

# FOOD SAFETY GUIDELINES FOR THE PREPARATION OF RAW EGG PRODUCTS

## Contents

Introduction .....	3
Purpose and scope .....	4
Acknowledgements.....	5
Definitions .....	5
Receiving and storing eggs .....	7
Supplier and food information .....	7
Storage of whole eggs .....	7
Other foods.....	7
Processing eggs – practical steps to control <i>Salmonella</i> .....	8
Equipment and utensils.....	8
Personal hygiene .....	8
Handling of eggs .....	9
Preparation of acidified raw egg product .....	9
Preparation of non-acidified raw egg product .....	9
Temperature control.....	10
Storage and display .....	10
Premises .....	10
Appendix 1: Acidification of raw egg products.....	11
Steps for measuring pH .....	11
Different pH measuring methods .....	11
Raw egg product acidification check sheet.....	13
Appendix 2: Temperature calibration and measurement .....	14
Calibration procedures .....	14

## Introduction

*Salmonella* is the most common type of bacteria associated with foodborne illness outbreaks in Australia. Mishandling of eggs and egg-based products is a significant contributor to foodborne illness in Australia, and in NSW.

The pathogen *Salmonella* is known to be present on the surfaces of eggs and improper handling can lead to raw egg products becoming contaminated.

The raw egg products that are most commonly implicated in *Salmonella* food poisoning include:

- Sauces and spreads made with raw egg – e.g. mayonnaise, aioli, hollandaise, egg butter
- Desserts made without an effective cook step – e.g. tiramisu, mousse, fried ice cream
- Drinks containing raw egg – e.g. eggnog, egg flip, raw egg high protein smoothies

The purpose of these guidelines is to give businesses using raw egg products clear guidance and advice on how to meet food safety regulations.

All food businesses need to meet the requirements of the *Australia New Zealand Food Standards Code* (Food Standards Code) to ensure they follow safe handling practices.

In order to protect customers from the risk of foodborne illness, businesses need to comply with Standard 3.2.2, Division 3, Clause 7 (see below) to ensure that only safe and suitable food is processed.

### 7 Food processing

- (1) A food business must –
  - (a) take all practicable measures to process only safe and suitable food; and
  - (b) when processing food –
    - (i) take all necessary steps to prevent the likelihood of food being contaminated; and
    - (ii) where a process step is needed to reduce to safe levels any pathogens that may be present in the food – use a process step that is reasonably known to achieve the microbiological safety of the food.
- (2) A food business must, when processing potentially hazardous food that is not undergoing a pathogen control step, ensure that the time the food remains at temperatures that permit the growth of infectious or toxigenic microorganisms in the food is minimised

This is particularly important for food businesses such as restaurants, cafés, bakeries and caterers that prepare raw egg products.

Given there is a known risk in the preparation of raw egg products, the Food Authority has developed these guidelines to assist businesses to undertake practices that will ensure that they comply with the requirements. The following guidance is recommended:

1. Use safer alternatives to raw eggs in foods which are not cooked. Alternatives include commercially produced dressings and sauces, or pasteurised egg products.
2. If raw egg product is the only option, then all of the following controls must be in place:
  - a) Receipt – Reputable suppliers, good delivery and storage, no cracked or dirty eggs
  - b) Storage – Correct storage and display of ingredients and product, including proper temperature control
  - c) Processing – Correct handling such as good personal hygiene (including good hand washing practices and proper use of gloves if used), use of sanitised egg separator, proper temperature control
  - d) Premises – Clean premises, fixtures, fittings and equipment, compliant hand wash facility, sanitised equipment (including egg separator) and food contact surfaces

**AND**

- e) The product is to be acidified to a pH of 4.2 or lower – this can be achieved using vinegar or lemon juice
  - f) The raw egg product should be stored at or below 5°C for no longer than 24 hours and should be discarded at the end of the day. A fresh batch should be made daily.
3. If the raw egg product is not acidified, then:
    - a) a) to d) applies (see above)

**AND**

- b) The product is to be made to order and consumed immediately. If there is any storage of raw egg product then the acidification step to a pH of 4.2 or lower is required.

**Note:**

Under the Food Standards Code Division 3, Standard 3.2.2, temperature of products must be either at or below 5°C during transport, storage and display. The Food Standards Code allows for alternative compliance provided the businesses can demonstrate the product's safety (Clause 25, Standard 3.2.2).

The '4-hour / 2-hour rule' is used by Food Standards Australia New Zealand (FSANZ) as an example of an alternative method for compliance (see page 10). If a business uses the '4-hour / 2-hour rule', then a documented system must be in place to demonstrate evidence that it is being used effectively.

## Purpose and scope

This document aims to provide retail and food service businesses with information on the safe preparation of raw egg products. The document covers areas from receipt of eggs through to preparation of raw egg products. These areas can all potentially affect the safety of the product. It also includes an example of a monitoring system for use when acidifying raw egg product.

This document does not cover all requirements of the Food Standards Code, in particular requirements relating to premises and equipment. Businesses are urged to read the Food Standards Code and ensure they meet the requirements of the Code as it relates to their business.

## Acknowledgements

This document has been developed with assistance from NSW local council environmental health officers.

## Definitions

Term	Definition																				
Acidified product	Product with vinegar/lemon juice added to achieve a pH of 4.2 or less																				
Broken egg	An egg with a cracked shell and a broken shell membrane																				
Cleaning	The process of removing food and other types of soils from surfaces, equipment and utensils. Detergents are used to assist removal																				
Cracked egg	Eggs with a cracked shell (where a crack is visible by the naked eye or by candling) and with an unbroken shell membrane. Hairline cracks often escape visual detection and can worsen as eggs move through the supply chain																				
Dirty egg	Egg with shell contaminated with visible faeces, soil or other matter (e.g. yolk, albumen, feathers)																				
Pathogenic bacteria	Bacteria capable of causing food poisoning e.g. <i>Salmonella</i>																				
Potentially hazardous foods	Food that has to be kept at a certain temperature to minimise the growth of any pathogenic bacteria that may be present in the food or to prevent the formation of toxins in the food  (Food Standards Code 3.2.2, Division 1, Clause 1)																				
Pasteurised egg product	Processing egg product to the time and temperature combination as follows : <table border="1" data-bbox="391 1041 1382 1451"> <thead> <tr> <th>Column 1</th> <th>Column 2</th> <th>Column 3</th> <th>Column 4</th> </tr> </thead> <tbody> <tr> <td>Egg product</td> <td>Retention temperature to be no less than (°C)</td> <td>Retention time to be no less than (minutes)</td> <td>Maximum temperature to be immediately rapid cooled to (°C)</td> </tr> <tr> <td>Egg pulp (without any sugar or salt)</td> <td>64</td> <td>2.5</td> <td>≤ 7</td> </tr> <tr> <td>Liquid egg yolk</td> <td>60</td> <td>3.5</td> <td>≤ 7</td> </tr> <tr> <td>Liquid egg white</td> <td>55</td> <td>9.5</td> <td>≤ 7</td> </tr> </tbody> </table> (Food Standards Code 4.2.5, Division 3, Clause 21)	Column 1	Column 2	Column 3	Column 4	Egg product	Retention temperature to be no less than (°C)	Retention time to be no less than (minutes)	Maximum temperature to be immediately rapid cooled to (°C)	Egg pulp (without any sugar or salt)	64	2.5	≤ 7	Liquid egg yolk	60	3.5	≤ 7	Liquid egg white	55	9.5	≤ 7
Column 1	Column 2	Column 3	Column 4																		
Egg product	Retention temperature to be no less than (°C)	Retention time to be no less than (minutes)	Maximum temperature to be immediately rapid cooled to (°C)																		
Egg pulp (without any sugar or salt)	64	2.5	≤ 7																		
Liquid egg yolk	60	3.5	≤ 7																		
Liquid egg white	55	9.5	≤ 7																		
Raw egg products	Food that is prepared with raw egg and consumed without further processing (e.g. without cooking). Examples include: <ul style="list-style-type: none"> <li>• Sauces and spreads made with raw egg – e.g. mayonnaise, aioli, hollandaise, egg butter</li> <li>• Desserts made without an effective cook step – e.g. tiramisu, mousse, fried ice cream</li> <li>• Drinks containing raw egg – e.g. eggnog, egg flip, raw egg high protein smoothies</li> </ul>																				

Term	Definition
Ready-to-eat foods	<p>Food that is ordinarily consumed in the same state as that in which it is sold and does not include nuts in the shell and whole, raw fruits and vegetables that are intended for hulling, peeling or washing by the consumer.</p> <p><i>(Food Standards Code 3.2.2, Division 1, Clause 1)</i></p> <p>For retail businesses this would include cooked foods or other foods that have various dressing (e.g. raw egg mayonnaise)</p>
Sanitise	<p>To apply heat or chemicals, or heat and chemicals, or other processes, to a surface (e.g. food contact surfaces of equipment, eating and drinking utensils) so that the number of microorganisms on the surface is reduced to a level that:</p> <ol style="list-style-type: none"> <li>a. does not compromise the safety of the food with which it may come into contact</li> <li>b. does not permit the transmission of infectious disease</li> </ol> <p><i>(Food Standards Code 3.2.2, Division 5, Clause 20(2)(b))</i></p>
Shelf-stable foods	Foods which can be stored unrefrigerated without affecting their safety or quality.
Temperature control	<p>Means maintaining food at a temperature of:</p> <ol style="list-style-type: none"> <li>a. 5°C or below if this is necessary to minimise the growth of infectious or toxigenic microorganisms in the food so that the microbiological safety of the food will not be adversely affected for the time the food is at that temperature; or</li> <li>b. 60°C or above; or</li> <li>c. another temperature – if the food business demonstrates that maintenance of the food at this temperature for the period of time for which it will be so maintained, will not adversely affect the microbiological safety of the food.</li> </ol> <p><i>(Food Standards Code 3.2.2, Division 1, Clause 1)</i></p>

## Receiving and storing eggs

Maintaining food safety begins by ensuring only safe and suitable ingredients are purchased from a supplier and that these items are stored correctly. The following information is provided to assist meeting the requirements of the Food Standards Code regarding the receipt and storage of food.

### Supplier and food information

- A list of food suppliers should be maintained in case they need to be contacted.
- For all foods, the label or receipt needs to contain details of suppliers' names and addresses. Phone contact details should also be kept.
- Only accept eggs that are:
  - clean, and not cracked, broken or leaking and supplied in clean packaging.
  - correctly labelled (i.e. with name of the food, the supplier's name and address date marking).
- Ensure proper stock rotation to ensure that the oldest stock is used first (as long as they are within date).
- Items that do not meet these requirements should be returned to the supplier.

### Storage of whole eggs

- Store whole eggs (egg in shell) in a refrigerator or cool room.
- Avoid temperature fluctuations and only take out what is required for service.
- Don't store fresh egg pulp that has been collected (pooled) in a bowl.

### Other foods

Potentially hazardous foods and certain raw products will need to be stored under refrigeration at or below 5°C. This includes meat, chicken, seafood, dairy products and eggs.

- Only receive foods that are within their 'Use-by' date or 'Best Before' date.
- Only receive potentially hazardous food that has been transported under temperature control.
- Once received, all potentially hazardous foods must be placed under refrigerated storage at or below 5°C.
- Refrigerated raw ingredients must be stored separately from ready-to-eat foods and ingredients.
- Raw foods such as uncooked chicken and meat must not be placed above ready-to-eat foods in the refrigerator to prevent the raw juices from dripping onto them.
- Refrigerated unpackaged foods and ingredients must be covered during receipt and storage to protect against contamination.
- Store foods in accordance with the manufacturer's instructions.

## Processing eggs – practical steps to control *Salmonella*

Preparing foods can involve a great deal of handling of both raw and cooked foods. Because raw egg products are eaten without any further cooking it is important that they are prepared correctly and safely.

Raw foods can contain bacteria and, if not handled correctly, the numbers of bacteria can grow. Poor handling of cooked foods can result in cross-contamination from raw foods and if not stored correctly, the number of bacteria can grow.

Below are some main points to assist in proper preparation of foods, particularly raw egg products, and to help avoid cross-contamination.

### Equipment and utensils

- All equipment and utensils must be in good condition and able to be easily cleaned and sanitised.
- Food contact surfaces such as equipment, benches and utensils are to be clean and sanitised before use.
- Boards and utensils must be cleaned and sanitised between preparing different foods, especially when preparing foods that will not be further cooked (e.g. raw egg products).
- Use a sanitised egg separator to separate egg yolk from egg whites. Eggs must not be separated using their shells as the shells may contain traces of *Salmonella* on the surface.

### Personal hygiene

All persons preparing and handling food must ensure they follow good personal hygiene practices:

- People who are sick with vomiting, diarrhoea or fever must not prepare or serve food.
- Take all practicable measures to prevent unnecessary contact with ready-to-eat food.
- Wash hands prior to preparing food and after handling non-food articles, using the toilet, smoking, drinking, eating and touching hair, scalp or body.
- Wash hands between handling of raw ingredients and ready-to-eat foods.

### Use of disposable gloves

It is not mandatory for food handlers to use disposable gloves, although if used correctly they can assist with minimising contamination. When using disposable gloves they must be:

- Only used for one continuous task and then discarded.
- Regularly changed to avoid cross-contamination – this is especially the case when changing from preparing raw ingredients to handling ready-to-eat foods.
- Always discarded and not kept for later use once taken off.
- Removed and discarded before using the toilet, smoking, eating, drinking or touching the hair, scalp or body.



## Handling of eggs

Because eggs can harbour *Salmonella* on the surface, the handling of eggs is critical. When handling eggs, follow these guidelines:

- Do not use dirty or cracked eggs.
- Do not wash eggs. Washing makes them more susceptible to contamination. Discard dirty, broken and cracked eggs.
- Visually inspect eggs before use to ensure there are no hairline cracks.
- Use raw egg pulp immediately – i.e. do not pool or store raw egg batches.
- Use a sanitised egg separator.
- Regularly prepare fresh batches of raw egg mixture:
  - For acidified egg product: document pH and storage times, store for maximum of 24 hours at or below 5°C.
  - For non-acidified egg product: use immediately.
  - If any raw egg product is out of temperature control (i.e. not at or below 5°C), then storage times and temperatures must be documented to demonstrate evidence of compliance with the '4-hour / 2-hour rule' (see page 10).

## Preparation of acidified raw egg product

Correct preparation of acidified raw egg product (using vinegar or lemon juice) ensures the product is safe to use:

- Product acidified to a pH of less than 4.2 inhibits the growth of pathogenic bacteria, including *Salmonella*.
- Acidification should occur as part of the preparation step and should be checked to ensure proper acidification has occurred. An example worksheet is provided in Appendix 1 (see page 11).
- It is important that the pH is measured and recorded as evidence to show that all practicable measures are being taken to process safe and suitable food.
- Once acidified, the product must be covered when not being used.
- It is important that the product is kept at or below 5°C and that the '4-hour / 2-hour' rule is observed.
- Acidified product must be discarded at the end of the day and a new batch prepared daily. Product must not be stored for longer than 24 hours.

## Preparation of non-acidified raw egg product

- Non-acidified raw egg product should only be made if there is no alternative, such as using pasteurised egg.
- In this situation, stringent hygienic practices must be followed and product should be made to order for immediate consumption.
- Product should not be consumed after 4 hours of preparation and must not be stored for later use.

## Temperature control

- Temperature control throughout the operation is critical in minimising microbial growth, e.g. raw egg product must be at or below 5°C. This includes all operations during receipt, processing, storage and display.
- If the raw egg product is out of temperature control (i.e. not at or below 5°C), there must be documented evidence that the below '4-hour / 2-hour' rule is being met.

### 4-hour / 2-hour rule

Any ready-to-eat potentially hazardous food, if it has been at temperatures between 5°C and 60°C:

- For a total of less than 2 hours, must be refrigerated or used immediately,
- For a total of longer than 2 hours but less than 4 hours, must be used immediately, or
- For a total of 4 hours or longer, must be thrown out

(ANZFA, 2001, *Safe Food Australia – A Guide to the Food Safety Standards*,  
[www.foodstandards.gov.au/publications/pages/safefoodaustralia2nd519.aspx](http://www.foodstandards.gov.au/publications/pages/safefoodaustralia2nd519.aspx))

### Temperature measuring device

Businesses handling potentially hazardous foods must have a temperature measuring device. Thermometers must be easily accessible and able to accurately measure temperatures to +/- 1°C. Hence, thermometers should be calibrated to ensure accuracy. Appendix 2 provides information on calibrating thermometers.

## Storage and display

Product must be stored and displayed to prevent cross-contamination. This includes:

- prepare and store in the same container that will be used for service (to prevent extra handling and potential for cross-contamination)
- use date labels to ensure only fresh batches are used
- do not top up or mix batches
- for acidified raw egg products:
  - make fresh batches daily
  - store at or less than 5°C
  - discard at end of day and store no longer than 24 hours.
- for non-acidified raw egg products:
  - make to order
  - use immediately.

## Premises

The cleanliness of the premises, fixtures and fittings assist in minimising cross contamination. In particular the following is important:

- An acceptable hand washing facility that includes:
  - warm running water
  - soap
  - single-use hand towels, for example paper towels.

## Appendix 1: Acidification of raw egg products

At pH values of 4.2 or less, most pathogenic bacteria do not grow, divide into spores or produce toxins. A product with a pH of 4.2 or less could be used as a control measure for preventing the growth of *Salmonella*.

Therefore, acidification of raw egg product using vinegar to a pH of 4.2 or less will assist in stopping the growth of *Salmonella* bacteria.

The pH of the raw egg product must be checked to make sure it has reached the 4.2 pH limit.

Note: it may be possible to use lemon juice instead of vinegar, depending on the recipe. However, the pH must still be recorded.

### Steps for measuring pH

The pH of a raw egg product can be measured using a pH meter, pH strips or pH paper, as follows:

1. Once the raw egg product has been prepared, place a small sample ( $\frac{1}{4}$  cup) in a clean container.
2. Dip the pH paper/strip directly into the raw egg product and compare with the colour chart (for pH meters follow the manufacturer's instructions).
3. Record the pH on the *Raw egg product acidification check sheet* (see page 13).
4. If the pH is greater than 4.2, add more vinegar and mix, then take another pH reading.
5. Continue adding vinegar until pH is less than 4.2. If extra vinegar is needed, raw egg product recipes should be revised to account for the extra vinegar required.



Equipment needed for measuring pH values

### Different pH measuring methods

#### pH paper

- The pH paper should be able to read pH in 0.3 units, although it is difficult to distinguish less than 0.6 of a unit.
- Incorrect readings can occur from improper handling (contamination from hands).
- pH paper requires careful handling.

### pH strips

- The strips should read pH in units of 0.5, although it is difficult to distinguish less than whole units.
- pH strips are easy to use and do not require as careful handling as the pH paper.

### Hand held digital pH meter

- Meters read pH in 0.1 units with certainty.
- Some hand held pH meters also measure the sample's temperature and compensate the measurement for sample temperature.
- The meter requires calibration before use with at least a single buffer (buffer pH 4.0 is suitable for acidified raw egg product).
- The pH meter comes with instructions but may require some training of operators.



## Appendix 2: Temperature calibration and measurement

### Calibration procedures

Hand held thermometers should be calibrated monthly and results recorded on a checklist.

#### Ice Point (0°C)

1. Fill a small container with crushed ice.
2. Add a little water to the container to make an ice slurry.
3. Place the thermometer in the centre of the container so that the point of the probe is in contact with the ice.
4. Allow the temperature reading of the thermometer to reach a steady reading.
5. Record the reading and calculate the difference from 0°C.
6. Thermometers with a deviation of more than 1°C should be discarded.

#### Boiling Water Point (100°C)

1. Fill a small container with boiling water.
2. Immediately place the thermometer in the centre of the container so that the point of the probe is in the centre.
3. Allow the temperature reading of the thermometer to reach a steady reading.
4. Record the reading and calculate the difference from 100°C.
5. Thermometers with a deviation of more than 1°C should be discarded.