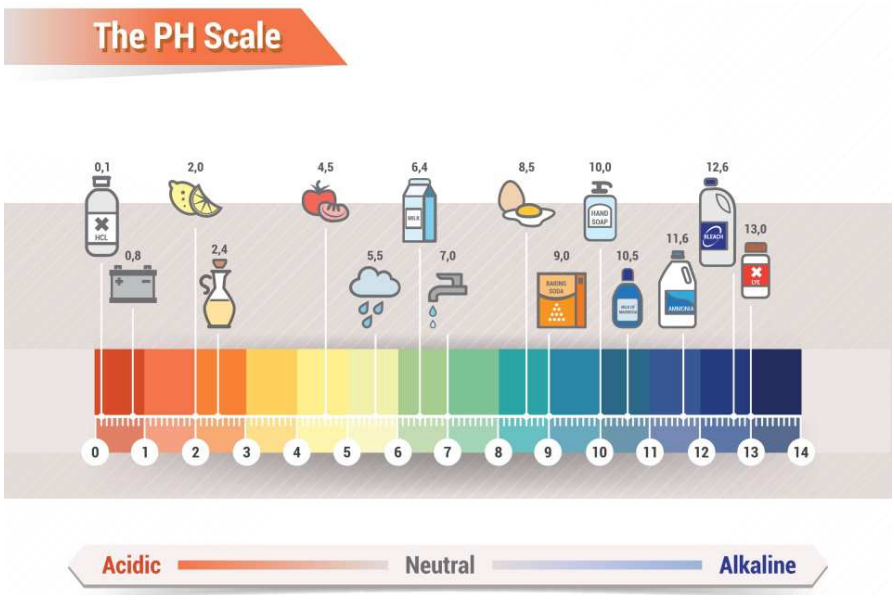
## How is acidity measured?

The strength of acid is measured by pH, which is a numeric scale used to specify the how acidic a food is.

pH is measured using a pH meter or pH strips. Products are acidic if they are less than 7.0 on the pH scale (see Figure 1).

Accurate and precise pH measurement is critical for food safety. Measuring equipment needs to be appropriate to your food parameters and operating effectively. Refer to the pH measurement and equipment section of this FSP supplement below.

**Figure 1: The pH scale**



## Why is pH so important?

As many acidified foods do not undergo a cooking process, there is increased risk that food-poisoning bacteria, and the toxins some produce, may grow in your product to harmful levels. This can occur if the pH of your product is above pH 4.6. The risk of botulism (from *Clostridium botulinum* spores germinating and producing toxins) is increased if the pH is above pH 4.6. These bacterial toxins are not destroyed by further cooking, and can cause life-threatening food poisoning.

The Code requires compliance with specific pH levels for some products; these are detailed in Table 1. For further information visit the Food Standards Australia New Zealand (FSANZ) website <www.foodstandards.gov.au>.

To ensure the safety of your food, you should aim for a pH of 4.2 in your acidic foods so that these products stay well under the critical pH 4.6 throughout their entire shelf life. Be aware that the pH may rise initially. This can happen if the acid is neutralised by the food or as it is absorbed into the food.

**Table 1: The Code's standards for pH of foods**

| Food | pH limit | Code standard |
|---|---|---|
|  | pH ≤ 4.6 | **Standard 2.3.1 Fruits and vegetables**<br>Fruit and vegetables in brine, oil, vinegar or water must not have a pH greater than 4.6 |
|  | pH ≤ 4.5 | **Standard 2.5.3 Fermented milk products**<br>Fermented milk or yoghurt should have a pH of no greater than 4.5 |

## Preserving food with acid

### Using the properties of food acids for the purpose of preservation

Acids, such as the lactic acid produced by fermenting vegetables, act as preservatives by stopping or slowing the growth of food-poisoning and spoilage bacteria.

Some food acids are more inhibitory to bacteria than others. Acetic and lactic acids are generally the most inhibitory but the strength of an acid is not necessarily an indicator of its inhibitory powers.

Food can be acidified by direct acidification or fermentation.

### A low pH alone is not enough for adequate food safety

Some food-poisoning bacteria, such as *Salmonella spp.*, *Escherichia coli* and *Listeria monocytogenes*, can still grow in food below pH 4.6. Therefore, acid is not normally the sole control measure, but is used in combination with other control measures (known as hurdles).

Good manufacturing practices, a robust hazard analysis and control process-based food safety program and good hygiene practices, all play key roles in preventing food borne illness.

Food safety in acidification and fermentation specifically requires:

- good quality, undamaged, raw materials
- contamination prevention (before, during and after processing)
- well-controlled acidification and fermentation.

See Table 2 for examples of these food safety steps.

In addition to these preventive controls, combinations of acid and certain ingredients act to magnify the preservation power.

Other ingredients that can be used in combination with acid are:

- salt and/or sugar – some bacteria are salt intolerant, others can be controlled by lowered water activity which can be achieved with the addition of salt and sugar
- preservatives – additives such as sorbic acid or benzoic acid can be added according to the specification in the Code <www.foodstandards.gov.au>. For further information, see 'Standard 1.3.1 Food additives'
- nisin – an antibacterial protein produced by bacterium *Lactococcus lactis*.

**Table 2: Food safety steps and examples of suitable parameters**

| Food safety step | Examples of safety parameters |
|---|---|
| Good quality undamaged raw materials | • Use trusted raw materials suppliers who have adequate food safety measures in place.<br>• Remove dirt and bacteria from raw produce by washing produce in potable water or removing contaminated or damaged outer leaves or skins.<br>• Use heat treatment to eliminate competing bacteria prior to acidification, such as using pasteurised milk for making yoghurt. |
| Contamination prevention | • Use good personal hygiene practices (such as hand washing).<br>• Use effective cleaning and sanitising procedures. |
| Well-controlled acidification and fermentation | • Use a tested recipe and ensure this same recipe is followed accurately each time you make your product.<br>• Know and maintain the correct fermentation temperature for your product (see p. 11 for more information on temperature).<br>• Refrigerate finished product at < 5 °C.<br>• Use heat treatment (where appropriate) on your finished product.<br>• Add between 1 and 3.5% salt to fermented vegetables to inhibit salt-intolerant food-poisoning bacteria prior to food acid production. See Appendix 1 on how to calculate the correct amount of salt for your food. |

## Methods and processes for the acidification of food

The two processes for the acidification of food are direct acidification and fermentation.

### Direct acidification of food

The inactivation or inhibition of food-poisoning bacteria by direct acidification is achieved by directly adding acid to food. The acid acts in conjunction with heat treatment or water activity lowering substances such as salt and sugar. Some examples of direct acidification include adding:

- vinegar to onions for pickled onions, or to cucumbers for pickles (gherkins)
- vinegar to artichokes for later sealing in oil
- lemon juice to milk to make paneer.

Changes in pH are immediate. Sufficient acid must be added to account for any neutralisation or absorption of acid by the food.

### Does your food business prepare vegetables in oil?

When vegetables are packed in oil and sealed in jars or bottles, it creates a low-oxygen environment that favours the growth of pathogens such as *Clostridium botulinum*, which can cause botulism. Oil prevents oxidation and discolouration of vegetables in the containers, but it does not kill microorganisms. To inhibit pathogen growth, the vegetables must be acidified with acid (such as, vinegar or lemon), to a pH of 4.6 or lower, before adding oil. Any herbs or spices added to the vegetables must be similarly treated or be thoroughly dried (to reduce their water activity) before being mixed with the vegetables.

Tomatoes are a special case. A fresh tomato has a pH of just below 4.6. When dried (or semi-dried), the acid concentrates and the pH is reduced.

### Fermentation of food

Fermented food and beverages undergo a microbial process where yeasts, bacteria or moulds, degrade or break food components into by-products. For example:

- sugar is converted to a food acid (yoghurt, sauerkraut, kombucha)
- sugar is converted to an alcohol (beer, wine)
- alcohol is converted to a food acid (vinegar).

Fermentation controls food-poisoning bacteria by:

- competition – where fermentation bacteria compete for available nutrients with other bacteria
- inhibition – where fermentation bacteria make substances that inhibit growth of unwanted microorganisms
- displacement – where fermentation bacteria are present in numbers that allow them to be the most numerous organisms on the surface of the food. Bacteria often need to attach to the surface of the food to survive.

### Using starter cultures

To ensure satisfactory and consistent fermentation results, and to inhibit the growth of food-poisoning bacteria, the use of product-specific starter cultures is recommended.

Commercially produced starter cultures use bacteria that assist at the beginning of the fermentation process and are specific to the chosen food type.

Using a starter culture is the best way to ensure a uniform finished product. Follow the manufacturer's direction regarding dosage and optimum temperatures.

It is best practice to use new starter cultures for each batch. If you do not use a new starter culture, you must follow the specific guidelines set out in your FSP (see Appendix 2 for pitching calculation examples). Not doing so can result in unsatisfactory and unsafe fermentation.

## Fermentation temperature

Each product has an optimum fermentation temperature for a satisfactory result.

Fermentation will favour the survival of any food-poisoning bacteria present if the temperature is too cold, as food-poisoning bacteria can grow when fermentation is slowed.

Optimum temperatures ensure the best flavour and health of preferred bacteria. This should be carefully controlled and measured. If you are unsure of the optimum temperature for your starter culture, follow recommendations and guidance from the culture manufacturer, or seek expert advice from a food technologist.

## Duration of fermentation

Fermentation must be as rapid as possible to ensure food-poisoning bacteria do not grow. The time taken to achieve a pH drop to under pH 4.6 must be within the specified period for your product(s). You should observe the pH drop happen within a consistent timeframe with each batch you produce. If you cannot achieve this repetition you should review your processes.

## Fermented foods and beverages containing alcohol

During the fermentation process sugar can be converted to alcohol, therefore fermented products may contain alcohol.

Food and beverages that contain alcohol must comply with the Code's 'Standard 2.7.1 Labelling of alcoholic beverages and food containing alcohol' and the Liquor Licensing Act for the state and territories where it is sold. For further information visit the FSANZ website <www.foodstandards.gov.au> and the Victorian Commission for Gambling and Liquor Regulation <www.vcglr.vic.gov.au>.

**Please note:** If you are selling product within the state of Victoria, and your product exceeds **0.5% alcohol by volume (ABV),** it is considered a liquor and falls under the *Victorian Liquor Control Reform Act 1998*. You are required to hold a liquor license to sell this type of product.

## Measuring alcohol strength in brewed soft drinks

Popular techniques for measuring alcohol strength in alcoholic drinks, such as using a hydrometer for beer and wine, may not be appropriate for some brewed soft drinks like kombucha and kefir. This is due to the presence of organic acids produced during the fermentation process that can cause inaccurate results.

To obtain an accurate measure of the strength of alcohol in these products, you can use:

- gas chromatography
- near infra-red spectrometry
- distillation followed by the gravimetric measurement of the distillate or by measurement in a density meter, or
- ebulliometer.

The ebulliometer is an economical way to measure alcohol strength, and is a permissible method if you are using this FSP and producing less than 100,000 litres of brewed soft drink in one calendar year. If you are producing more than 100,000 you must use one of the other methods.

## Necessary skills and knowledge

If you are using this supplement, you must be able to demonstrate sound knowledge of:

- the fermentation method used
- how the equipment is operated
- how risk is managed
- how to fill in the correct records.

# What are the risks?

## Purchasing and receiving food

**Goal: Ensuring food is safe when you purchase and receive it**

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| Receiving incorrect raw materials or ingredients containing products such as allergens or additives. This can cause harm to some customers and may mislead others. | Make sure you know what is present in the foods you use as ingredients.<br>Make sure raw materials, packaging or ingredients you receive are to your specification. | Compare brand name, grade of food received with your purchase details, and/or your specifications. | Reject raw materials, packaging or ingredients that do not match the correct specification.<br>Reject suppliers that do not provide food and packaging the way you want it.<br>Change practices and labels so that they comply with the Code. |

## Processing food

**Goal: Ensuring your food process is safe**

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| Fermentation may fail or be difficult to control if the raw materials and ingredients used contain large populations of bacteria or yeast. | Ensure your raw materials and ingredients are prepared adequately prior to acidification to reduce levels of bacteria or yeast present. | Ensure your preparation process involves reducing these populations. For example, by removing outer leaves from vegetables such as cabbages, washing and/or peeling root vegetables, hard boiling eggs, using pasteurised milk or heat treating fruit used for flavouring. | Discard products if fermentation fails and pH of less than 4.6 is not achieved within the specified timeframe for your product.<br>Change raw material specification and/or supplier. |

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| Starter culture is contaminated or out of date, causing unsatisfactory fermentation and allowing food-poisoning bacteria to grow to harmful levels.<br><br>Only brewed soft drinks and fermented milks (not yoghurt), as defined by the Code Standard 2.6.2 and 2.5.3–2, can use starter cultures kept from a previous batch – known as pitching or back slopping. | Rotate your stock to ensure you use your starter cultures within their use-by or best-before date.<br><br>Ensure starter cultures are covered to protect from dust and other airborne contaminants. | Check your starter culture before use to ensure it is in date and free from signs of contamination or spoilage. | If your culture is out of date or contaminated, discard it and start again using a new culture. |
| Food-poisoning bacteria can grow in brewed soft drinks and fermented milk if the amount of starter culture pitched is too low and the pH drop is not achieved rapidly. | The amount (or dosage) pitched must be greater than 10%. A pH of less than 4.6 must be achieved within 4 hours. | Calculate the amount of starter culture pitched using the calculation in Appendix 2.<br><br>Use pH strips or a calibrated pH probe to measure the pH is below 4.6 within 4 hours.<br><br>If your product's pH does not drop to less than 4.6 within 4 hours you must provide evidence that the product is safe. Food safety parameters require scientific testing/justification. | Add more acid to immediately decrease pH to less than 4.6. Discard if you see any signs of spoilage. |
| Food poisoning bacteria can grow in high risk food if acidification is too slow and a pH level of less than 4.6 is not achieved rapidly. | You must be able to show your acidification process is effective to ensure food poisoning bacteria does not grow to harmful levels prior to achieving your target pH.<br><br>Ensure your food sample is prepared appropriately to ensure accuracy in pH testing. See **Record 12: My pH checks and meter accuracy** for how to prepare your sample. | Use pH strips or a calibrated pH probe to measure that the pH is below 4.6, within the following timeframes:<br>• fermented milk – 4 hours<br>• yoghurt – 6 hours<br>• brewed soft drinks – 4 hours<br>• fruits, vegetables and eggs – 24 hours.<br>Use **Record 12: My pH checks and** | Add more acid to immediately decrease pH to less than 4.6. Discard if you see any signs of spoilage.<br><br>Re-calibrate pH probe, repair or replace equipment if necessary.<br><br>Review your product and processes to ensure your fermentation is satisfactory. |

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| | | **meter accuracy** to record your pH results. Records include an initial validation period followed by a monthly process validation test.<br><br>If your product's pH does not drop to less than 4.6 within the periods specified, you must provide evidence that the product is safe. Food safety parameters require scientific testing/justification. | |
| Food-poisoning bacteria can grow in high-risk foods if the acid level is insufficient in your finished product. | Check the pH of your product to ensure a pH of less than 4.6 is achieved.<br><br>Ensure your food sample is prepared appropriately to ensure accuracy in pH testing. See **Record 12: My pH checks and meter accuracy** for how to prepare your sample. | Use pH strips or a calibrated pH probe to measure the pH of your finished product.<br><br>Use **Record 12: My pH checks and meter accuracy** to record your pH results. Records include an initial validation period followed by a monthly process validation test.<br><br>If your product's pH does not drop to less than 4.6 you must provide evidence that the product is safe. Food safety parameters require scientific testing/justification. | Add more acid to immediately lower pH to less than 4.6. Discard if you see any signs of spoilage.<br><br>Re-calibrate pH probe, repair or replace equipment if necessary.<br><br>Review your product and processes to ensure your fermentation is satisfactory. |
| Growth of spoilage bacteria occurs producing toxic by-products, such as fungal toxins. | Ensure food during manufacture is covered to protect from dust and other airborne contaminants. | Look for mould or yeast activity on the surface, colour changes, off smells. | Discard food products if you suspect they have spoiled.<br><br>Review procedures, handling and recipe used for reason for failure. |
| Food-poisoning bacteria can grow if your product is not stored at the correct temperature. | Store product at 5 °C or less. | Measure core temperature of high-risk food stored in the refrigerator using a probe thermometer regularly (at least once a day).<br><br>Use **Record 2: My temperature** | Discard food if you suspect it has not been stored correctly. |

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| | | **checks of food in cold or hot storage** to record you results daily.<br><br>If your product does not require temperature control you must provide evidence that the product is safe stored at room temperature. Food safety parameters require scientific testing/justification. | |

## Packaging and labelling food

**Goal: Ensuring the food you package and label is safe**

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| Finished product in glass bottles can explode from the overproduction of fermentation gasses, causing injury. | You must be able to show your fermentation process is effective to ensure gas production does not cause glass packaging to explode.<br><br>Your finished product must be stored at 5 °C or less. | Measure core temperatures of high-risk food stored in the refrigerator using a probe thermometer regularly (at least once a day).<br><br>**Use Record 2: My temperature checks of food in cold or hot storage**, to record you results daily. | Discard food if you suspect it has not been stored correctly or has overproduced gas and may explode. |
| Food-poisoning bacteria can grow to harmful levels if use-by and best-before dates are not accurate. | You must be able to show your food is safe to eat for the lifespan (shelf life) of your product. This is the period indicated by the use-by date or best-before date.<br><br>If your product's shelf life changes upon opening, this secondary shelf life must also be considered. | Provide evidence of shelf life determination. Food safety parameters require scientific testing. | Review your product and processes to obtain food safety within your shelf life period. |

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| Food-poisoning bacteria can grow in high-risk foods if they are not stored at the correct temperature. | Ensure products are stored and transported at the correct temperature.<br>Label your product with storage instructions, including instructions for storage once opened. | Check that your label and product information is accurate and meets the requirements in the Code. | Revise information so it is correct. |
| Not meeting requirements in the Code to include important information for customers about beverages and food containing alcohol.<br>Failure can cause harm to some customers and may mislead others. | Make sure the presence of alcohol is declared on any food or beverage that is required to bear a label. | Check that your label and product information is accurate and meets the requirements of the Code. | Change practices and re-label food so that labels comply with the Code.<br>Revise information so it is correct. |

## pH measurement and equipment

**Goal: Ensure that pH measurement is precise and accurate and meters are calibrated**

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| If pH meters are not accurate, the pH of your food may be above 4.6 and allow food-poisoning bacteria to grow. | Calibrate pH meters each day they are used.<br>External calibration should be undertaken as per the manufacturer's instructions. | Conduct testing using standard buffer solutions.<br>Use **Record 12: My pH checks and meter accuracy** to record your pH meter calibration.<br>Have equipment calibrated by the manufacturer, supplier or an external contractor. | Have faulty pH meters repaired or replaced.<br>Clean the pH meter probe regularly, as per the manufacturer's instructions to ensure any food residue is removed from the meter probe.<br>Ensure pH buffers are within use-by date.<br>Ensure the pH meters are stored as per the manufacturer's instructions. |

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| If pH indicators (also known as strips or litmus paper) are not suitable measurement tools (not adequately precise or accurate) for your food, the pH may be above 4.6 and allow food-poisoning bacteria to grow. | Use pH strips that provide measurement with adequate precision for your product.<br><br>Do not use pH strips on highly coloured food which may discolour the paper and stop you from measuring pH accurately. | Have a laboratory test your food to prove accuracy of your pH measurement. | Replace pH papers with a product with better precision.<br><br>Use a pH meter to measure the pH of highly coloured foods.<br><br>Use a pH meter to test the pH of your food. |

## Additional requirements for brewed and fermented soft drinks

A brewed soft drink may contain no more than 1.15% alcohol by volume (the term 'alcohol' is a reference to ethyl alcohol or ethanol).

**Please note:** If you are selling product within the state of Victoria, and your product exceeds **0.5% ABV**, it is considered a liquor and falls under the *Victorian Liquor Control Reform Act 1998,* and you will be required to hold a liquor license. For more information contact the Victorian Commission for Gambling and Liquor Regulation <www.vcglr.vic.gov.au>.

**Goal: Ensure brewed soft drinks are safe to consume**

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| Overproduction of alcohol when manufacturing non-alcoholic brewed beverages.<br><br>Failure can cause harm to some customers and may mislead others. | Identify the alcohol strength limit you should adhere to and ensure your product contains no more than this predetermined limit.<br><br>You must be able to show you can control secondary fermentation.<br><br>Ensure your process and formulation is followed accurately for each batch produced. | Measure one sample from every finished batch produced for alcohol strength.<br><br>Record your results in **Record 13: Alcohol strength in my brewed soft drinks by batch.** | Discard if alcohol is produced in excess of determined limits.<br><br>Change practices and labels so they comply with the Code. |
| Overproduction of alcohol when manufacturing non-alcoholic brewed beverages. The alcohol strength must remain under the appropriate limit for the duration of the product's shelf life. | Ensure alcohol production does not continue throughout your product's shelf life duration.<br><br>Ensure your process and formulation is followed accurately for each batch produced.<br><br>You must be able to show you can control secondary fermentation. | Measure three samples from three concurrent batches (for each flavour you produce, regardless of when the flavour is added), at the end of their stated shelf life for alcohol strength.<br><br>You must provide certificates of analysis of measurement stating alcohol strength, including the variance, is present in your product at the end of its shelf life. Certificates must be from a laboratory accredited by the National Association of Testing Authorities.<br><br>Use **Record 14: Alcohol strength in my brewed soft drinks for the** | Discard if alcohol is produced in excess of determined limits.<br><br>Change practices and labels so that they comply with the Code. |

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| | | **duration of shelf** life to record the results.<br><br>This record must be repeated annually, or if your product formulation or process changes you must provide new shelf-life checks. All new products and flavours require shelf-life checks. | |
| Fermentation can continue post-manufacturing, causing the production of alcohol. | Store and transport your product at 5 °C or less.<br><br>Ensure the storage instructions are legible and prominent. | Measure core temperatures of brewed soft drinks in the refrigerator using a probe thermometer regularly (at least once a day).<br><br>Use **Record 2: My temperature checks of food in cold or hot storage** to record you results daily. | Discard food if you suspect it has not been stored correctly.<br><br>Discard if alcohol is produced in excess of determined limits.<br><br>Change practices and labels so that they comply with the Code. |
| If your method of alcohol measurement is not suitable, the alcohol in your product may be greater than 1.15% ABV. | Ensure your method of measurement is accurate and precise. | Permissible methods to test the alcoholic strength of your products, corrected to 20 ºC are:<br><br>• gas chromatography<br>• near infra-red spectrometry<br>• distillation followed by the gravimetric measurement of the distillate or by measurement in a density meter<br>• any other method that consistently produces a similar result by a documented testing process where you have compared your results to those from a laboratory accredited with the National Association of Testing Authorities (if you produce less than 100,000 litres of brewed soft drink per year you may use a | Use measuring equipment that can provide adequate precision and accuracy for your product. |

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| | | ebulliometer to measure alcohol strength, use **Record 16** to validate your process. This record must be repeated annually).<br>Use **Record 15: How I measure the alcohol strength in my brewed soft drinks** to record the results. | |

## Displaying brewed and fermented soft drinks

**Please note:** If you are selling product within the state of Victoria, and the product exceeds **0.5% ABV**, it is considered a liquor and falls under the *Victorian Liquor Control Reform Act 1998,* and you will be required to hold a liquor license. For more information contact the Victorian Commission for Gambling and Liquor Regulation <www.vcglr.vic.gov.au>.

**Goal: Ensure brewed soft drinks are safely displayed**

| What can go wrong? | What can I do? | How can I check? | What if it is not right? |
|---|---|---|---|
| Fermentation can continue post-manufacturing, causing the production of alcohol. | Only buy from reputable suppliers.<br>Request that brewed and fermented soft drinks are made to a requested standard, as outlined above. Before accepting it from a supplier.<br>Store product at 5 °C or less. | Ask suppliers for information about their products or a copy of their completed **Record 13: Alcohol strength in my brewed soft drinks by batch**.<br>Measure the temperature of deliveries to see whether they are 5 °C or less. | If the temperature of the product is above 5 °C when delivered, reject the delivery.<br>Discard food if you suspect it has not been stored correctly. |

# Risk and tips

## Shelf life

Use-by and best-before dates can be determined by shelf life testing, which is normally undertaken in laboratory conditions. All shelf life studies include an assessment of the safety of the product and this assessment will normally precede any assessment of shelf life.

Understanding the shelf life of your product is a key step in determining its safety, quality and profitability.

## Getting the right raw materials

Creating specifications for your raw materials is the best way to ensure you know exactly what is going into your product and ensuring accuracy in your labelling. Examples of the types of specification you may include can be:

- organoleptic – such as flavour, colour, texture
- physical – such as size, shape, foreign-matter tolerances
- microbiological– such as standard plate count, yeast and moulds, coliforms
- chemical – such as pesticide residue, pH
- allergen information – such as gluten free.

Always review your raw material deliveries against your specifications and reject any that do not meet your requirements.

## Identifying allergens in your ingredients, products and processes

Failing to identify and label allergens correctly in your product can result in life-threatening allergic reactions in some people. Refer to *Support program 1: Food allergies, intolerances and general information for customers* for more information on allergens in your FoodSmart FSP.

Food allergens can be present in many food ingredients and are not always obvious from their name. Once a recipe has been formulated, each ingredient must be carefully reviewed. Identify any allergens by reviewing ingredient specifications and labels, speaking to suppliers and understanding how to identify the less obvious ones. You can also use an external certified laboratory to test your ingredients to confirm composition and labelling information.

A useful resource is the Allergen Bureau's *Unexpected Allergens in Food.* This guide assists the food industry to identify basic food ingredients and food additives that may contain or be derived from one or more of the allergens required, by the Code, to be identified on food labels when present. The guide is available on the Allergen Bureau website <www.allergenbureau.net>

For an example of labelling of allergens see Appendix 3.

# Record 12: My pH checks and meter accuracy

Adequate pH testing requires you to validate your process (Record 12A) and ensure ongoing food safety with monthly checks (Record 12B). pH must be checked at regular intervals to ensure food safety and you can choose the way you keep this information, such as the record below. However you decide to record this information make sure you record the date, batch tested, pH after initial pH drop, time taken to achieve this pH drop, and for the finished product, and any corrective action.

## Record 12 section A – measuring pH to validate your acidification process

Measure the pH of your food in five concurrent batches (for each flavour variant). The pH must be under 4.6 after initial fermentation and for the finished product. If your results are inconsistent, you should review your process. If you are using a pH meter you must calibrate it for accuracy each day it is used.

**Step 1:** Check your pH meter is accurate (calibration) and record the result. See Appendix 4 on how to calibrate your pH meter.

**Step 2:** Check you are achieving a rapid initial pH drop to less than pH 4.6.

Use pH strips or a calibrated pH meter to measure that the pH is below 4.6 within the following timeframes, from the fermentation being initiated:

- fermented milk – 4 hours
- yoghurt – 6 hours
- brewed soft drinks – 4 hours
- fruits, vegetables and eggs – 24 hours.

**Step 3:** Check your finished product has a pH of less than 4.6.

Use pH strips or a calibrated pH meter to measure that the pH is below 4.6 in your finished product.

## Record 12 section B – ongoing pH measurement to confirm your process is still working

Repeat your pH testing at least once a month (for each flavour variant).

### How to measure the pH of food

**Remove a sample**: Always remove a small sample from your product and test this sample. Testing your main batch can cause hazards such as: physical contamination from broken glass from a damaged electrode, bacterial contamination from using an unclean electrode or paper, cross contamination from another product or chemical contamination from cleaning chemical residue present on the electrode.

**Prepare your sample:** Samples should be tested at a constant temperature, preferably room temperature. Rinse and dry the electrode between products. If your product is a mixture of solid and liquid foods (such as pickled vegetables), you must measure both components together by blending all components into a puree using proportional amounts of the components.

## pH meter care

- Rinse the electrode between products using warm tap water.
- Only use soft facial tissues (they must not have added oils like lavender or aloe vera) to wipe the electrode.
- The electrode can get food build-up on it from testing which will make it inaccurate. Follow the manufacturer's instructions to make sure it is cleaned properly.
- When not in use, follow the manufacturer's instructions for correct storage. It may need to be stored in distilled water.

## Example of record 12A: measuring pH to validate your acidification process

**Use this record to validate your process. Validation must be repeated if your process or formulation changes, and for new flavours**

| | |
|---|---|
| **Product name (flavour):** | *Kimchi* |
| **pH drop timeframe?** | *24 hours* |

| Test # | Batch ID | Date and time fermentation initiated | pH meter calibration – daily | | pH check after pH drop | | | | pH of finished product | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Reading for pH 4.0 buffer | Reading for pH 7.0 buffer | Date and time of pH check | Check pH | Time between initiation and 1 pH check? | Corrective action (if pH is above 4.6) | Final check pH | Corrective action (if pH is above 4.6) |
| *1* | *15/12/17* | *09/05/17 3.00pm* | *4.01* | *7.00* | *10/05/17 3.00pm* | *4.6* | *24 hours* | *NA* | *3.8* | *NA* |
| *2* | *21/01/18* | *10/06/17 10.00am* | *3.59* | *7.01* | *11/05/17 9.55am* | *4.7* | *24 hours* | *Add 30ml of vinegar and retest* | *4.7* | *Fermentation unsuccessful, discarded* |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |



Have you achieved compliant results for five concurrent batches of your product?

Yes or no? If no, you will need to repeat the validation process.

## Record 12A: measuring pH to validate your acidification process

**Use this record to validate your process. Validation must be repeated if your process or formulation changes, and for new flavours**

| | |
|---|---|
| **Product name (flavour):** | |
| **pH drop timeframe?** | |

| Test # | Batch ID | Date and time fermentation initiated | pH meter calibration – daily | | pH check after pH drop | | | | pH of finished product | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Reading for pH 4.0 buffer | Reading for pH 7.0 buffer | Date and time of pH check | Check pH | Time between initiation and 1 pH check? | Corrective action (if pH is above 4.6) | Final check pH | Corrective action (if pH is above 4.6) |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |

Have you achieved compliant results for five concurrent batches of your product?

Yes or no? If no, you will need to repeat the validation process.

## Example of record 12B – monthly ongoing pH measurement to confirm your process is still working

**Repeat your pH testing at least once a month, testing is to be undertaken for each flavour variant**

| Product name/flavour | Kimchi |
|---|---|

| Batch ID | Date and time fermentation initiated | pH meter calibration - daily | | pH check after pH drop | | | | pH of finished product | |
|---|---|---|---|---|---|---|---|---|---|
| | | Reading for pH 4.0 buffer | Reading for pH 7.0 buffer | Date and time of pH check | pH of sample | Time between initiation and pH check? | Corrective action (if pH is above 4.6) | pH of sample | Corrective action (if pH is above 4.6) |
| 11082 | 09/11/17 10.00am | 4.0 | 7.01 | 10/11/17 | 4.6 | 24 hours | NA | 3.8 | |
| 11083 | 09/12/17 11.20am | 3.59 | 7.00 | 10/12/17 | 4.5 | 24 hours | NA | 3.8 | |
| 11084 | 09/01/18 9.15am | 4.1 | 7.01 | 10/01/18 | 4.5 | 24 hours | NA | 4.7 | Discard, fermentation unsatisfactory |
| | | | | | | | | | |
| | | | | | | | | | |
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## Record 12B – monthly ongoing pH measurement to confirm your process is still working

**Repeat your pH testing at least once a month, testing is to be undertaken for each flavour variant**

| Product name/flavour | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Batch ID | Date and time fermentation initiated | pH meter calibration -– daily | | pH check after pH drop | | | | pH of finished product | |
| | | Reading for pH 4.0 buffer | Reading for pH 7.0 buffer | Date and time of pH check | pH of sample | Time between initiation and pH check? | Corrective action (if pH is above 4.6) | pH of sample | Corrective action (if pH is above 4.6) |
| | | | | | | | | | |
| | | | | | | | | | |
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# Record 13: Alcohol strength in my brewed soft drinks by batch

Measure one sample from each finished batch produced for alcohol* strength. A brewed soft drink may contain no more than 1.15% alcohol by volume.

**Please note:** If you are selling product within the state of Victoria, and your product exceeds **0.5% alcohol by volume (ABV)**, it is considered a liquor and falls under the *Victorian Liquor Control Reform Act 1998,* and you will be required to hold a liquor license. For more information contact the Victorian Commission for Gambling and Liquor Regulation <www.vcglr.vic.gov.au>.

Refer to **Record 15: How I measure the alcohol strength in my brewed soft drinks** method for measuring alcohol strength in brewed soft drinks to ensure you are using a permissible method to measure your product.

The instruments and processes used to measure the alcoholic strength must be able to produce a result with a tolerance of plus or minus 0.3% points of the actual alcoholic strength.

**Records must be completed for each flavour variant you produce.**

*The term ‘alcohol’ is a reference to ethyl alcohol or ethanol.

## Example record 13: Alcohol strength in my brewed soft drinks by batch

**Use your approved testing method to test one sample from every finished batch (per flavour)**

| **Product name/flavour:** | | | **Apple kombucha** | | |
|---|---|---|---|---|---|
| **My testing method and variance (refer record 15):** | | | **ebulliometer** | | |
| **Date** | **Batch ID** | **Result: Alcohol strength (% ABV)** | **Is your alcohol strength (mark the correct column):** | | **Corrective action, if above 1.15%** |
| | | | **1.15% ABV or less?** | **Greater than 1.15% ABV?** | |
| 09/05/17 | 12258 | 0.42 | X | | NA |
| 11/05/17 | 12259 | 1.16 | | X | Discard, review process |
| 15/05/17 | 12260 | 0.85 | X | | NA |
| | | | | | |
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## Record 13: Alcohol strength in my brewed soft drinks by batch

**Use your approved testing method to test one sample from every finished batch (per flavour)**

| **Product name/flavour:** | |
|---|---|
| **My testing method and variance (refer record 15):** | |

| **Date** | **Batch ID** | **Result: Alcohol strength (% ABV)** | **Is your alcohol strength (tick the correct column):** | | **Corrective action, if above 1.15%** |
|---|---|---|---|---|---|
| | | | **1.15% ABV or less?** | **Greater than 1.15% ABV?** | |
| | | | | | |
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# Record 14: Alcohol strength in my brewed soft drinks for the duration of shelf life

Measure three samples from three concurrent batches (for each flavour you produce), at the end of their stated shelf life for alcohol strength. You must provide certificates of analysis stating how much alcohol,* including the variance, is present in your product at the end of its shelf life. Certificates must be from a laboratory accredited with the National Association of Testing Authorities.

The instruments and processes used to measure the alcoholic strength must be able to produce a result with a tolerance of up to plus or minus 0.3% points of the actual alcoholic strength.

A brewed soft drink may contain no more than 1.15% alcohol by volume for the duration of the shelf life.

**Please note:** If you are distributing product within the state of Victoria, and your product exceeds **0.5% alcohol by volume (ABV)**, it is considered a liquor and falls under the *Victorian Liquor Control Reform Act 1998,* and you will be required to hold a liquor license. For more information contact the Victorian Commission for Gambling and Liquor Regulation <www.vcglr.vic.gov.au>.

*The term ‘alcohol’ is a reference to ethyl alcohol or ethanol.

## Example of record 14: Alcohol strength in my brewed soft drinks for the duration of shelf life

**Use this record to validate your process. Validation must be repeated annually or if your process or formulation changes, and for new flavours**

| **Product name/flavour:** | Apple kombucha | **Which year are these results for?** | 2017 |
|---|---|---|---|
| **Shelf life (in days):** | **90 days** | | |

| **Test #** | **Date tested** | **Batch ID** | **Date marked on packaging (end of shelf life)** | **Result: Alcohol strength determined by a NATA accredited laboratory (%)*** | | **Tolerance of test (%)** | **Is the alcohol strength compliant at the end of shelf life? Yes or no?** |
|---|---|---|---|---|---|---|---|
| **1** | **05/03/17** | 2235 | **BB 05/03/17** | **Sample 1** | 0.38 | 0.3% | Yes |
| | | | | **Sample 2** | 0.39 | 0.3% | Yes |
| | | | | **Sample 3** | 0.38 | 0.3% | Yes |
| 2 | 13/03/17 | 2236 | **BB 13/03/17** | **Sample 1** | 0.39 | 0.3% | Yes |
| | | | | **Sample 2** | 0.40 | 0.3% | Yes |
| | | | | **Sample 3** | 0.39 | 0.3% | Yes |
| 3 | 25/03/17 | 2237 | **BB 25/03/17** | **Sample 1** | 1.16 | 0.3% | No |
| | | | | **Sample 2** | 1.17 | 0.3% | No |
| | | | | **Sample 3** | 1.16 | 0.3% | No |



Have you achieved compliant results for three samples from three concurrent batches of your product (that is, nine tests in total)?
**Yes or no?** If no, you will need to repeat the validation process to determine the shelf life of your product.
* Your certificates of analysis must be attached to this record.

## Record 14: Alcohol strength in my brewed soft drinks for the duration of shelf life

**Use this record to validate your process. Validation must be repeated annually or if your process or formulation changes, and for new flavours**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Product name/flavour:** | | | | | **Which year are these results for?** | | |
| **Shelf life (in days):** | | | | | | | |
| **Test #** | **Date tested** | **Batch ID** | **Date marked on packaging (end of shelf life)** | **Result: Alcohol strength determined by a NATA accredited laboratory (%)*** | | **Tolerance of test (%)** | **Is the alcohol strength compliant at the end of shelf life? Yes or no?** |
| 1 | | | | **Sample 1** | | | |
| | | | | **Sample 2** | | | |
| | | | | **Sample 3** | | | |
| 2 | | | | **Sample 1** | | | |
| | | | | **Sample 2** | | | |
| | | | | **Sample 3** | | | |
| 3 | | | | **Sample 1** | | | |
| | | | | **Sample 2** | | | |
| | | | | **Sample 3** | | | |

Have you achieved compliant results for three samples from three concurrent batches of your product (that is, nine tests in total)?

**Yes or no?** If no, you will need to repeat the validation process to determine the shelf life of your product.

* Your certificates of analysis must be attached to this record.

# Record 15: How I measure the alcohol strength in my brewed soft drinks

Permissible methods to test the alcoholic* strength of your products, corrected to 20 ºC are:

- gas chromatography
- near infra-red spectrometry
- distillation followed by the gravimetric measurement of the distillate or by measurement in a density meter
- any other method that consistently produces a similar result by a documented testing process where you have compared your results to those from a laboratory accredited with the National Association of Testing Authorities. (If you produce less than 100,000 litres of brewed soft drink per year you may use a ebulliometer to measure alcohol strength, use **Record 16** to validate your process. This record must be repeated annually.)

The instruments and processes used to measure the alcoholic strength must be able to produce a result with a tolerance of plus or minus 0.3% points of the actual alcoholic strength.

*The term ‘alcohol’ is a reference to ethyl alcohol or ethanol.

| **Tick the method you use to test the alcohol strength of your product?** | |
|---|---|
| ☐ Gas chromatography | ☐ Near infra-red spectrometry |
| ☐ Distillation followed by the gravimetric measurement of the distillate | ☐ Ebulliometer: complete **Record 16** |
| ☐ Other: complete table below and attach certificates of analysis to this record | |
| **What is the tolerance of your measurement?** | |
| **If you use any other method, provide details here to document your testing process.** | |
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# Record 16: My ebulliometer accuracy checks for measuring alcohol strength in brewed soft drinks

If you produce less than 100,000 litres of brewed soft drink in a calendar year, it is permissible to use an ebulliometer and a formula to measure the alcoholic strength of your brewed soft drink, provided it is supported by the testing process set out below.

The steps to follow to test your ebulliometer accuracy are:

1. Write down your practice and any calculations and formulas you use here for calculating the alcohol strength of your product using a hydrometer and formula.
2. Provide certificates of analysis (COA) stating the alcohol strength of your products, including the variance, in three samples from three concurrent batches of your product (that is, nine tests in total). Certificates must be from a NATA accredited laboratory.
3. Compare your ebulliometer results to lab COAs of the same batch, to validate your testing procedure.
4. Validate your results annually.

| **Write down your practice and any calculations and formulas you use here for calculating the alcohol strength of your product using a ebulliometer and formula.** |
|---|
| |
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## Example of record 16: My ebulliometer accuracy checks for measuring alcohol strength in brewed soft drinks (example)

Use this record to validate testing method, repeat annually. Three samples from three concurrent batches of your product (that is, nine tests in total) must be tested.

| **Which year are these results for?** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Test #** | **Date** | **Product name and batch ID** | **Result A: Alcohol strength determined by ebulliometer and formula (%)** | | **Result B:** Alcohol strength determined by a NATA accredited laboratory (%)* | | **Variance:** Difference between result A & B | **Is the variance greater than 0.3%? Yes or no?** |
| 1 | 09/05/17 | Original 8952 | **Sample 1** | 0.45 | **Sample 1** | 0.47 | 0.02 | No |
| | | | **Sample 2** | 0.48 | **Sample 2** | 0.46 | 0.02 | No |
| | | | **Sample 3** | 0.47 | **Sample 3** | 0.45 | 0.02 | No |
| 2 | 15/05/17 | Ginger and lemon 8953 | **Sample 1** | 0.42 | **Sample 1** | 0.42 | 0 | No |
| | | | **Sample 2** | 0.43 | **Sample 2** | 0.44 | 0.01 | No |
| | | | **Sample 3** | 0.43 | **Sample 3** | 0.43 | 0 | No |
| 3 | 17/05/17 | Original 8954 | **Sample 1** | 0.4 | **Sample 1** | 0.86 | 0.43 | Yes |
| | | | **Sample 2** | 0.48 | **Sample 2** | 0.90 | 0.42 | Yes |
| | | | **Sample 3** | 0.43 | **Sample 3** | 0.87 | 0.44 | Yes |

Is the variance greater than 0.3% for any of the nine samples in this table?

**Yes or no?** If yes, you will need to repeat the validation process.

* Your certificates of analysis must be attached to this record.

## Record 16: My ebulliometer accuracy checks for measuring alcohol strength in brewed soft drinks

Use this record to validate testing method, repeat annually. Three samples from three concurrent batches of your product (that is, nine tests in total) must be tested

| **Which year are these results for?** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Test #** | **Date** | **Batch ID** | **Result A: Alcohol strength determined by ebulliometer and formula (%)** | | **Result B:** Alcohol strength determined by a NATA accredited laboratory (%)* | | **Variance:** Difference between result A & B | **Is the variance greater than 0.3%? Yes or no?** |
| 1 | | | **Sample 1** | | **Sample 1** | | | |
| | | | **Sample 2** | | **Sample 2** | | | |
| | | | **Sample 3** | | **Sample 3** | | | |
| 2 | | | **Sample 1** | | **Sample 1** | | | |
| | | | **Sample 2** | | **Sample 2** | | | |
| | | | **Sample 3** | | **Sample 3** | | | |
| 3 | | | **Sample 1** | | **Sample 1** | | | |
| | | | **Sample 2** | | **Sample 2** | | | |
| | | | **Sample 3** | | **Sample 3** | | | |

Is the variance greater than 0.3% for any of the nine samples in this table?

**Yes or no?** If yes, you will need to repeat the validation process.

* Your certificates of analysis must be attached to this record.

# Appendix 1: Calculating the correct amount of salt for fermented vegetables

## How to calculate the correct amount of salt for fermented vegetables

Fermented vegetables, such as sauerkraut or kimchi, need between 1% and 3.5% salt to provide adequate food safety during fermentation**.**

### To calculate what percentage salt you are currently dosing, use the following calculation:

Divide the amount of salt by the amount of vegetables and multiply it by 100.

$$\frac{\text{Amount of salt}}{\text{Amount of vegetables}} \times 100 = \text{percentage of salt}$$

Note: both vegetables and salt must use the same unit of measurement, such as grams.

For example, when making sauerkraut you are using 2 kg of cabbage and 40 g of salt.

$$\frac{40\text{g}}{2000\text{g}} \times 100 = 2\%$$

Therefore, your recipe uses 2% salt.

**To calculate a 2% salt dosage, for example, use the following calculation.**

If you do not know how much salt to use in your formulation, use the following calculation:

weight of vegetables X 2% = grams of salt required.

Note: both vegetables and salt must use the same unit of measurement, such as grams.

For example, if you are using 2 kg of cabbage your recipe should contain 20 g of salt.

# Appendix 2: Calculating dosage for starter culture pitching in brewed soft drinks

## How to calculate starter culture percentages for pitching

Only brewed soft drinks and fermented milks (not yoghurt), as defined by the Standard 2.6.2 and 2.5.3–2 of the Code, can use starter cultures kept from a previous batch (known as pitching or back slopping). The amount (or dosage) pitched must be greater than 10%.

Solvent – the component of a solution that is present in the greatest amount, the substance in which the solute is dissolved.

Solute – substance that is dissolved in another substance (a solvent), forming a solution. Usually the smallest component.

**To calculate what percentage you are currently dosing, use the following calculation:**

$$\frac{\text{solute}}{\text{solvent}} \times 100 = \text{dosage percentage}$$

**To calculate a 10% dosage, use the following calculation.**

solvent x 0.1 = solute

**For example:**

Using kombucha as an example, the solvent is the freshly brewed tea, and the solute is the small amount of starter culture used to start the fermentation. The solution is the mix of them both.

**To calculate your dosage percentage:**

The solute is 200 millilitres (mL) of starter culture to 2 litres (l) of the solvent which is the freshly brewed tea.

First you must convert both numbers to the same unit, in this case we will use mL. The solute is already in mL The solvent is 2 L, therefore is 2000mL.

$$\frac{200\ \text{mL}}{2000\ \text{mL}} \times 100 = 10\%$$

Therefore, your dosage rate is 10

**To calculate a 10% dosage:**

2000 mL x 0.1 = 200 mL

Therefore, the amount you need to use to obtain a 10% dosage is 200 mL.

# Appendix 3: A case study in labelling of allergens

A fermented vegetable manufacturer has begun developing a range of fermented vegetables. While they are developing and trialling their recipes, they know they need to take allergen management into account right from the start.

Once a recipe has been finalised, allergens are identified before accurate labelling can be completed. See table below for a recipe example detailing ingredients and their allergens.

Based on the information the company gathered from supplier specifications, labels and supplier questioning, and reviewing the requirements regarding the labelling of foods in the Code, the ingredient declaration for spiced sauerkraut was written as follows:

Cabbage (97%), salt, whey powder (contains milk), spices (contains wheat), starter culture (contains milk).

**Spiced sauerkraut recipe – what to check**

| Ingredient | Contains an allergenic product (Yes, no, maybe) | What to check |
|---|---|---|
| Cabbage | No | Check specification for presence of allergens. |
| Salt | No | Check specification for presence of allergens. |
| Starter culture | Maybe | Check specification for presence of allergens.<br>How is the starter culture grown? What it is grown on may need to be declared on the label.<br>Does the starter culture contain any bases, carriers, free-flowing agents (for example, maltodextrin, flour, oleoresins, emulsifiers). If yes, what are they derived from? For example, wheat, maize, soy or egg? |
| Whey powder | Yes, contains milk | Check specification for presence of allergens. |
| Pepper | Maybe | Check specification for presence of allergens (see supplier 1 below).<br>Do they contain any bases, carriers, free-flowing agents (for example, maltodextrin, flour, oleoresins, emulsifiers)? If yes, what are they derived from? For example, wheat, maize, soy or egg? |
| Cumin | Maybe | Check specification for presence of allergens (see supplier 1 below).<br>Do they contain any bases, carriers, free-flowing agents (for example, maltodextrin, flour, oleoresins, emulsifiers)? If yes, what are they derived from? For example, wheat, maize, soy or egg? |

| Ingredient | Contains an allergenic product (Yes, no, maybe) | What to check |
|---|---|---|
| Celery seeds | Maybe | Check specification for presence of allergens (see 'Supplier 1' example below).<br>Do they contain any bases, carriers, free-flowing agents (for example, maltodextrin, flour, oleoresins, emulsifiers)? If yes, what are they derived from? For example, wheat, maize, soy or egg? |

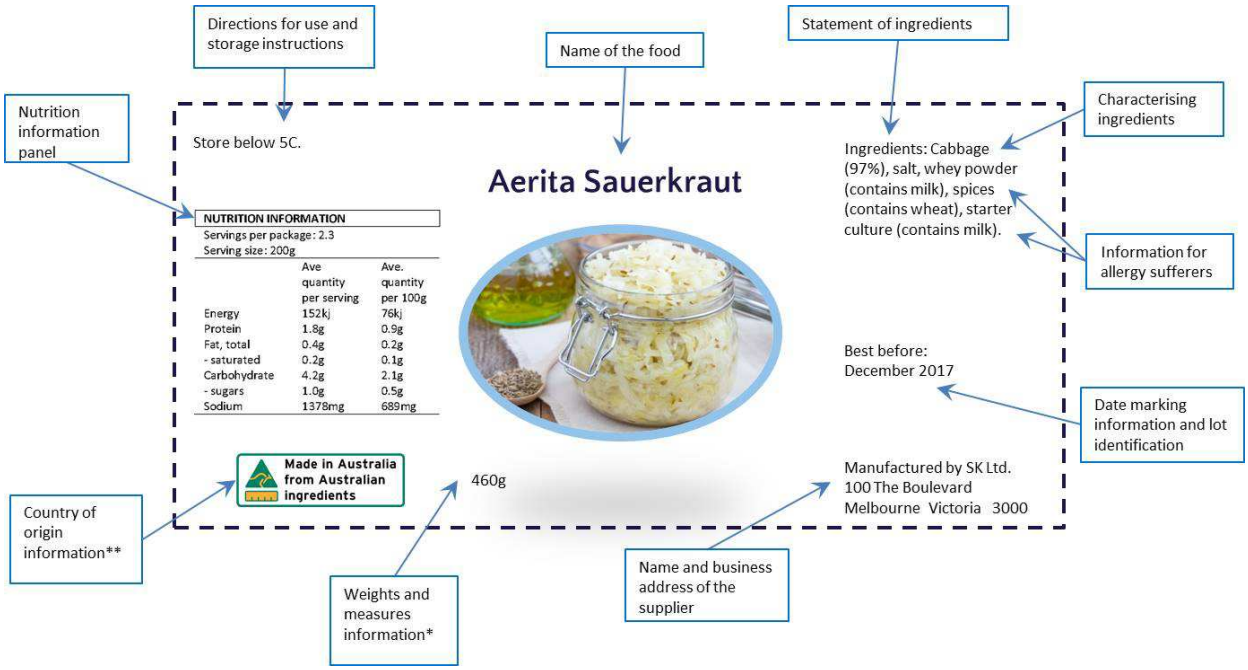
## Supplier 1: Raw materials – an example

A ground-spice producer advises that, due to growing, harvesting, storage and/or transportation conditions, cross-contact with wheat grains and pollen occurs, and there is high likelihood gluten will always be 'detectable' in the final ground spice. On occasion, gluten may be present at more than 20 mg/kg.

As the gluten protein is consistently present and with no way of controlling it, the supplier chooses to declare that it was an allergen present in the product.

Declaring it means that packaging the ground spice for direct sale requires a declaration that the product 'Contains wheat' and includes wheat in the ingredient list. Manufacturers using this ground spice as part of their product, even when present in small amounts, will also need to declare the presence of wheat.

**Figure 2: Sauerkraut label example**




* Labels must contain accurate weights and measures information. The National Measurement Institute are the national trade measurement regulator who ensure correct weight and measurement information is used on food labels, visit http://www.measurement.gov.au for more information.

** The Australian Competition and Consumer Commission ensure that correct country of origin information is used on labels, visit www.accc.gov.au/consumers/groceries/country-of-origin for more information.

# Appendix 4: Calibrating your pH meter

Many pH meters are calibrated accurately when you buy them. This accuracy can be lost if it gets bumped, dropped or is used over a long time. You need to make sure your pH meter is showing you the right pH of food. You may want to check this more often, but you must check each pH meter **every day you use it** and record the result. Your pH meter should be accurate to pH +/- 0.01. If you have more than one pH meter, name it, for example P1, P2, P3 and label it, and note which one was used when completing your records.

## How to check your pH meter

**Step 1** Place electrode into pH 4.0 standard buffer,* wait until the reading is stable and record the reading. An accurate meter will show a pH of between 3.99 and 4.01

**Step 2** Carefully rinse and dry the electrode, to ensure all pH 4.0 is removed

**Step 3** Place electrode into pH 7.0 standard buffer,* wait until the reading is stable and record the reading. An accurate meter will show a pH of between 6.99 and 7.01.

**Step 4** If the pH is greater or less than +/- 0.01, it may have a build-up present from food testing causing the inaccuracy. Remove the build-up from the probe and try again.

**Step 5** If the pH is still greater or less than +/- 0.01, the pH meter is inaccurate and needs to be replaced immediately.

*Standard buffers can be purchased from the same locations that sell pH meters. Buffers usually expire three months after they are opened. They must be disposed of once expired.

# Appendix 5: Glossary

| Term | Meaning |
|---|---|
| ABV | Alcohol by volume. |
| Acid food | Food that is below pH 4.6. |
| Acidic food | Food that is below pH 7.0. |
| (the) Act | See the Victorian *Food Act 1984.* |
| Alcohol | The term 'alcohol' is a reference to ethyl alcohol or ethanol. |
| Australia New Zealand *Food Standards Code* (the Code) | The collection of bi-national standards designed to promote national consistency in Australia's and New Zealand's food laws. It lists requirements for food businesses in relation to food safety practices, general requirements and food premises set up and equipment. It also outlines the requirements for foods such as additives, labelling and genetically modified foods. |
| Brewed soft drink | (a) The product is prepared by a fermentation process from water with sugar and one or more of:<br>(i) fruit extractives or infusions; or<br>(ii) vegetable extractives or infusions; and<br>(b) contains no more than 1.15% alcohol by volume.<br>Some examples of brewed soft drinks are ginger beer, kombucha, and kefir. |
| Certificates of analysis (COA) | Documented test results from an accredited laboratory. |
| Fermented milk | A food obtained by fermentation of milk or products derived from milk, where the fermentation involves the action of microorganisms and results in coagulation and a reduction in pH. |
| Fermented soft drink | See brewed soft drink. |
| Food safety program (FSP) | A documented program developed by a business that describes how it will manage food safety through the identification and control of hazards in the production, manufacturing and handling of food as described in the Hazard Analysis and Critical Control Point (HACCP) system. The program also specifies the records that the business maintains to demonstrate the implementation of the program and actions taken to keep food safe. |
| High acid food | Food that is below pH 3.7. |
| Kefir | A fermented milk, when made without dairy it is a brewed soft drink. |

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| Kombucha | A brewed soft drink. |
| Low acid food | Food that is above pH 4.6. |
| Pickles | Vegetables that have been acidified by lactic acid fermentation or the direct addition of vinegar. |
| Processing aid | See the Code ‘Standard 1.3.3 Processing aids’ for information on processing aids. |
| Sauerkraut | Cabbage that has been fermented by lactic acid bacteria. |
| Starter culture | A microbiological culture which initiates fermentation. |
| Victorian *Food Act 1984* (the Act) | The principal Act that controls the sale of food in Victoria. Under the Act, food business owners must ensure food sold to customers is safe and suitable to consume. |
| Yoghurt | A fermented milk where the fermentation has been carried out with lactic acid producing microorganisms. |