

Code of Practice
For the
Manufacture of
Egg Products

Australian Egg Corporation Limited

Acknowledgements

This voluntary Code of Practice has been prepared, after extensive consultation with the egg industry, by a Working Party. The Working Party comprised of representatives from the egg industry, the Victorian Department of Human Services, the Victorian Department of Natural Resources and Environment and the University of Melbourne.

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2. Introduction

There have been a number of outbreaks of infectious diseases associated with the consumption of eggs. These have highlighted the need to develop Codes of Practice: one Code focussing on shell egg production and another Code on the production of egg products. Egg products in liquid, frozen and dried forms are used as ingredients in many food products. This Code of Practice (“the Code”) provides guidance on the hygienic manufacture, storage, packaging and distribution of egg products intended for human consumption and sets the minimum standards of hygiene. It is expected that these standards shall be met.

The Code aims to prevent contamination and deterioration in the quality of egg products and has been designed to cover all different types of egg product manufacturing. The Code is a flexible document and recognises the difficulties some manufacturers may have in hygiene control.

The Code also reflects and supports existing Commonwealth, State and Territory food safety related legislation. Because the legislation reflects minimum standards, where it is considered appropriate and in the public interest, this Code proposes higher standards. AECL expects members to abide by this Code.

A Working Party consisting of representatives from industry, Victorian Department of Human Services (DHS), the Victorian Department of Natural Resources and Environment (NR & E) and the University of Melbourne have created the Code. It uses a Hazard Analysis Critical Control Point (HACCP) approach, which is also referred to as a “Food Safety Program”, to ensure that a hygienic chain is maintained from the receipt of raw materials through to the final consumer.

A HACCP system is a cost effective technique used by businesses to ensure product safety. In this instance, the egg production process is broken down into steps. Hazards are then identified in each step. A hazard is something that could affect the product in a way that may cause harm to the consumer and consequently affect the success of the business.

For each hazard an appropriate control measure is listed and those which are deemed to be vital to the production of a safe product are identified as critical control or safety points. (Examples of these safety points are indicated in the flow diagram in **Appendix 1**). The system must then be monitored to ensure that it is operating effectively.

Although most poultry diseases do not affect humans, to ensure the manufacture of a safe product, it is expected that egg product manufacturers will only obtain good quality eggs from farms which comply with the **Code of Practice for Shell Egg Production, Grading, Packing and Distribution**. It is expected that manufacturers will ensure that instructions for the safe storage and handling of egg products are passed on to their retailer/caterer customers and to the final consumer.

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3. General

3.1 Review Procedure

The Code will be reviewed from time to time in the light of new knowledge, changing industry practice and changing health standards. The code is viewed as a living document, which will be updated to reflect the latest scientific and field based developments. The review process will also recognise any new requirements of the **Food Standards Code, 1987** in relation to egg products. Input is encouraged from industry to ensure this Code retains its relevance. Updates will be endorsed at General Meetings of the Australian Egg Corporation Limited.

3.2 Coding System

On the bottom right hand side of each page is a box showing the following: -

- COD Number. The first three digits of the COD Number relate to the module of the Code. Module numbers are shown on the right hand of the page of the index and relate to the headings in the Code. The last two modules refer to the version number of the particular page. Therefore, the number "02" after the dash means that this is the second version of this particular page;
- Issue Date. This refers to the date on which the latest version of this particular page was printed and distributed;
- Page. This refers to a page number in the module (the number before the word "of") and the number of pages in the module (the number after the word "of").

Therefore, the coding system will be an indication of the nature, manner and outcome of any review of the code.

3.3 Complying With the Code

The Code is a voluntary Code of Practice which will help egg product manufacturers to comply with the general provisions of the food act and/or regulations and other relevant State/Territory legislation. It is expected that all egg product manufacturers will comply with this code. Egg product manufacturers shall develop their own program for the implementation of the Code so that practices not already carried out are implemented within the following time periods: -

- By 1 July 2007 for structural requirements;
- By 1 July 1999 for other requirements.

Help is available on all aspects of the Code from industry representatives or suitably qualified professionals.

3.3 Courses

Courses to assist with compliance with the Code are available for egg product manufacturers. Ongoing inhouse training shall also be carried out on a regular basis. Below is a list of contact points for relevant courses.

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For information about the following courses: -

- Hygiene for egg producers;
- General food hygiene;
- Hazard Analysis Critical Control Points (HACCP).

contact: -

1. Local Council Environmental Health Department
2. Local TAFE College
3. State/Territory departments of Health/Human Services
4. State/Territory departments of Agriculture/Primary Industries
5. Major Egg Organisations
6. Australian Egg Corporation Limited

3.4 Legislation

Legislation covering eggs and egg products is found under the general provisions of the food act and/or regulations operating in the States and Territories and the **Food Standards Code, 1987** (with amendments).

The **Food Standards Code 1987** (with amendments) currently states that cracked eggs shall not be sold for human consumption unless they are to be further processed by pasteurisation in accordance with Section E1, clauses (2), (3) and (4). (See **Appendix 3**).

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4. Food Safety Hazards

A hazard is anything that could cause harm to the consumer. Hazards can be biological (for example, *Salmonella*), physical (for example, glass particles), or chemical (for example, cleaning chemicals).

4.1 Biological

Biological hazards are the main hazards, which can affect eggs and egg products. This document therefore concentrates mainly on reducing biological hazards during and after the manufacturing of egg products.

4.1(a) *Salmonella*

Salmonella is the main pathogenic bacterium associated with eggs. The illness caused by this bacterium (salmonellosis) can affect anyone. However, it is more commonly reported in children under five years of age. The symptoms are often more severe in the elderly, the very young and people with other medical conditions.

Symptoms: *The most common symptoms are diarrhoea, fever, stomach cramps, nausea, vomiting and headache. In extreme cases the illness can result in death.*

4.1(b) Sources of *Salmonella*

The primary sources of *Salmonella* are the intestinal tracts of animals and birds. Animals may become infected from the consumption of contaminated feed or water or contact with infected animals.

4.1(c) Contamination of Eggs

Pathogenic bacteria such as Salmonella may contaminate eggs either by: -

- Movement of bacteria through the shell. This is particularly so when the shell is soiled or damaged; or
- Infection of the egg during its development in the hen. Strains of a type of *Salmonella* (*Salmonella* Enteritidis) can affect the reproductive tissue in hens with the result that eggs may already be contaminated at the time of laying. This type of *Salmonella* has caused many food poisoning outbreaks overseas, but it is not endemic in Australia.

4.1(d) Contamination of Egg Products

Raw Egg Products can be contaminated by: -

- *Salmonella* being present inside intact eggs which are broken out. A batch of product can be adulterated by the addition of one contaminated egg;
- Pathogenic bacteria present on the outside of the shell may gain entry into egg pulp during the breaking out process;
- Unhygienic methods of breaking eggs such as by crushing the whole egg increases the bacterial loading of egg pulp including the number of pathogens.

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Pasteurised egg product can be contaminated because of: -

- An incorrect pasteurisation process;
- The pasteurisation process being insufficient due to the large bacterial loading of the raw egg pulp. High bacterial loads arise because raw egg pulp is not stored in refrigerated conditions;
- Cross contamination from raw pulp to pasteurised pulp. Cross contamination could occur via staff, equipment, utensils, etc.

4.1(e) Outbreaks of *Salmonella* Food Poisoning Associated with Eggs

Outbreaks have been traced to: -

- Use of raw eggs, for example in mayonnaise, egg nogs or gelati;
- Eggs only undergoing a mild cooking process, for example, in hollandaise sauce or soft boiled eggs;
- Cross contamination, for example, in bakeries where uncooked product (such as imitation cream) have been prepared using utensils used for uncooked egg mix;
- Unhygienic methods of production of shell eggs.

4.2 Physical

Egg pulp can become contaminated with foreign bodies (such as glass, metal, rodent droppings, hair, insect larvae, wood splinters and rust) during production. Foreign body hazards may occur at several stages in the production of egg products.

4.3 Chemical

Cleaning chemicals and pest control chemicals/baits are toxic and can have harmful effects if consumed. They can also 'taint' the flavour of food.

Chemical contamination can often arise from cleaning substances. They can get into food in many ways including the following: -

- Harmful chemicals stored with food ingredients;
- Chemicals in unmarked bottles;
- Chemicals in food containers;
- Spillages on work surfaces;
- Chemical residues left on surfaces after cleaning.

Chemicals used shall *be* stored in areas away from any food, food equipment or ingredient stores. Manufacturer's instructions regarding handling and storage are to be followed.

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5. *Personnel Hygiene Requirements*

5.1 Staff

High standards of personal hygiene practices in egg product premises to minimise the entry of pathogenic organisms must be employed in the plant to prevent the transfer of bacteria from areas handling raw product to areas handling post pasteurised product.

- All food handling staff (including relief and casual staff) shall be trained in hygienic practices. This requires staff to recognise the need to maintain the standards of hygiene as set out in this Code;
- Each egg product premises shall provide its own operations manual for use by staff. It shall contain working instructions and a check list of routine hygiene tasks;
- Adequate handwashing and toilet facilities shall be provided and their appropriate use encouraged;
- Staff shall wash their hands upon commencing work, after using the toilet, before eating and regularly throughout the day;
- Full washable protective clothing, hats and washable footwear shall be worn, changed and laundered regularly. Staff shall have different protective clothing for the raw and post-pasteurisation areas;
- It is very important that egg product is not contaminated after processing with foreign objects, chemicals or pathogenic organisms. Contamination can occur via people, equipment and utensils. Ensure that staff that work in the raw product area do not work in the post pasteurisation areas unless they have washed exposed areas, including hands and changed into clean, protective clothing, including footwear;
- No eating or drinking shall take place in the egg processing area;
- All food handlers must be made aware of the conditions under which they must not work if they have symptoms or illnesses which may compromise safe egg product manufacturing, product handling, product testing and storage. Under State/Territory food legislation, the proprietor of a food premises has the responsibility to ensure staff handling unpackaged food are not suffering from an illness which could render food either unfit for human consumption or adulterated. **Appendix 2** lists all illnesses and exclusion periods for diseases which food handlers shall not work with food.

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5.2 Visitors

Visitors can introduce pathogenic bacteria into egg product premises. The proprietor or manager shall ensure that visitors carry out strict hygiene precautions.

- Visitors shall be kept to an absolute minimum and must be subject to the same degree of hygiene control as the staff. Washable or disposable overalls, or lab coats, as well as hats and boots shall be provided by the premises for visitors and washed or disposed of after use.

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6. *Egg Product Premises*

6.1 **Layout**

Buildings shall be designed so that there is a logical workflow from the raw material to the post pasteurisation areas to reduce the risk of cross contamination.

There shall be separate areas or rooms for the following processes: -

- Storage of eggs and unprocessed raw egg product;
- Breaking of eggs;
- Processing of eggs;
- Storage of processed egg product;
- Storage of additives;
- Storage of cleaning and sanitising products.

Separation of the raw and pasteurised areas must be via physical barriers, such as a partition or plastic interlocking strips. It is recommended that foot baths containing sanitisers (100-200ppm bleach solution) be provided at the entrances to the pasteurisation and post pasteurisation areas. It is important that sanitisers in foot baths are renewed daily.

6.2 **Construction**

Buildings shall be constructed so that they can be kept clean to prevent the build up of microorganisms and the harbourage of pests.

New plant and equipment shall be constructed from smooth impervious materials that can be easily cleaned. Adequate hand washing facilities with non-hand operable taps and hot and cold running potable water must be present.

6.3 **Pest Control of Buildings**

It is important that rodents, insects and birds are controlled because they can all transfer bacteria to egg products.

- Premises must be pest proofed;
- Vegetation around buildings, including in or around ditches, shall be kept under control to discourage pests;
- Baits must not be positioned or stored where they could expose eggs, egg products or water to risk of contamination;
- A pest control program shall be put in place and a log book kept of records of inspections and treatment. It may be necessary to employ a pest control operator to monitor the premises;
- Suitable protective clothing shall be worn when handling pest control chemicals;
- Domestic animals shall not be permitted on the premises.

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6.4 Cleaning and Sanitising Buildings and Equipment

Cleaning removes matter conducive to the growth of microorganisms and removes materials that would provide food or harbourage for pests. Sanitising is the process of destroying pathogenic microorganisms. Effective cleaning and sanitising will minimise the risk of egg and egg products becoming contaminated with pathogenic organisms.

- Cleaning and sanitising of the plant and equipment shall be carried out in accordance with **Australian Standards 4709-2001 “Cleaning and Sanitising of Plant and Equipment in the Egg Handling and Processing Industry”**;
- The cleaning program must ensure that cleaning and sanitising occurs in all parts of the pipe line system. Care must be taken to ensure that a build-up of residue does not occur in the pipes or tanks. Equipment shall be periodically dismantled for cleaning;
- A cleaning schedule shall be drawn up for all egg product premises. This shall describe cleaning tasks, frequency, sanitisers to be used and include a recording system. The recording system, which shall include the name and signature of the person responsible for this task, shall ensure that the schedules are being adhered to;
- Cleaning of the entire plant shall be carried out daily, either at the completion of the production batch or at the end of the working day;
- Instruments and equipment may need to be cleaned several times during the working day;
- Swabs for bacteriological analysis shall be taken on a regular basis to monitor the efficacy of the cleaning process;
- Sanitisers shall be stored in labelled bottles away from any areas where eggs and egg products are stored.

6.5 Waste Disposal

Waste products must be disposed of in a hygienic, environmentally responsible manner so that eggs and egg products for human consumption are protected from contamination.

- All waste material must be removed frequently from processing rooms and removed from the premises daily;
- Rejected eggs and egg products shall be disposed of on an appropriate tipping site by burial;
- Rejected eggs and egg products shall not be used as animal feed unless they are further heat treated to eliminate pathogens;
- Sanitisers must be disposed of in accordance with Environmental Protection Agency guidelines.

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7. Eggs

To reduce the risk of egg product being contaminated with *Salmonella*, eggs of a predetermined quality shall be purchased. All egg product manufacturers shall endeavour to ensure that the premises from which they purchase eggs are complying with the **Code of Practice for Shell Egg Production, Grading, Packing and Distribution**. It is recommended that written assurance be sought on the quality of eggs being purchased.

- For the manufacture of pasteurised egg, cracked eggs can be used (**Food Standards Code, 1987**, Standard E1, (1), (c), (i), (e)). (**Appendix 3**).

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8. *The Process*

8.1 Use of Egg Product

Pasteurisation involves heating food at a relatively low temperature for a short time to destroy all vegetative cells of pathogens and a considerable proportion of spoilage organisms. Toxins and spores will usually survive the pasteurisation process. The main objective in pasteurising liquid egg is to destroy pathogenic organisms, in particular *Salmonella*. Pasteurised egg product can be used in the manufacture of uncooked as well as cooked foods.

Unpasteurised egg product shall not be sold or used.

8.2 Storage and Transport of Eggs and Raw Pulp to Processing Plant

Shell eggs and egg pulp must be transported to the processing plant in such a way that prevents contamination and growth of any microorganisms that may be present in the eggs.

8.2(a) Shell Eggs

- Eggs shall be transported to the egg processing plant in a vehicle that holds the eggs at a temperature not exceeding 15 °C (+/- 3) and within a system that avoids temperature fluctuations;
- On receipt at the premises the eggs shall be placed in a cool room operating at below 15 °C (+/- 3 °C);
- Eggs held below 15 °C (+/- 3 °C) throughout the production/distribution chain shall be processed within seven working days from date of lay;
- Eggs that have been held at 8 °C or below throughout the production/distribution chain shall be processed within a maximum of eight weeks from date of lay;
- Shell damaged eggs shall be kept below 8 °C and be broken out within four days from date of lay.

8.2(b) Raw Egg Pulp

- Chilled liquid egg product brought in from another site shall be transported in a vehicle that can hold the pulp at a temperature of less than 5 °C and then stored at the processing plant at a temperature of less than 5 °C. The pulp shall be heat treated within 48 hours of breaking the eggs;
- Frozen liquid egg brought in from another site shall be transported in a vehicle that can hold the frozen pulp at a temperature of -18 °C or below and then stored at -18 °C or below at the processing plant.

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8.3 Inspection and Sorting of Eggs

It is important that shell eggs of a predetermined quality are used for processing so that a quality product is produced. Cracked eggs can be used for pulp to be pasteurised. However, cracked eggs must not be used if unpasteurised egg pulp is being produced. Only top quality eggs shall be used in that instance.

- Eggs shall be candled prior to processing to remove rejected eggs. Eggs which have not been candled can be used, providing rejected eggs can be effectively sorted and removed on the egg breaking equipment;
- Eggs with the shell membrane broken and heavily leaking shall be discarded and not used in any egg product;
- Cracked eggs with the shell and/or membrane ruptured but not leaking can be added to pulp that is to be pasteurised, but must not be used for unpasteurised egg pulp. Eggs pulled from a carcass, or rejected eggs shall not be used;
- Incubated clear eggs shall not be used for human consumption. These eggs are likely to contain high numbers of bacteria.

8.4 Cleaning/Washing of Eggs

It is important that the cleaning or washing process is carried out correctly so bacteria that could be present on the outside of the shells or chemicals from the sanitiser do not gain entry into the eggs. Washing removes the bloom from the egg shell making it easier for bacteria to get inside the egg through the pores. The risk of bacteria getting into unwashed dry-cleaned eggs is significantly reduced.

- Dirty eggs need to be cleaned before being broken out and this shall be carried out in an area that is separate from the breaking room or any other room where exposed egg contents are being handled.

8.4(a) Dry Cleaning Eggs

If eggs are not washed, dirty eggs can be cleaned using a dry abrasive method. A clean, dry, sanitised cloth or other suitable material can also be used.

The equipment used to clean eggs that are not washed must be sanitised or disposed of on a daily basis.

8.4(b) Egg Washing

Water used for washing eggs shall be free from pathogenic microorganisms or toxic chemicals;

The washing process shall be mechanised and continuous. Eggs shall not be allowed to stand or soak in the wash water. The machine must be cleaned and sanitised after use.

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Washing Procedure

Machine Type	Washing	Sanitising	Rinsing
Single Stage		Water temperature 41-44°C. Use a sanitiser such as a chlorine based sanitiser specifically for use on eggs. Eggs air dried/mechanically dried.	
Two Stage		Water temperature 41-44°C. Use a sanitiser such as a chlorine based sanitiser specifically for use on eggs.	Pathogen free water 2-3°C higher than sanitising water. Eggs air dried/mechanically dried.
Three Stage	Water temperature 41-44°C. Egg detergent.	Water temperature 3-4°C higher than wash water. Use a sanitiser such as a chlorine based sanitiser specifically for use on eggs.	Pathogen free water 2-3°C higher than sanitising water. Eggs air dried/mechanically dried.

Appendix 4 provides an example of temperatures used for a three stage shell egg washing and sanitising process.

8.4(c) Detergents/Sanitisers

Detergents and sanitisers must be suitable for use for egg washing and used in accordance with any instructions issued by the manufacturer.

The Australian Standards 4709-2001 “Cleaning and Sanitising of Plant and Equipment in the Egg Handling and Processing Industry”, outline the properties of suitable sanitisers and detergents for use in the egg industry. For more information refer to the Australian Standard.

8.5 Egg Pulping Process

It is important that this is done so that the bacterial loading of the pulp is kept to a minimum. Equipment specifically designed for the particular egg product being prepared shall be used because the process for egg breaking and separating is so specialised. The specialised equipment pass eggs through a candling inspection and washer (if required) before breaking them and pumping the pulp through filters or clarifiers.

8.5(a) Egg Breaking and Separating

- Rejected eggs must be identified and removed from the processing line and be placed in a washable container labelled for this purpose;
- Eggs shall be dry when broke to prevent bacterial contamination of liquid egg from water droplets on the shell.

8.5(b) Centrifuging

Use

- The use of a centrifuge or any process involving crushing the whole egg to obtain egg pulp or white from empty shells shall only be done for product which will be pasteurised as bacteria on the outside of the shell, including *Salmonella*, can get into the pulp.

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The conditions outlined below need to be met for centrifuging for pasteurised pulp because this process greatly increases the bacterial loading of the egg.

Products

- Centrifuges shall only be used for the production of pasteurised frozen whole egg and whole egg powder where microbiological results can be obtained prior to dispatch and sale;
- Centrifuges can be used to produce frozen unpasteurised whole egg, providing this product is sent for pasteurisation.

Raw Materials

- Only graded eggs shall be processed, including undersize, oversize, misshapen, cracked and rough shelled eggs;
- Shell damaged eggs shall be refrigerated at less than 8°C, inspected before use and processed within four days of grading. Shell membrane damaged eggs shall be discarded;
- Dirty, stained eggs shall not be used.

Equipment

- The centrifuge shall continuously discharge the shell so that there is no build up or accumulation of shell in the machine;
- The equipment shall be dismantled for cleaning;
- The equipment shall be cleaned and sanitised after use;
- The equipment shall be regularly swabbed to verify hygienic cleaning practices are being used.

8.5(c) Frozen Pulp from Another Plant

- Frozen raw egg pulp shall be thawed prior to pasteurisation through a block chipper and into a steam/water jacketed stainless steel vat, which does not operate at higher than 60°C. The thawing process shall be completed within two hours and egg pasteurised within a further two hours.

8.6 Storage of Egg Pulp before Processing

Egg pulp to be pasteurised must be stored in such a way that prevents the growth of microorganisms and prevents contamination of any pasteurised egg product.

- The product shall undergo heat treatment as soon as possible after breaking the eggs. If treatment is not carried out immediately, liquid egg product shall be stored under hygienic conditions at a temperature of less than 5°C for no longer than 24 hours after breaking the eggs.
- Egg products that are to be desugared, and then spray dried, may be held for 24 hours at less than 5°C prior to pasteurisation;

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- Raw egg pulp shall be stored in a separate area to pasteurised egg product to prevent the risk of cross contamination or product identification difficulties.

8.7 Pasteurisation

The objective in pasteurising raw egg is to destroy pathogenic organisms, especially salmonellae, without affecting the physical and functional properties of the raw egg. The correct time and temperature must be used to ensure the product is pasteurised. Once a product has been pasteurised, it is important to protect it from any risk of contamination.

8.7(a) Liquid Egg

- Equipment specifically manufactured for pasteurising egg product shall be used;
- Liquid egg product is pasteurised by holding it for the specified time and temperature as detailed below (**Food Standards Code, 1987**, Part E1) (**Appendix 3**):

Liquid Egg Product	Minimum Temperature to be retained at (°C)	Minimum Time to be Retained for (Minutes)	Maximum Temperature to be cooled to (°C)	Other Requirements
(i) Liquid egg or mixture of liquid yolk and liquid white	64°C	2.5 minutes	< 5°C	
(ii) Liquid yolk	60°C	3.5 minutes	< 5°C	
(iii) Liquid white	55°C	9.5 minutes	< 5°C	
(iv) Egg white mix	55°C	9.5 minutes	< 5°C	Made from liquid egg white which has been pasteurised in accordance with (iii)
(v) Sugared/salted yolk	62°C	3.5 minutes	< 5°C	

- The equipment shall have: -
 - Attachments as may be necessary to ensure a constant flow rate of egg pulp;
 - Thermostatic control of the heating of the egg pulp;
 - The automatic diversion of flow of any whole egg not heated adequately;
 - Thermographs to record temperatures over time.

8.7(b) Dried Egg Products

- Dried egg products shall, where possible, be pasteurised prior to drying;
- To destroy all pathogens, dried egg white products processed from unpasteurised liquid egg white shall be subjected to a suitable heat treatment process, (such as hot room process), preferably in its final packaging. The product shall be held for at least 15 days in a room at a temperature of at least 60°C.

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8.7(c) Additives

- Where required, salt or sugar shall be added prior to pasteurisation. Salt and sugar shall be sieved prior to adding;
- Additives must be free from any contaminants.

8.8 Storage After Pasteurisation

Pasteurised egg product must be stored in such a way that prevents contamination and growth of microorganisms.

- Pasteurised product must be stored separately from raw product to prevent any risk of cross contamination;
- Storage temperatures shall be achieved as quickly as possible after processing. Blast chillers and freezers are recommended to achieve desired storage temperatures;
- All refrigerators, cool rooms and freezers shall be fitted with thermometers. Temperatures shall be recorded twice daily. It is recommended that automatic temperature recording devices are installed;
- Products to be frozen shall be blast frozen. Products shall be frozen within twenty-four hours. Storage shall be at -18°C, or below;
- Liquid egg products shall be stored at less than 5°C;
- Dried egg products shall be stored in a cool dry store.

8.9 Packing

Packing must be carried out in such a way that prevents the contamination of the final product.

- Egg product shall be packed in either cleaned and sanitised returnable containers, or new containers or bags;
- Empty containers shall be stored in a clean, dry and pest proof area. They shall be visually inspected immediately prior to filling to ensure that they are clean;
- Egg product shall be filled into containers in a closed line system. Large vats shall be filled by means of a pipe inserted through a lid. When similar containers such as bags are filled, it is important that the operator does not contaminate the product with his/her hands;
- Filled containers shall be sealed immediately and then taken to the appropriate area (cool room, freezer or dry store) for storage.

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8.10 Dispatch

Egg products need to be transported to prevent the risk of contamination or the growth of microorganisms.

- The vehicles and containers for this transport of egg product shall be designed and equipped so that the product temperatures are maintained during the transportation of the product (below 5°C for liquid egg and -18°C for frozen product);
- Tankers and mobile containers shall be cleaned, rinsed and then sanitised as soon as practicable after emptying and recleaned and sanitised before being refilled;
- Pipes, connections and valves used for the filling and discharge of the liquid egg shall be of a suitable design and shall be adequately cleaned and sanitised after use and before reuse.

8.11 Marking of Egg Products

Egg products shall be marked so that customers are adequately informed of the storage requirements for the product and so that the product can be readily identified and traced in the event of a recall.

- Every consignment of egg products leaving a processing establishment shall bear a label. The storage temperature, batch number, best before date and name and address of the manufacturer shall be clearly labelled on the product packaging;
- Egg product which is UNPASTEURISED must be clearly labelled as such. It is recommended that the label also states that product is only to be used in foods which will be cooked.

Disposal of Waste

8.12(a) Rejected Eggs/Egg Pulp

Rejected eggs and egg pulp must be disposed of in a hygienic manner so that eggs and egg products for human consumption are protected from risk of contamination.

- All waste material must be removed frequently from processing rooms and removed from the premises daily;
- Rejected eggs and egg products shall be disposed of at an appropriate tipping site by burial;
- Rejected eggs and egg products shall not be used as animal feed unless they are further heat treated to eliminate any pathogens.

8.12(b) Sanitisers

- Sanitisers must be disposed of in accordance with State/Territory environmental protection guidelines.

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8.13 Advice to Customers

Correct storage of egg products by customers is important to ensure the maintenance of high safety and quality standards.

- **Appendix 5** outlines information about the safe storage, use and handling of egg products to be provided by egg product manufacturers to customers, either directly or indirectly through the distributor.

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9. *Quality Assurance*

9.1 **Food Safety Program**

A Food Safety Program is a system, which identifies, evaluates and controls hazards that are significant for food safety. A Food Safety Program helps prevent safety problems by careful planning and is an essential component in running a successful food business.

- As outlined at the beginning of the Code, all egg product manufacturers shall have as part of their quality assurance program a comprehensive Food Safety Program based on a HACCP system in place at their premises. **Appendix 1** details all the steps required to devise a food safety program.

9.2 **Hygiene Policy**

Satisfactory standards of hygiene will not be achieved without the commitment of all involved. Quality control policies need to be established at the egg product premises so that standards are set and all persons involved are aware of them.

All producers of egg product shall have a hygiene policy. The hygiene policy shall detail the following aspects: -

Staff

- The importance and significance of good personal hygiene;
- Staff training, including planned training and ongoing training;
- The maintenance of a staff sickness record and procedures, and exclusion periods for certain illnesses.

Premises

- Periodic internal and operational audits of premises and equipment;
- Details of cleaning and disinfection procedures which shall include chemicals to be used and a cleaning schedule;
- Pest control, including a reporting and surveillance system.

Process

- Monitoring of raw supplies, including a raw materials specification;
- Prevention of contamination of product;
- Maintenance of temperature records during storage, processing and distribution;
- Procedures to be followed in the event of equipment breakdown;
- Waste disposal procedures.

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Quality Assurance

- Bacteriological and chemical monitoring;
- Maintenance of records for the results of each test and process carried out;
- Procedures for dealing with a food recall, food poisoning or food complaint;

The hygiene policy *shall* be given to each member of staff so that every employee is fully aware of the standards expected.

9.3 Sampling

Microbiological and chemical testing are useful indicators of the effectiveness of a Food Safety Program and Hygiene Policy.

9.3(a) Microbiological and Chemical Standards Outlined in E1 of the Food Standards Code, 1987

(i) Chemical Standard

Pasteurised liquid egg or a mixture of liquid yolk and white must satisfy the prescribed chemical test, which measures whether the product has been adequately pasteurised.

(ii) Microbiological Standard

Liquid egg, liquid egg yolk, liquid egg white and mixtures of liquid yolk and liquid white, must satisfy the prescribed microbiological standard, whether the final product is pasteurised or unpasteurised.

When examined by the prescribed methods they must: -

- Have a standard plate count not exceeding 10,000 microorganisms per gram of the food in three samples, with no sample exceeding 50,000 microorganisms per sample; and
- Be free from *Salmonella* in 25g of the food.

9.3(b) Sampling Procedures for Egg Products

The **AS 1918-1976 "Methods for Sampling Egg and Egg Products"** must be adhered to.

- 50-100gm samples to be taken for chemical analysis (for pasteurised product);
- 100gm samples to be taken for bacteriological analysis (for pasteurised, raw and unpasteurised product). Ensure each sample is taken aseptically;
- Obtain samples for temperature control in addition to samples taken for analysis.

9.3(c) Sampling Regime for Manufacturers

It is important that manufacturers of egg products have their own sampling regime.

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- It is recommended that product is sampled on a regular basis, both bacteriologically and chemically, to verify whether the food safety program is operating correctly;
- Records shall be kept of all test results at the premises;
- A *Salmonella* clearance shall be given for egg product to be used in the manufacture of high risk foods that will not be further cooked (for example, gelati, mayonnaise), or for catering to vulnerable groups, such as infants, and elderly and debilitated people, before leaving the pasteurisation plant. This can be achieved by using a validated rapid *Salmonella* testing kit which can give results in approximately 48 hours (as compared to testing by the Australian Standard test which takes about five days);
- It is a legal requirement under State/Territory infectious diseases legislation that all isolations of *Salmonella* species, *Campylobacter jejuni*, and *Listeria monocytogenes* in food for human consumption be notified to the responsible authorities. Notification must occur as soon as is practicable by telephone or other rapid transmission. This is to be followed by notice in writing within seven days by the person in charge of the laboratory. The source of the contamination must be investigated. The product, (unless it is raw egg pulp prior to pasteurisation), must be either reprocessed or disposed of under local council supervision;
- Ensure that persons sampling egg product for bacteriological analysis are fully trained for the purpose. A person working in the raw area shall take the raw sample and a person from the post-pasteurisation area shall take finished product samples. This will help to eliminate the chance of cross-contamination of the sample;
- In larger plants that have a microbiologist on site, it is recommended that he/she take all the samples.

9.3(d) Shelf Life of Liquid Egg Products

Raw product will have a high bacterial loading if poor quality eggs (such as a large number of cracked eggs) are being used for the raw material and centrifuging is being carried out to obtain egg pulp. The pasteurisation process may not be sufficient to kill all of the spoilage organisms.

To minimise the risk of a high bacterial loading, only graded eggs should be processed. However, shell damaged eggs can be used provided they are refrigerated at less than -8°C. Shell membrane damaged eggs and dirty, stained eggs must not be used as raw material in centrifuges. For further details on centrifuging, please refer to Section 8.5(b) of this Code.

All producers of egg product shall carry out microbiological tests to verify the shelf life of their chilled and frozen products. Each product must be labelled with “best before” information that complies with the **Food Standards Code, 1987**.

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9.4 Food Recall

If it is revealed that an egg product on the market poses a safety hazard to consumers, the product will need to be recalled. In the event of this occurring, the Australia New Zealand Food Authority or the responsible State/Territory government agency must be contacted without delay. All egg product manufacturers shall have a food recall protocol. The Australia New Zealand Food Authority document ***Food Recall Protocol, 1997***, can give guidance on preparing such a protocol.

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Appendix 1: Food Safety Program

A *Food Safety Program* is a system, which identifies, controls and monitors potential hazards to food safety. This system is also referred to as HACCP or *Hazard Analysis Critical Control Point*.

This approach reduces the reliance on end product testing. Food Safety Programs are designed to ensure/maximise the safety of food by identifying and controlling food safety risks during production, thereby preventing unsafe egg products entering the market place.

A logical step by step approach is required to look at the operation from start to finish, from the selection of eggs for processing to the final egg product sold to the customer. It may be advantageous to employ an independent consultant to help in the development of a Food Safety Program.

Steps In Preparing A Food Safety Program

Step 1: Tasks

Identify the tasks required to operate an egg product manufacturing premises. Use a team of people with backgrounds in egg production and egg products manufacturing to help with this list. Use the person experienced within a certain process to describe the steps involved.

List the steps in order and construct a flow chart. (See example).

Step 2: Potential Hazards

Identify potential hazards. A hazard is anything that may cause harm to the consumer. The Code has identified the majority of hazards that can affect the egg product production process. However, the hazards identified are by no means exhaustive and there may be other hazards that specifically affects operations.

A hazard may be: -

- Presence or growth of harmful bacteria, for example, *Salmonella*;
- Chemical contamination, for example, pesticides, bleach;
- Foreign material, for example, glass, metal.

Identify the steps where potential contamination can occur.

Step 3: Safety Points

Decide the Safety Points. These are the points during the production process at which the identified hazard can be controlled. SP's may be referred to in other HACCP documents referred to as Critical Control Points.

The following are examples of safety points: -

Example 1. Ensuring correct pasteurisation takes place.

Example 2. The prevention of cross contamination during packing.

Example 3. The prevention of the multiplication of bacteria during storage.

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The attached flow chart shows examples of the safety points for a Food Safety Program for pasteurised egg product.

Step 4: Safety Limits

A Safety Limit is a criterion that separates acceptability from unacceptability. Safety Limits are necessary to reduce risks to a safe level or remove them completely. Safety Limits need to be set at each safety point that have been identified in Step 3, which are then monitored whenever necessary. "Safety Limits" may also be referred to in other HACCP documents as "Critical Limits".

Safety Limits for the examples above are as follows: -

Example 1. Ensure that egg pulp is pasteurised for the correct length of time at the correct temperature. The safety limit would be the minimum required temperature and holding time for pasteurisation.

Example 2. Ensure that staff, equipment, utensils, etc are totally separate in the raw and post pasteurisation areas, that staff carries out good personal hygiene practices and effective cleaning procedures are in place. The safety limit would be no Salmonella bacteria in the product.

Example 3. Egg products shall be stored at a constant safe temperature. The safety limit would be a temperature of less than 5°C for chilled product.

Step 5: Safety Checks

Safety points must be checked and recorded.

Checking and recording for the examples above are as follows: -

Example 1. Check with the thermograph and temperature gauge that the correct pasteurisation safety limits are being met. Record the time and temperature of the pasteurisation process in a log book for each batch of product produced.

Example 2. Take samples for microbiological analysis of each batch of product produced and regular swabs of surfaces and equipment, etc. Record all results in a log book.

Example 3: Take the temperature of the cool room at least once daily and record temperatures in a log book.

Step 6: Corrective Action

Corrective action must be taken if the Safety Limits at each safety point are not being met.

Corrective action for the examples above is as follows:

Example 1: If the pasteurisation safety limits are not met then the product must be repasteurised.

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Example 2: If the final product contains Salmonella bacteria then the product must be discarded or reprocessed. If Salmonella bacteria are isolated from swabs then the production of any further product must cease until a thorough clean up and disinfection of the entire area has been carried out.

Example 3. If the temperature rises above the specified temperature then the temperature of the cool room shall be adjusted. If product has been stored at this temperature for a length of time that may have compromised it's quality or safety, then the product may need to be rejected or sent for further processing.

Work Sheets

Develop working instructions for the safety points and safety checks for staff to refer to. These shall be simple and clear.

All staff shall be trained in the Food Safety Program that has been developed. Staff members shall be given individual responsibilities.

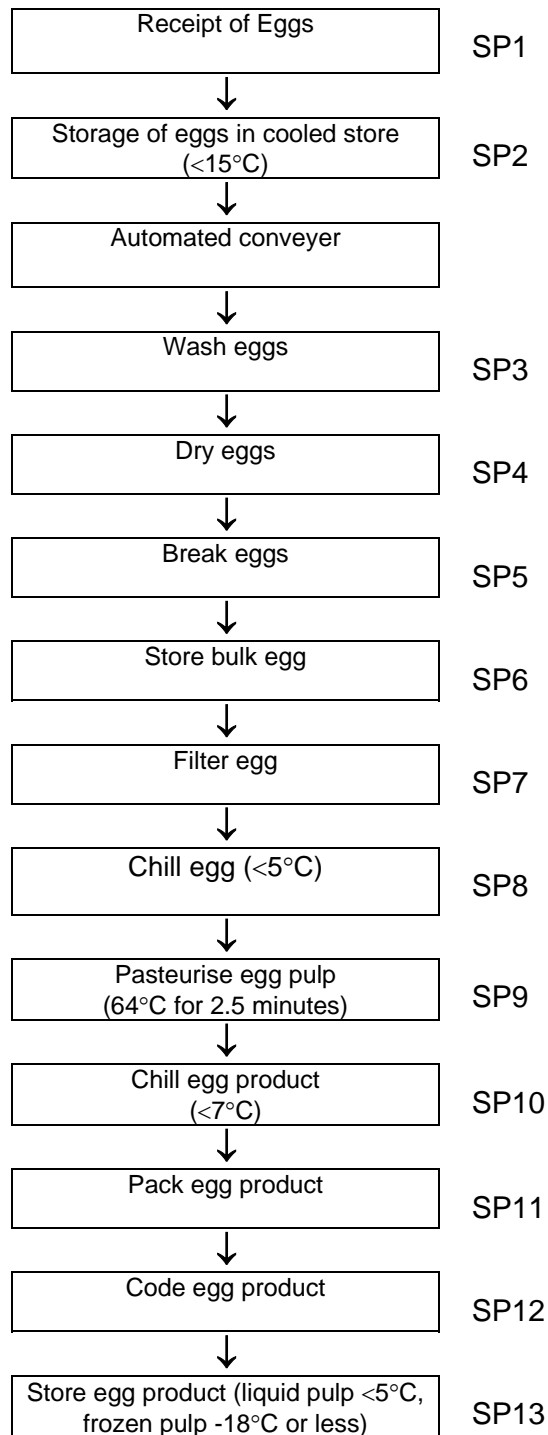
Instructions must cover what to do if a safety limit is not achieved. Examples of corrective action include rejection of product and pasteurisation. The work sheet outline in this attachment will assist in the development of instructions relevant to the operation.

Step 7: Monitoring the System

Once a Food Safety Program is running it requires monitoring to ensure objectives are being met. Microbiological tests shall be carried out regularly to ensure that the program is operating effectively. The Program shall be a flexible working document that will require ongoing review and evaluation. An independent auditor shall audit the Food Safety Program. An example of a flow chart at an egg product manufacturing premises identifying safety points is attached.

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Example of a Flow Diagram for a Food Safety Program for Pasteurised Egg Product, Showing Safety Points



SP = Critical Control Point or Safety Point

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Example of a Safety Point Work Sheet

Number	Safety Points	Safety Checks	Safety Limits	Action to Take if Safety Limits are not met

Appendix 2: Guidelines for Exclusion of Food Handlers from Handling Unpackaged Food

Disease/Organism	Period of Exclusion for Case
Typhoid and Paratyphoid	<p>Exclude from food handling until three consecutive negative specimens of faeces have been obtained. Specimens shall be taken each week for three weeks. If the urine was positive on initial diagnosis or the person has a history of urinary tract disease, urine samples shall be collected in addition to faeces.</p> <p>A person who is a typhoid carrier (i.e. any person who continues to excrete <i>Salmonella typhi</i> organisms for 90 days or longer) must not engage in the preparation, manufacturing or handling of food for consumption by others. (See State/Territory health infectious diseases legislation for further information).</p>
Cholera, VTEC and <i>Shigella dysenteriae</i>	Exclude until 3 consecutive faecal specimens taken at least 24 hours apart are found to be negative.
Hepatitis A and E	Exclude from food handling until one week after the onset of jaundice. Any person with acute hepatitis must be excluded from work until the laboratory tests have revealed the condition not be to Hepatitis A or E.
<i>Taenia solium</i> (pork tapeworm infection)	Exclude until treated.
Tuberculosis	Exclude under rendered non-infectious.
Gastroenteritis (acute Diarrhoea and/or vomiting)	Any person with gastroenteritis must be excluded from food handling.
Gastroenteritis caused by the following organisms: a) <i>Campylobacter</i> <i>Salmonella</i> <i>Staphylococcus aureus</i> <i>Clostridium perfringens</i> <i>Bacillus cereus</i> <i>Yersinia</i> Cryptosporidium <i>Entamoeba histolytica</i> (Amoebiasis) <i>Giardia lamblia</i> Rotavirus <i>Shigella</i> (other than <i>Shigella dysenteriae</i>) <i>Vibrio parahaemolyticus</i>	Exclude until symptoms have ceased and counsel on returning to work regarding good personal hygiene.

Appendix 2: Guidelines for Exclusion of Food Handlers from Handling Unpackaged Food

(continued)

Disease/Organism	Period of Exclusion for Case
Other bacterial Gastroenteritis	Exclude until symptoms have ceased and counsel on returning to work regarding good personal hygiene.
b) Norwalk or Norwalk like virus and other viral gastroenteritis.	Exclude until 48 hours after symptoms have ceased.
Boils, abscesses and other purulent lesions of hands, face or nose.	Exclude unless lesion is covered with a waterproof dressing.

Appendix 3: Standard E1

From Food Standards Code, 1987 (With Amendments – October 1993) Australia and New Zealand Food Authority (previously National Food Authority)

Part E: Eggs, Liquid Eggs and Liquid Egg Products

- (1) (a) Save where, in this Code, the contrary intention appears –
- (i) ‘egg’ means the egg of any avian species ordinarily consumed by humans;
 - (ii) ‘liquid egg’ means whole egg removed from the shell. The term includes such a product that is frozen or chilled but does not include reconstituted dried egg;
 - (iii) ‘liquid yolk’ means the yolk of egg separated as efficiently as is practicable from the white thereof;
 - (iv) ‘liquid white’ means the white of egg separated as efficiently as is practicable from the yolk thereof;
 - (v) ‘egg white mix’ means a mixture of liquid white with some or all of the components specified in paragraph (c).
- (b) for the purposes of this Code, liquid white and dried liquid white may contain triethyl citrate in proportion not exceeding 1.25g/kg;
- (c) egg white mix may contain –
- (i) not more than –
 - (A) 5g/kg in total of the modifying agents specified in Group I set out in Standard A10;
 - (B) 20g/kg in total of the modifying agents specified in Group II set out in Standard A10;
 - (C) 10g/kg in total of the modifying agents specified in Group III set out in Standard A10;
 - (ii) modifying agents specified in Group VI set out in Standard A10;
 - (iii) gelatine;

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-
- (d) deleted
 - (e) Any whole egg the shell of which has been cracked, must not be sold unless sold specifically for processing which involves or includes one of the methods of pasteurisation by heat treatment specified in clauses (2), (3) and (4).
- (2) Liquid egg or a mixture of liquid yolk and liquid white shall not be sold or used in the manufacture of food unless it has been pasteurised by being retained at a temperature not lower than 64°C for at least 2.5 minutes and immediately rapidly cooled to a temperature not greater than 7°C.
- (3) Liquid yolk shall not be sold or used in the manufacture of food unless it has been pasteurised by being retained at a temperature not lower than 60°C for at least 3.5 minutes and immediately rapidly cooled to a temperature not greater than 7°C.
- (4) (a) subject to clause (5), liquid white must not be sold or used in the manufacture of food unless it has been pasteurised by being retained at a temperature not lower than 55°C for at least 9.5 minutes and immediately rapidly cooled to a temperature not greater than 7°C;
- (b) subject to clause (5), egg white mix must not be sold or used in the manufacture of food unless it has been –
- (i) pasteurised by being retained at a temperature not lower than 55°C for at least 9.5 minutes and immediately rapidly cooled to a temperature not greater than 7°C; or
 - (ii) made from liquid white which has been pasteurised in accordance with sub-clause (a);
- (5) (a) Clauses (2), (3) and (4) do not apply to a non-retail sale of liquid egg products where –
- (i) the respective liquid egg products are made entirely from eggs in the shells of which –
 - (A) are substantially free from stain, dirt and other foreign matter; and
 - (B) have not been cracked prior to preparation; and
 - (ii) the label on or attached to the package of the liquid egg product includes the statement, in type of 6mm –

‘WARNING: UNPASTEURISED’

immediately preceding or following the prescribed name of the product.

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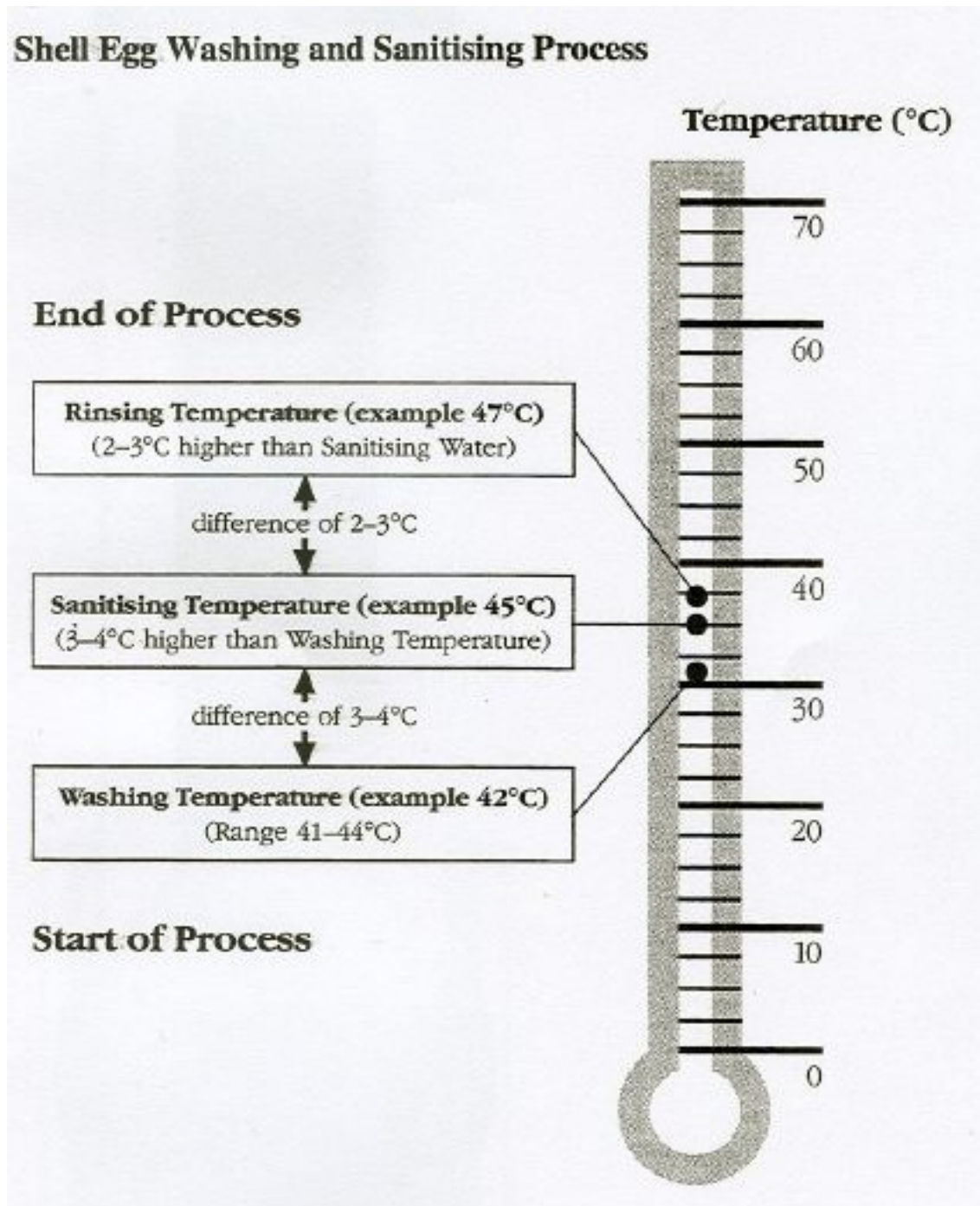
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- (b) Clauses (2), (3) and (4) do not apply to liquid egg products used in the preparation of another food where the respective liquid egg products –
- (i) are made entirely from eggs the shells of which –
- (A) are substantially free from stain, dirt and other foreign matter; and
- (B) have not been cracked prior to preparation; and
- (ii) either –
- (A) are for use without delay in a food which is itself for immediate consumption; or
- (B) are used in a food which itself is pasteurised or which otherwise undergoes a treatment equivalent to pasteurisation.
- (6) Pasteurised liquid egg or a mixture of liquid yolk and liquid white or a mixture of liquid yolk and egg white mix, when tested as described in Section 11 of AS 1383 – 1974, Methods for the Chemical Examination of Eggs and Egg Products, must yield after Step 11.7.4(c) a solution of blue-violet colour which measures greater than 3 of a standard Lovibond Comparator Disc 4/26 or equivalent, or which results in an absorbance at 585 nm greater than 0.15 when measured using a spectrophotometer.
- (7) Microbiological Standard
Liquid egg, liquid yolk, liquid white, egg white mix, mixtures of liquid yolk and liquid white and mixtures of liquid yolk and egg white mix when examined by the methods prescribed by clause (8) of this Standard shall –
- (a) have a standard plate count not exceeding 10,000 micro-organisms per gram of the food;
- (b) be free from *Salmonella* in 25 g of the food.
- (8) Methods of Microbiological Analysis
The methods set out in this clause are the prescribed methods with respect to the microbiological examination of eggs and egg products;
- (a) Standard plate count.
Proceed in accordance with the current Australian standard methods in AS1766. Methods for the Microbiological Examination of Food, save that for the purpose of this method when 5 sample units each consisting of 100g or more of the food are examined as detailed the result shall be reported as ‘not exceeding 10,000 micro-organisms per gram of the food’ when at least 4 of the 5 sample units have a standard plate count not exceeding 10,000 micro-organisms per gram and any remaining sample unit has a standard plate count not exceeding 50,000 micro-organisms per gram;

(b) *Salmonella*

Proceed in accordance with the current Australian standard method in AS1766. Methods for the Microbiological Examination for Food, save that for the purpose of this method when 5 sample units each consisting of 100g or more of the food are examined as detailed the result shall be reported as "*Salmonella* not detected in 25g of the food" only when no *Salmonella* has been detected in 25g of each of the 5 sample units. For the purposes of this method, the sample units may be examined individually, or pooled.

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Appendix 4: Example of Temperatures Used for a Three Stage Shell Egg Washing and Sanitising Process



Appendix 5: Storage and Handling Guidelines for Customers of Egg Products

- Customers should ensure that egg products are delivered to their premises at the correct temperatures, i.e. less than 5°C for liquid egg product and -18°C or below for frozen product.
- It is recommended that raw egg or egg product are not used in foods which will not be cooked. In this instance pasteurised egg product should be used.
- If large volumes of eggs are required, pasteurised egg should be used to minimise the risk of contamination and cross contamination.
- Damaged packaging should be inspected upon receipt. Any damaged packages of egg product should be returned to the manufacturer or distributor.
- Liquid egg and reconstituted egg mixes are highly vulnerable to contamination and should be handled with care. Unused liquid egg or egg mix should be stored at less than 5°C and used within the 'best before' date.
- Food hygiene training for staff should include the correct use and storage of eggs and egg products and measures to be taken to avoid cross contamination.
- Liquid egg should be stored at a temperature of less than 5°C and frozen egg product at a temperature of -18°C or less. Dried egg product should be stored in a moisture free area.

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Appendix 6: Glossary

<i>Bacteria</i>	Single celled microorganisms which cannot be seen with the naked eye. Some bacteria can cause disease.
<i>Batch Turn Around</i>	Flock replacement.
<i>Blood Spots or Meat Spots</i>	Occasionally found in an egg. They are caused by the rupture of a blood vessel during formation of the egg.
<i>Bloom</i>	The coating or covering on the egg shell that seals its pores, helps prevent bacteria from getting into the shell and reduces moisture loss from the egg. When eggs are washed for cleanliness purposes the process removes the bloom.
<i>Buffer</i>	A suitable distance between two areas to prevent the risk of contamination.
<i>Candling</i>	The step in grading that lets the egg grader look inside the egg without breaking it to assess its quality.
<i>Cleaning</i>	Removing contaminating matter, foreign odour or visible residue from a previous operation or process of any contaminating matter of a human or animal origin that would provide food or harbourage for undesirable pests or bacterial growth.
<i>Contamination</i>	The occurrence of any objectionable matter in the product.
<i>Cracked Egg</i>	An egg in which the shell and/or membrane is ruptured.
<i>Cross Contamination</i>	The contamination of an item by another.
<i>Culled</i>	A bird that has been selected from a flock and killed.
<i>Deep Litter System</i>	A system in which birds are confined in a building with access to an area of litter material such as earth, wood shavings, straw, rice hulls, shredded paper, etc.

Egg(s)	Refers to hen's eggs intended for human consumption.
Food Poisoning	An acute illness of sudden onset caused by the recent consumption of contaminated or poisonous food.
Food Safety Program	A system, which identifies, evaluates and controls hazards that are significant for food safety.
Grading	Eggs classified according to interior and exterior quality and size.
Hazard	A biological, chemical or physical agent or factor with the potential to cause an adverse health effect.
Hazard Analysis	The procedure used to identify potential hazards and to estimate the severity of the hazard and the likelihood that it will occur.
Header Tank	Storage tank for feed or water sited above a process area.
Hopper	Inverted pyramid or cone through which grain passes.
Hygiene	All measures necessary to ensure the safety and wholesomeness of food at all stages of the food chain (including preparation, processing, packaging, storing, handling, transportation and offering for sale or supply to the consumer).
Microorganism	Single celled organism that cannot be seen with the naked eye and include bacteria, viruses, fungi, etc.
Mobile Shedding	Sheds for the hens used in a free range system that are moved periodically to different locations so that the manure is spread over the land.
Non-Cage Birds	Birds reared in barns or free range (without being in cages).
Pathogen	Disease producing organism.
Pathogenic	Dangerous, harm causing.
Pest	An unwanted insect or small animal that damages food supplies and can spread disease, such as rats, mice, flies, cockroaches and wild birds.

<i>pH</i>	An index used as a measure of acidity or alkalinity. pH can be measured using pH paper.
<i>Rejected Eggs</i>	These include eggs that are cracked, broken, dirty, that have been in an incubator or have been extracted from a carcass, or have a defect such as black rot.
<i>Risk</i>	The assessment of the probability of an adverse hazard or event occurring and the impact of that occurrence in a food.
<i>Safety Point (or Critical Control Point)</i>	A step in a food operation at which control can be applied to prevent or eliminate a food safety hazard or reduce it to an acceptable level.
<i>Safety Limit (or Critical Limit)</i>	A criterion which separates acceptability from unacceptability.
<i>Sanitiser</i>	A substance that is capable of reducing the numbers of viable microorganisms to a level satisfactory for product quality and public health, without adversely affecting the food.
<i>Sanitising</i>	The process of destroying pathogenic microorganisms. (Sanitising is not sterilising).
<i>Silo</i>	Pit or tower for the storage of hen feed.
<i>Vaccine</i>	A preparation of killed or weakened (attenuated) microorganisms which, when inoculated into the body, will stimulate it to produce antibodies to protect against the disease caused by those microorganisms.
<i>Virus</i>	Microscopic pathogen that multiplies in the living cell of the host.