



Processed Meats Code of Practice

Part 1: Overview

Prelims

Amendment 0

February 2010

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Disclaimer

IMPORTANT DISCLAIMER

Every effort has been made to ensure the information in this report is accurate.

NZFSA does not accept any responsibility or liability whatsoever for any error of fact, omission, interpretation or opinion that may be present, however it may have occurred.

Website

A copy of this document can be found at: <http://www.nzfsa.govt.nz/animalproducts/index.htm>

Review of Code of Practice

This Code of Practice will be reviewed, as necessary, by the New Zealand Food Safety Authority. Suggestions for alterations, deletions or additions to this code of practice, should be sent, together with reasons for the change, any relevant data and contact details of the person making the suggestion, to:

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New Zealand Food Safety Authority

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Amendment Record

It is important that this publication is kept up-to-date by the prompt incorporation of amendments.

To update this publication when you receive an amendment, remove the appropriate outdated pages, destroy them, and replace them with the pages from the new issue. Complete instructions will be given on the covering letter accompanying the amendment. File the covering letter at the back of the publication and sign off and date this page.

If you have any queries, please ask your local verifier.

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1 Introduction

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1.1 Purpose and Scope

This Code of Practice (COP) has been developed by the New Zealand Food Safety Authority (NZFSA) and the Pork Processors Association. It has been developed to assist meat processors comply with the requirements of the Food Act 1981 and the Animal Products Act 1999 (APA), and produce processed meats from mammals, ostriches and emus that are safe and suitable for their intended purpose. It provides guidance on Good Manufacturing Practice (GMP), process control, and the application of Hazard Analysis and Critical Control Point (HACCP) principles for the production of processed meats, including smallgoods.

Processed meat, as defined in the Food Standards Code, means a meat product containing no less than 300 g/kg meat, where meat either singly or in combination with other ingredients or additives, has undergone a method of processing other than boning, slicing, dicing, mincing or freezing, and includes manufactured meat and cured and/or dried meat flesh in whole cuts or pieces.

Examples of processed meat products covered by this COP are:

- fresh sausages
- cooked comminuted meat products (e.g. luncheon, bologna, cooked sausages)
- uncooked comminuted fermented meat products (UCFM) (e.g. salami, pepperoni)
- cooked cured meat products (e.g. ham, corned beef, pastrami)
- cooked uncured meat products (e.g. roast beef)
- bacon
- dry-cured meat products (e.g. prosciutto)
- dried meat products (e.g. jerky, biltong)
- meat patties.

1.2 Contents

This COP is divided into four parts.

Part 1: Overview

Part 1 gives an overview of the COP and the requirements of the Food Act and the APA. It also provides web links to other relevant documents published by NZFSA.

Part 2: GMP – Hygiene and Sanitation, and Quality Assurance

Part 2 provides guidance on requirements and procedures for hygiene and sanitation, quality assurance, and other Food Safety Programme (FSP) and Risk Management Programme (RMP) requirements.

Part 3: GMP – Process Control

Part 3 provides guidance on processing requirements and controls for the main process steps involved in the production of processed meats.

Part 4: HACCP Application

Part 4 shows how the principles of Hazard Analysis and Critical Control Point (HACCP) can be applied to the production of processed meats. HACCP models for various types of products are also provided.

1.3 Exclusions

This COP does not cover the following product categories:

- chilled or frozen raw meat, including those which have been boned, cut, sliced, diced, or minced
- canned meat products
- prepared meat meals; and
- meat preparations (breaded or battered meats; marinated meats).

This COP has been developed based on New Zealand requirements only and does not include overseas market access requirements. Exporters must ensure that they meet the requirements for an RMP and any overseas market access requirements relevant to their product and intended market.

2 Requirements of the Food Act 1981 and the Animal Products Act 1999

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2.1 Legal Requirement for Food Businesses

Businesses involved in the production of processed meat products, including smallgoods, must operate under one of the following regimes:

- an approved FSP under Section 8G of the Food Act 1981
- a registered RMP under the Animal Products Act 1999; or
- the Food Hygiene Regulations 1974 and local authority (Council) registration.

Processors may choose to operate under the Food Hygiene Regulations, or obtain an exemption from the regulation by operating an FSP approved by the NZFSA. However, those that require an official assurance from the NZFSA in order to export any processed meat product must operate under the Animal Products Act and have a registered RMP.

FSPs and RMPs are documented programmes designed to identify and manage hazards and suitability factors, during a product's processing and sale, in order to ensure that the resulting product is safe and suitable for its intended purpose. The programmes are "legally binding" so they must be developed and implemented in accordance with relevant New Zealand legislation.

The major supermarkets in New Zealand require their suppliers to have an approved FSP or RMP, thus, most medium to large scale meat processors have an FSP or RMP. This COP has been written mainly for FSP and RMP operators, however, the guidance provided on GMP will also assist those operating under the Food Hygiene Regulations.

This COP addresses relevant legal requirements of the Animal Products Act and its subordinate legislation, Section 8G of the Food Act 1981, and the Australia New Zealand Food Standards Code. In relation to the Animal Products Act, only the Animal Products Regulations and the Animal Products (Specifications for Products Intended for Human Consumption) Notice are included, as these are the most relevant pieces of legislation for

operations producing product for human consumption. Requirements from the Animal Products Act legislation are mandatory for businesses operating under an RMP, and they are strongly recommended for those operating under an FSP.

The Food Standards Code applies to all businesses regardless of whether operations are managed under an FSP, RMP or the Food Hygiene Regulations.

2.2 Contents of an FSP or RMP

The documented FSP or RMP must include the following:

2.2.1 Good Manufacturing Practice (GMP)

GMP (may also be referred to as good operating practice) includes the practices and procedures designed to ensure the consistent production of products that are fit for their intended purpose, and that meet relevant regulatory requirements. It includes several interacting components such as hygienic practices, process control and quality assurance systems. GMP is usually documented in supporting systems or GMP programmes of an FSP or RMP.

GMP is the foundation for Hazard Analysis and Critical Control Point (HACCP), and FSPs and RMPs.

GMP for the production of processed meats is discussed in Parts 2 and 3 of this COP.

2.2.2 Application of HACCP principles

The operator must apply HACCP principles, as appropriate to the product and process, to ensure a systematic approach to the identification and analysis of hazards and their control. This is covered in Part 4 of this COP.

2.2.3 Other FSP or RMP requirements

Other FSP or RMP requirements such as business identification, operator's details, and provisions for auditors or verifiers must also be documented in the FSP or RMP.

2.3 FSP and RMP Components

There are differences in the required components of a FSP and RMP, but the key components are similar for both programmes, which are:

- a. Operator, business and FSP/RMP identification
- b. List of FSP or RMP documents
- c. Management authorities and responsibilities
- d. Scope
- e. Product, process and premises descriptions
- f. Any regulatory limits and operator-defined limits (i.e. product and processing criteria, including standards from the Food Standards Code)
- g. GMP (including control measures, monitoring procedures and corrective actions)
- h. Application of HACCP (identification, analysis and control of hazards to human health)
- i. Identification and competency of responsible persons
- j. Operator verification system
- k. Document control and record keeping procedures
- l. Recall procedures
- m. Validation of the FSP or RMP

Operators should consult other NZFSA documents to obtain additional specific requirements for FSPs or RMPs.

Information about FSP development, assessment, and approval can be found in [What Does a Food Safety Programme Look Like?](#) and [Approval of a Food Safety Programme](#).

The [RMP Manual](#) provides comprehensive information on the principles and components of RMPs and provides guidance for their development and registration.

2.4 Use of the COP in the Development of an FSP or RMP

An operator is expected to develop and implement their FSP or RMP in accordance with this COP. This will:

- ensure that the operator complies with acceptable industry practices and procedures
- ensure that the operator meets relevant regulatory requirements; and
- simplify and reduce the cost of developing and evaluating (where appropriate) the FSP or RMP.

Operators must develop their own FSP or RMP that are specific to their own products, processes and premises. Relevant parts of the COP may be incorporated or referenced in their FSP or RMP, as appropriate.

3 Other Legislation

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This COP will assist processed meat operators meet some of the requirements of the Food Act and the Animal Products Act. Operators should not rely solely on this COP to provide them with information on all legal requirements. Operators are responsible for ensuring that they are familiar and comply with all legislation.

Legislation that is likely to be relevant to meat processors includes, but is not limited to, the following Acts and their associated regulations and specifications:

- Animal Products Act 1999
- Biosecurity Act 1993
- Building Act 2004
- Commerce Act 1986
- Consumer Guarantees Act 1993
- Fair Trading Act 1986
- Food Act 1981
- Hazardous Substances and New Organisms Act 1996
- Resource Management Act 1991
- Health and Safety in Employment Act 1992
- Weight and Measures Act 1987

4 Other Sources of Information

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The NZFSA website contains other information which would be of value to meat processors. The following sections provide links to information that would be of particular relevance:

4.1 NZFSA Science Contracts

This page contains links to a wide range of [scientific research](#) undertaken by or on behalf of NZFSA. This can help assist operators understand current food safety issues which may be relevant to their product and process.

4.2 Microbial Pathogen Data Sheets

This page contains links to a series of [microbiological data sheets](#) that have been prepared for NZFSA by the Institute of Environmental Science and Research Limited (ESR). These can be used to help operators understand the characteristics of the microorganisms that need to be controlled by their process, their sources, growth parameters and examples of processing guidelines.

4.3 Risk Profiles

This page contains links to [microbiological risk profiles](#) that have been prepared for NZFSA by ESR. Risk Profiles provide information relevant to a food/hazard combination to help operators understand the microorganisms they need to control in their processes and their associated public health significance.

4.4 Hazard Database

The [hazard database](#) is under development. It provides information on food safety hazards in some New Zealand foods. The search results list the hazard(s) associated with the food, the source of the hazard, and actions an operator can take to control the hazard.



Processed Meats Code of Practice

Part 2: GMP – Hygiene and
Sanitation, and Quality Assurance

Prelims

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This COP has been written for processors of processed meat products, including smallgoods, operating a Food Safety Programme (FSP) under the Food Act, or a Risk Management Programme (RMP) under the Animal Products Act. However, the guidance provided is also recommended for those operating under the current Food Hygiene Regulations.

Parts 2 and 3 provide guidance on Good Manufacturing Practices (GMP). Part 2 covers hygiene and sanitation, and quality assurance programmes. Part 3 focuses on process control at key processing steps. Processors should comply with both parts to ensure the safe production of processed meats.

1.2 Layout of Part 2

Part 2 is divided into programmes that cover hygiene and sanitation, quality assurance, and other FSP and RMP requirements.

The GMP programmes are laid out with the following subheadings:

Scope

This describes the contents of the particular GMP programme and its application. The sources of hazards controlled under the programme are identified for the hygiene and sanitation programmes.

Control measures

This section discusses the regulatory and industry agreed requirements, and the control measures or procedures for meeting these requirements.

To identify a regulatory requirement, the legislation from which the particular requirement is taken is cited at the end of the sentence. For example,

1.2.2 “All inputs, including raw materials, ingredients, additives and packaging must be handled, processed, and stored in a manner that minimises any potential contamination or deterioration. **[AP Reg 9, HC Spec 115]**”

In most cases the mandatory requirements have been paraphrased. Operators should refer to the legislation for the actual wording. Legal requirements from the Animal Products Act are mandatory for businesses operating under a Risk Management Programme (RMP), and they are strongly recommended for those operating under a Food Safety Programme (FSP). The abbreviations used for legislation cited are:

- AP Reg - the current version of the [Animal Product Regulations](#)
- HC Spec - the current version of the [Animal Products \(Specifications for Products Intended for Human Consumption\) Notice](#)
- RMP Spec - the current version of the [Animal Products \(Risk Management Programme Specifications\) Notice](#)
- AC Spec - the current version of the [Animal Products \(Specifications for Products Intended for Animal Consumption\) Notice](#)

The procedures given in each section are the accepted or industry agreed means of achieving or complying with regulatory requirements. The operator must comply with the procedures that are applicable to their product and process unless they have proposed an alternative process, procedure or parameter that is not provided for in this COP. The operator must demonstrate the validity and effectiveness of any proposed alternative. Any alternative process, procedure or parameter must be documented in the FSP or RMP.

Guidance material is presented in a box. It provides explanatory information, recommendations and options for achieving a particular outcome or requirement.

Monitoring procedures

This section discusses the requirements for monitoring compliance to documented procedures to ensure the effective implementation of the particular GMP programme.

Corrective action procedures

This section gives the corrective actions required when any non-compliance occurs.

Records

This section gives the list of records that must be kept by the operator.

1.3 Other RMP Requirements

Certain requirements specific to RMPs are not adequately covered in this document (e.g. details of the operator and day-to-day manager, identification of risk factors related to wholesomeness and labelling, amendments, verifier's rights, notification requirements and other operational requirements). RMP operators should consult the [RMP Manual](#) for comprehensive discussions of all RMP requirements.

1.4 Documentation of GMP Programmes

1.4.1 Legal requirement

The operator must document sufficient procedures to ensure that GMP is applied. These procedures must cover:

- a. the control measures to be used to control hazards and suitability factors
- b. any parameters to be met
- c. any monitoring procedures that are to be carried out; and
- d. any corrective action procedures that are to be applied in the event of loss of control; including restoration of control, identification and disposition of affected product, and any measures to be taken to prevent recurrence of the loss of control.

1.4.2 Contents of GMP programmes

The operator should ensure that the following are covered in the documented GMP programmes:

- a. purpose and scope
- b. authorities and responsibilities
- c. procedures (covering control measures, monitoring, corrective action and operator verification)
- d. records; and
- e. references to other relevant documents, as applicable.

1.5 Definitions

Amenities - includes toilets, wash rooms, locker rooms, change rooms, lunch rooms, and cafeterias.

Approved maintenance compound - any maintenance compound that is approved by the NZFSA or listed in specifications made under the Animal Products Act 1999 (i.e. listed in the [Approved Maintenance Compounds \(Non-dairy\) Manual](#)). (Note: The use of approved maintenance compounds is mandatory only for RMP operators. Operators under the Food Act may use a "suitable maintenance compound").

Calibration - procedure used for the comparison of a measuring instrument with a standard, under specific conditions, and adjustment of the instrument, if necessary.

Clean - when used as a verb, means to remove visible contaminants from any surface.

Contaminant - any biological agent, chemical agent, foreign matter or other substance not intentionally added to food which may compromise product safety or suitability.

Cooked product - product that has undergone a cooking step.

Cooking - the application of heat to a product to destroy vegetative pathogens that may pose a hazard to human health.

Control measure - any action and activity that can be used to prevent or eliminate a product safety hazard, or reduce it to an acceptable level.

Corrective action - any action to be taken when the results of monitoring a process step or control measure indicate a loss of control.

Critical Control Point (CCP) - a step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Critical limit - a criterion which separates acceptability from unacceptability at a CCP.

Equipment - includes:

- a. the whole or any part of any utensil, machine, fitting, device, instrument, stamp, apparatus, table, or article, that is used or available for use in or for preparing, marking, processing, packing, storing, carrying, or handling of any product, ingredient, additive, or processing aid; and
- b. any utensil or machine used or capable of being used in the cleaning of any equipment or facilities.

Essential services - includes the provision of gases, lighting, ventilation, and water and waste management.

Facilities - includes amenities, storage areas, and processing areas.

Food additive - any substance not normally consumed as a food in itself and not normally used as an ingredient of food, but which is intentionally added to a food to achieve one or more technological functions.

Food Standards Code - the code incorporated into New Zealand law by the New Zealand (Australia New Zealand Food Standards Code) Food Standards 2002 and issued by the Minister under section 11C of the Food Act 1981.

Good Manufacturing Practice (GMP) - documented procedures relating to practices that are required to ensure products are fit for their intended purpose (may also be referred to as Good Operating Practice (GOP)).

Hazard Analysis and Critical Control Point (HACCP) - a system that identifies, evaluates and controls hazards that are significant for food safety.

Label - includes any wording, tag, brand, symbol, picture, or other descriptive matter written, printed, stencilled, marked, embossed, impressed on, appearing on, attached to, or enclosed within any product.

Ingredient - any substance, including a food or additive, used in the manufacture or preparation of a food and is present, whether in a modified form or not, in the final food.

Manufactured meat - processed meat containing no less than 660g/kg of meat.

Minimise - to have taken all practical steps to substantially reduce the potential hazard of concern, consistent with what is technologically feasible.

Monitor - the act of conducting a planned sequence of observations or measurements of control parameters to assess whether a process step or control measure is under control.

Non-complying product - any product that does not meet regulatory requirements, including relevant regulatory or operator-defined limits; or has not been processed in accordance with regulatory requirements or a validated process.

Operator-defined limit - a measurable limit established by an operator to manage the fitness for intended purpose of a particular product.

Operator verification - the application of methods, procedures, tests and other checks by the operator to confirm ongoing compliance to the documented Food Safety Programme or Risk Management Programme and regulatory requirements.

Packaging -

- a. means any material that is intended to protect and that comes into immediate contact with the product
- b. includes rigid materials such as cartons and containers where the product is filled directly into the carton and container; and
- c. includes any other material contained with, in, or attached to, the product (such as labels, heat sensors, oxygen scavengers).

Pathogen - a microorganism which causes illness.

Post-processing - process steps or activities undertaken after the application of a lethal heat or preservation treatment such as cooking, fermentation, or drying.

Potable water - means water that:

- a. in relation to water supplied by an independent supplier (including a public or private supplier), is of a standard administered by the independent supplier under the Health Act 1956 and any regulations made under that Act; or

- b. in relation to water supplied by the operator solely for the use of the operator such as bore water, rainwater, surface water, or ground water:
 - i. is of a standard equivalent to that in paragraph (a), as determined by the operator based on an analysis of hazards and other risk factors; or
 - ii. complies with the requirements in Schedule 1 (of the HC Spec); or
- c. meets the requirements of the current “Meat Division Circulars 86/3/2 Surveillance of Potable Water in Meat and Game Export Premises” and “86/3/5 Amendment to MDC 86/3/2 86/14/5 on Surveillance of Potable water in Meat and Game Export Premises” issued by the Ministry.

Protective clothing - special outer wear garments intended to preclude the contamination of product; and includes head coverings and footwear.

Process control - all conditions and measures applied during a process that are necessary to achieve safety and suitability of a product.

Processed meat - a meat product containing no less than 300 g/kg meat, where meat either singly or in combination with other ingredients or additives, has undergone a method of processing other than boning, slicing, dicing, mincing or freezing, and includes manufactured meat and cured and/or dried meat flesh in whole cuts or pieces.

Processing areas/rooms - includes all areas where ingredients and products are prepared (thawed, cut, weighed, pre-mixed, injected, cured, massaged, tumbled, emulsified, filled), processed (cooked, cooled, dried, fermented, sliced), and packed.

Protected - means sufficiently wrapped, packaged or enclosed to prevent the introduction of contaminants.

Ready-to-eat (RTE) product - a product that is ordinarily consumed in the same state as that in which it is sold. RTE products do not require additional preparation to achieve food safety, however, they may receive additional preparation for organoleptic reasons (i.e. to make them taste and/or look better). They can include frozen processed meat products.

Regulatory limit - a measurable regulatory requirement that is critical to the fitness for intended purpose of a particular product.

Rework (noun) - a product which has been partially or fully processed and is incorporated and reprocessed into another batch of product.

Rework (verb) - to incorporate rework into another batch of product.

Sanitise - the application of a chemical or physical agent with the intention of reducing microbial contamination to a level that will avoid the creation of a hazard.

Separate by distance - to separate products or processes by location or distance within a room or area so that any contact or contamination between products, equipment, processes or personnel is avoided.

Separate physically - means to separate by floor to ceiling walls and doors, or to fully protect product by containing it in enclosed vessels or equipment such as pipelines and vats.

Separate by time - to separate products and processes by means of a time difference.

Shelf-life - the period nominated by the operator during which a product maintains its fitness for intended purpose.

Smallgoods - term commonly used in New Zealand to refer to manufactured meat products such as hams, bacons, other cured products, and cooked meats.

Suitably skilled person - a person who in the opinion of the operator is skilled in a particular activity or task through training, experience, or qualifications.

Transportation outer - means a package that:

- a. encases any packaged or unpackaged animal material or animal product for the purpose of transportation and distribution; and
- b. is either removed before the animal product is used or offered for retail sale, or is not taken away by the consumer of the product;

but does not include a transportation unit.

Validation - process of obtaining evidence to demonstrate that a particular product will be fit for its intended purpose, through the achievement of any regulatory or operator-defined limit.

Waste - includes, without limitation, all solids, liquids, and gases that the operator intends to dispose of as being unwanted and that may become a source of contamination or attract pests.

2 General Requirements

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2.1 Scope

This section gives the regulatory requirements that apply to all GMP programmes covered in this COP.

2.2 Hygienic Practices

2.2.1 Operators must establish and carry out procedures to:

- a. ensure appropriate and adequate maintenance, cleaning, and sanitation of premises, facilities, essential services, and equipment
- b. manage waste
- c. control pests; and
- d. implement effective personnel hygiene practices. **[AP Reg 11; Food Act Section 8G]**

2.2.2 All inputs, including raw materials, ingredients, additives and packaging must be handled, processed, and stored in a manner that minimises any potential contamination or deterioration. **[AP Reg 9, HC Spec 115]**

2.3 Documents and Records

2.3.1 Operators must document the following in their FSP or RMP:

- a. processing procedures, and product and process parameters
- b. procedures for monitoring and verifying compliance to established processing procedures and parameters, particularly critical limits at identified critical control points

-
- c. corrective actions for any non-compliance or deviation to any regulatory limit or operator-defined limit, procedures, and product and process parameters. **[RMP Spec 8 and 11; Food Act Section 8G]**

2.3.2 Operators must maintain accurate records, particularly those for the monitoring and verification of product and process parameters critical to product safety. **[RMP Spec 20(2); Food Act Section 8G]**

3 Document Control and Record Keeping

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3.1 Scope

This section discusses the requirements for the control of FSP and RMP documents, and record keeping.

3.2 Control Measures

3.2.1 Document control

3.2.1.1 The operator must implement procedures to control documents and records; and ensure that the FSP or RMP is up-to-date and reflects the actual operation.

3.2.1.2 Every document that forms part of the FSP or RMP must be:

- a. legible
- b. dated or marked to identify its version
- c. authorised (signed) prior to use, either directly or within the document control system, by:
 - the operator
 - the day-to-day manager of the programme, or
 - a person nominated to do so in the programme's document control system; and
- d. available in a readily accessible form when required to by person with responsibilities under the programme. **[RMP Spec 19(1)]**

3.2.1.3 The operator must keep a register of all current FSP or RMP documents showing the document title, and current version and/or date of issue.

3.2.1.4 Details of all amendments to the FSP or RMP must be recorded in an amendment register. **[RMP Spec 19(2)]**

The amendment register may be presented in a table with the following column headings: document name or reference, details of amendment, reason for amendment, date of change, approved by.

In addition to completing the amendment register, amendments should also be identified in the document itself (e.g. by use of *italics*, highlighting the amended text).

RMP operators should consult the [RMP Manual](#) sections 3.3 and 3.19 for more detailed information regarding amendment requirements.

3.2.1.5 After an amendment has been authorised (and registered in the case of a significant amendment to an RMP) all amended parts of the FSP or RMP must be replaced with the current versions at all distribution points, without unnecessary delay. **[RMP Spec 19(2d)]**

3.2.1.6 The operator must retain for four years, one copy of all obsolete documents from a registered FSP or RMP in a manner that protects the documents from damage, deterioration or loss. **[RMP Spec 19(3)]**

3.2.1.7 Electronic versions of FSP or RMP documents must be protected with an effective backup system.

3.2.1.8 The operator must ensure that the registered FSP or RMP, and any archived documents, are readily accessible, or can be retrieved and made available within two working days of any request to:

- a. recognised or approved persons
- b. animal product officers (or food officers)
- c. the Director General; and
- d. persons authorised by the Director General. **[RMP Spec 19(4)]**

3.2.2 Record keeping

3.2.2.1 The operator must ensure that all records are legible, and stored for four years in a manner which protects the records from damage, deterioration or loss. **[RMP Spec 20(1)]**

3.2.2.2 Records relating to the FSP's or RMP's monitoring, corrective action and operator verification activities must include:

- a. the date and, where appropriate, the time of the activity or observation
- b. a description of the results of the activity or observation; and
- c. the identify of the person(s) who performed the activity. **[RMP Spec 20(2)]**

The way in which the date and time are documented in the record should be appropriate to the activity being monitored. For example, the monitoring of certain critical process time and/or temperatures may require the recording of the exact date and time when the observation is made. However, for the monitoring of certain GMP programmes, such as checking compliance with protective clothing requirements, a more general time period for the observation may be acceptable (e.g. shift).

3.2.2.3 Records must accurately reflect any observations taken, and must be made in way that facilitates verification.

Consideration should be given to the durability of paper on which records are kept (e.g. pen does not write well on wet paper), and its suitability for storage (e.g. thermal papers can fade over time). Pencil is not suitable for recording information because it is easy to erase or alter.

Any alterations made to records should be made alongside the original entry and initialled by the person amending the record.

The use of white out products (e.g. TwinkTM) is not acceptable to auditors and verifiers as it is not possible to see the original entry.

3.2.2.4 Electronic records must be backed up and protected from corruption, damage or loss. The person entering the data must be identified according to systems developed for the protection of electronic records.

3.2.2.5 The operator must make all records available to the following persons as required:

- a. recognised or approved persons

- b. animal product officers (or food officers)
- c. the Director-General; and
- d. persons authorised by the Director-General. *[RMP Spec 20(3)]*

3.3 Monitoring Procedures

Compliance to documented procedures must be regularly checked by the responsible person at a frequency that will ensure consistent and ongoing effectiveness of the programme.

3.4 Corrective Action Procedures

The operator must take corrective actions when any non-compliance to documented procedures occurs, or when the document control system is found to be ineffective.

The corrective actions should include: an assessment to determine the cause and extent of the non-compliance, and any consequential effects on other documents or records, and programmes; and actions necessary to prevent the recurrence of the problem (e.g. retraining of personnel involved, review of procedures and making amendments, if necessary).

3.5 Records

Records of the following must be kept:

- a. list of documents that make up the FSP or RMP
- b. amendment registers; and
- c. GMP and process control records, including monitoring, corrective action and verification records.

4 Design and Construction of Buildings, Facilities and Equipment

Amendment 0

February 2010

4.1 Scope

This section discusses the requirements and procedures for ensuring that all buildings, facilities and equipment are designed, constructed, installed and operated in a manner that prevents or minimises contamination of products, packaging, other inputs, equipment, and the processing environment.

The requirements of the Building Act 2004 are not covered in this document. Operators must comply with this and any other relevant legislation.

The sources of hazards controlled under this programme are summarised below.

Source of hazard	Examples of hazards
Facilities, equipment	Bacterial pathogens (e.g. <i>Listeria monocytogenes</i> , <i>Salmonella</i> spp., <i>E.coli</i> spp.) Chemical residues (e.g. toxic metals from product contact surfaces made of materials with cadmium, lead and their alloys) Physical hazards (e.g. metal, glass)
Maintenance chemicals (e.g. lubricating fluids)	Chemical residues
Environmental contaminants (e.g. dust, fumes, pollutants, sewage) Air	Bacterial pathogens (e.g. <i>Salmonella</i> spp., <i>E. coli</i> spp., <i>Clostridium</i> spp.) Chemical residues from fumes, pollutants
Pests (e.g. insects, rodents, birds) Waste (e.g. waste water)	Bacterial pathogens (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>E. coli</i> spp., <i>Listeria monocytogenes</i>)

4.2 Control Measures

4.2.1 General requirements

4.2.1.1 The operator must ensure that the premises, facilities, equipment and essential services are designed, located and constructed in a manner that enables the fitness for intended purpose of the product to be achieved and maintained. **[AP Reg 10]**

4.2.1.2 The facilities, equipment and internal structures, that may affect the suitability for processing of any material or the fitness for intended purpose of any product, must be of sanitary design. **[HC Spec 5(2)]**

4.2.1.3 Temperature controlled rooms and equipment must be operated within their design capability and capacity, and must consistently deliver the required temperature. **[HC Spec 6(3)]**

4.2.2 Location of premises and buildings

When deciding where to locate food premises or buildings, potential sources of contamination must be considered, as well as the effectiveness of any reasonable measures that might be taken to protect the product and the processing environment. Premises must be located away from:

- a. environmentally polluted areas and industrial activities which pose a serious threat of contaminating products
- b. areas subject to flooding unless sufficient safeguards are provided
- c. areas prone to infestation of pests; and
- d. areas where wastes, either solid or liquid, cannot be effectively removed.

4.2.3 Transport access ways

Roads, traffic areas and transport access ways on the premises site, and areas between and around buildings, must be constructed and maintained in a manner that facilitates effective drainage of surface water and minimises environmental contamination of the processing environment (e.g. from dust, mud).

Transport access ways and areas surrounding buildings should be sealed.

4.2.4 Design and layout of buildings and facilities

4.2.4.1 Adequate facilities must be available for the:

- a. hygienic performance of all operations
- b. storage of raw materials, ingredients, products, packaging and equipment
- c. storage and distribution of water
- d. cleaning and sanitation of facilities and equipment
- e. performance of personnel hygiene activities
- f. provision of essential services; and
- g. drainage and disposal of wastes.

4.2.4.2 Buildings, including internal structures such as floors, ceilings and walls, must be designed and constructed in a manner that:

- a. minimises contamination of the product
- b. facilitates cleaning and maintenance
- c. minimises the entrance and harbourage of pests; and
- d. minimises the entry of environmental contaminants.

4.2.4.3 Adequate space in processing areas must be provided to facilitate:

- a. the hygienic performance of all operations
- b. proper movement of personnel and materials
- c. the installation of equipment; and
- d. effective cleaning.

There should be adequate spacing to allow for cleaning and inspection:

- a. between pieces of processing equipment
- b. between equipment and walls; and
- c. between the base of equipment and the floor.

Equipment which releases a great deal of heat or moisture should be spaced sufficiently away from walls or ceilings to prevent damage to buildings.

4.2.4.4 The design and layout of processing facilities and equipment in the premises must:

- a. facilitate separation and prevent cross-contamination between:
 - raw and RTE products
 - products of different allergen status
 - products for human consumption and for animal consumption
 - any other incompatible products or operations (e.g. products with special characteristics such as organic), and
 - contaminated materials (e.g. outer packaging) and products and product contact surfaces; and
- b. facilitate the control of movement of personnel, raw materials and products, and equipment from areas of a lower hygienic status to those with a higher hygienic status; and
- c. facilitate effective cleaning and sanitation between operations with a different hygiene or allergen status.

Businesses building new premises are strongly advised to consider implementing physical separation between raw and RTE areas. Ideally:

- a. facilities should be designed so that the principle of one-way flow of food (i.e. from raw material receiving to dispatch of finished products) can be implemented
- b. the design and layout of the premises should restrict personnel access to RTE processing areas with access only through a changing facility
- c. drains from the “dirty” or “raw” side should not be connected to those on the “clean” or

“cooked” side

- d. floors in wet processing areas should have trapped drains. Point drains are preferred rather than open channel drains and they should be spaced appropriate to the activity. Open channel drains, when used in RTE areas should have a fall of at least 1 in 60 and be coved to allow ready cleaning. These drains should be deep enough along their length to prevent overflow and wide enough to allow cleaning
- e. RTE processing areas should have positive air pressure relative to the surrounding areas (i.e. air flow should move outward from RTE areas to adjacent areas of the premises)
- f. separate storage facilities (e.g. chillers and freezers) should be provided for the storage of raw and RTE products
- g. doors should be self-closing and, except where there is conflict with emergency exit requirements, should close with the internal pressure rather than against that pressure
- h. roller doors, sectional slide-over doors, concertina doors, folding doors and other multi-section doors that are difficult to clean should not be used
- i. plastic strips should not be used in doorways; and
- j. preformed coving that has a hollow cavity should not be used.

4.2.4.5 Any facilities used for the processing of product for animal consumption must be physically separated from facilities where product is processed for human consumption, and must be used only for the processing of product for animal consumption. However, products for human consumption and animal consumption may be processed in the same facilities, if the operator has effective procedures in place to maintain separation of product intended for human consumption from that intended for animal consumption, and to prevent cross-contamination or substitution between them. **[AC Spec 10 (7) and (8)]**

4.2.5 Floors, walls and ceilings

4.2.5.1 Floors, walls, ceilings and other exposed internal surfaces in processing areas that may affect the suitability or fitness for intended purpose of product must:

- a. in the case of surfaces subject to moisture (i.e. moisture from products, cleaning chemicals, water), be impervious and non-absorbent

- b. be free from depressions, pits, cracks, and crevices that may harbour contaminants
- c. be unaffected by any corrosive substance with which it is likely to come into contact, to the extent necessary to ensure that it will not harbour contaminants and is not a source of contamination
- d. be durable, resistant to fracture, and capable of withstanding repeated exposure to normal cleaning and sanitising
- e. be smooth, except for floors; and
- f. in the case of materials lining the walls, floors and ceilings, be of a colour that does not disguise contaminants having regard to the lighting arrangements. **[HC Spec 5(1)]**

Commonly used acceptable materials for floors are sealed concrete, floor tiles, and vinyl. Concrete or mortar floors which incorporate an approved latex or synthetic resin finish have better than ordinary resistance to meat, fats and acids.

Insulated panels are recommended for walls in processing areas. Laminates and melamine face sheeting are also suitable construction materials. Porous surfaces such as cement or plaster are not acceptable unless they are sealed to render them impervious to moisture.

Cracks or breaks in the floor, coving and in the wall lining in high risk areas (e.g. areas where cooked or RTE products are handled) require sealing as a priority of plant maintenance since they are potential reservoirs for *Listeria*.

4.2.5.2 Floors must be sufficiently strong to withstand its expected use (e.g. foot traffic, trolleys and forklifts).

4.2.5.3 Floors must be adequately graded to facilitate the drainage of water and prevent pooling.

Floors should be sloped so that water will run off to floor drains.

4.2.5.4 Floor to wall junctions must be constructed in a manner that facilitates cleaning.

The floor-to-wall junction should be coved in areas where wet operations or cleaning occur. Hollow coving is not recommended.

4.2.5.5 Floor joints and wall joints must be finished flush with the surface, and be sealed to prevent the ingress of water, pests and contaminants.

4.2.5.6 Objects attached to walls and ceilings, such as pipe work, cables, overhead cranes, light fixtures, fans and hoses, must be designed and appropriately located so that they:

- a. can be easily cleaned
- b. do not obstruct the cleaning of the walls or ceiling; and
- c. do not become a source of contamination of products (e.g. dust, dirt, rust particles, peeling paint).

4.2.5.7 Product lines, service lines, and ducting that pass through walls, ceilings or floors must be sealed to:

- a. eliminate crevices on both the interior and exterior surfaces
- b. prevent water seepage; and
- c. prevent harbourage and entry of vermin.

4.2.6 Doors and windows

4.2.6.1 Doors should be installed and located where their opening and closing will not result in contamination of products, equipment and the processing environment from external surroundings or other areas of lower hygienic status (e.g. waste area).

Doors in areas where processing and/or packing is carried out should not open directly to the outside. An anteroom providing two doors between the processing or packing room and the outside is recommended.

4.2.6.2 Doors must be impervious to moisture and cleaning chemicals, and easy to clean.

Roller doors, sectional slide-over doors, concertina doors, folding doors and other multi-section doors that are difficult to clean should be avoided, whenever possible.

4.2.6.3 Door jambs must be sealed to adjoining walls and floor junctions.

4.2.6.4 Plastic strips used in doorways must be installed in such a way so they can easily be taken down for regular cleaning. They must be replaced when they are worn or when they can no longer be effectively cleaned.

4.2.6.5 Windows must be constructed in such a way so they are easy to clean. They must be properly sealed to prevent water seepage, and harbourage and entry of pests.

Windows should be flush with the inside surface of the wall. However, if the sill has an inside ledge, this should be sloped downwards at an angle to prevent the build-up of dust and to facilitate effective cleaning.

4.2.6.6 Glass windows must not be used where glass could contaminate product if the window breaks.

The use of safety glass is a satisfactory alternative.

4.2.7 Drainage

4.2.7.1 The design and construction of the drainage system must prevent odours, pests, other objectionable material and storm water from entering the premises.

4.2.7.2 Drains must be of sufficient capacity (i.e. size and fall) to ensure liquid and solid waste is contained and rapidly removed to minimise the spread of waste across floors.

Screens or grating should be installed to prevent large fragments of solid material from entering the drains.

4.2.7.3 Drains must be designed and constructed in a manner that prevents potential contamination of products, packaging and equipment from aerosols and splashes from drains.

4.2.8 Lighting

4.2.8.1 Lights and light fixtures over products, exposed packaging material, or equipment must be of a safety type, or protected to prevent contamination of products in the event of breakage.

4.2.8.2 Lighting must be of sufficient intensity and quality to enable satisfactory performance of all operations, checks, and inspections. **[HC Spec 7]**

The following lighting intensities are acceptable:

- a. processing rooms – 500 lux, measured at working plane
- b. areas where product is inspected and prepared to inspection standards – 750 lux, measured at the working plane
- c. laboratories – 750 lux, measured at the bench
- d. stores with constant operation – 300 lux, measured at the floor aisles
- e. staff rooms, changing rooms, lavatories – 150 lux, measured at the floor

4.2.9 Ventilation systems

4.2.9.1 Well designed ventilation or air conditioning systems must be provided in processing areas to:

- a. minimise steam and condensation
- b. minimise airborne contamination of products; and
- c. control room temperatures and humidity, if required.

4.2.9.2 Ventilation systems must be designed, located and constructed in a manner that:

- a. ensures that air flows from “clean” to “dirty” processing areas, and cooked/RTE areas to raw food areas
- b. avoids air flow from warm areas to cold areas to minimise condensation problems; and

- c. prevents the entry of contaminants such as dust, ash, vapour or smoke.

Outside vents should be designed and constructed in a way that discourages birds from perching on them.

4.2.9.3 Effective filters must be installed and maintained in accordance with the manufacturer's recommendations.

4.2.9.4 Where air conditioning units are used or air is otherwise heated or cooled, fins on radiator and evaporator banks must be accessible for inspection, cleaning and sanitising. Condensate collection trays must be accessible for inspection, cleaning and sanitising.

4.2.9.5 Ventilation inlets and exhausts must not be installed in locations that would allow condensation or debris to fall and contaminate product (e.g. above open vats or trolleys in the chiller).

Equipment which release large amounts of heat or moisture should be isolated in a dedicated room and/or the equipment should be covered and vented.

4.2.9.6 Exhaust ventilation hood systems (e.g. hoods above certain cookers) must be designed, installed and maintained in a manner that prevents grease or condensation from draining or dripping onto product and equipment.

4.2.10 Water and steam

4.2.10.1 An adequate supply, volume and pressure of potable water, and appropriate facilities for its storage, distribution and temperature control must be available to ensure the safety and suitability of product and the hygienic operation of the premises.

Hot water used for the sterilisation of food processing equipment and other product contact surfaces that are subject to contamination should be at 82°C or higher, at the point of use.

4.2.10.2 Steam used in direct or indirect contact with product or product contact surfaces must not contain any substances which may be hazardous to human health. Steam must be produced from potable water.

4.2.11 Process gases and product contact air

4.2.11.1 Process gases that come into direct contact with any product must meet one of the following current standards:

- a. the “Food Chemicals Codex” published by the National Academy of Sciences and the National Research Council of the United States of America in Washington, D.C
- b. a “Food and Nutrition Paper” published by the Food and Agriculture Organisation of the United Nations in Rome
- c. the “Japanese Standards of Food Additives” published by the Federation of Food Additives Association in Japan
- d. the “British Pharmacopoeia of the Pharmaceutical Codex”; or
- e. the current Australia New Zealand Food Standards Code, Part 1.3 “Substances added to Food”, Standard 1.3.4 “Identity and Purity”. **[HC Spec 15]**

4.2.11.2 When compressed air is generated on-site for the purpose of processing and comes in direct contact with any product, the air must be filtered and the source must be clean and external to the building. **[HC Spec 16 (2)]**

4.2.11.3 The filters for filtering air that is used in contact with any product must comply with the current International Organisation for Standardisation Standard on “Compressed Air for General Use Part 1, Contaminants and Quality Classes”: Ref. No. ISO 8573.1, 1991; or any other international standard recognised by the NZFSA. **[HC Spec 16 (2)]**

4.2.11.4 Equipment used in delivering air and other gases used for direct or indirect product contact must be designed and operated in such way so that it does not introduce contamination to the product. The air and gases must be odourless and free from lubricating oil, water and solid particles.

Product contact air includes air used for cooling, drying, conveying, mixing and stirring; and compressed air that comes in contact with product or product contact surfaces.

Equipment using pressurised air in direct product contact should be fitted with a filter located as near to the use outlet as is feasible. The choice of filter will depend on the nature of the product

and process, and the size, nature and concentration of the particulate matter to be removed. Filters should be readily removable for replacement or cleaning.

4.2.12 Temperature-controlled rooms

Temperature controlled rooms and equipment must be operated within their design capability and capacity, and must consistently deliver any temperature specified in legislation or in the FSP or RMP. **[HC Spec 6 (3)]**

Processing areas should be maintained at a temperature not exceeding 12°C, except when:

- a. temperature conditions are sufficient to maintain the temperature of the meat and/or mix at not more than 7°C; and/or
- b. processing areas are used for thermal processing, fermentation, or where a higher temperature is either not detrimental to product safety or is required for its manufacture.

4.2.13 Refrigeration facilities

4.2.13.1 Refrigeration facilities must be designed and constructed with the:

- a. capability to reduce product temperatures to the required temperature within the prescribed time; or maintain product temperatures at or below the required temperature; and
- b. capacity appropriate for the volume of products likely to be processed or held on the premises at any one time.

4.2.13.2 Refrigeration facilities must be designed in a manner that minimises fluctuations in temperature caused by movement of products, people and equipment.

Temperature fluctuations can be minimised by using self closing doors, air curtains, plastic strip curtains, and in the case of doors that open to the outside, truck dock seals or full environmental facilities. Build-up of snow and ice in a freezer indicates that a significant entry of warm air has been occurring over a period of time.

4.2.13.3 Equipment for the control and accurate monitoring of temperatures and, when required, other refrigeration parameters (e.g. humidity, air-flow), must be provided and must operate at all times while refrigeration facilities are in use.

There should be a sufficient number of temperature sensors to monitor the temperature range in different parts of the room. If only one temperature sensor is used, it must be located in the return air flow to the evaporator unit, as this usually has the highest temperature.

Chillers and freezers should be fitted with calibrated automatic temperature recorders. When this is not provided, the temperature of the room should be monitored manually at regular intervals.

4.2.14 Waste facilities

4.2.14.1 Equipment and storage areas that are used to store or contain waste must:

- a. be clearly identified, and if equipment is permanently installed in an identified storage area, either the equipment or storage area may be identified; and
- b. not be a source of contamination to any animal product. **[HC Spec 20]**

4.2.15 Processing equipment

4.2.15.1 All equipment that come into contact with any product must be designed, constructed, installed and operated in a manner that:

- a. ensures the effective performance of the intended task
- b. ensures effective cleaning and sanitation
- c. facilitates effective process control and monitoring; and
- d. does not cause contamination of the product.

4.2.15.2 Equipment must be:

- a. durable
- b. resistant to chipping, cracking, flaking, delamination, abrasion
- c. able to withstand exposure to heat, water and all products expected to be processed under normal operating conditions

- d. designed to minimise build-up of food material and other residues; and
- e. corrosion resistant.

Bolts, nuts and threads on product contact surfaces should be avoided. When the use of these is unavoidable, they should be readily accessible for cleaning and inspection. Nuts should be open-ended, and bolts and nuts should be securely attached.

Equipment having seals and bearings should be designed and fabricated in a way that prevents lubricant from leaking, dripping, being forced into, or in any way contaminating product contact surfaces.

Equipment that is wet cleaned should be self-draining and graded to drain points, so no pools of liquid are left after cleaning.

Product contact surfaces should be free from imperfections such as pits, folds and crevices.

The product contact surface of welded joints should be ground and polished, and be free from pits, cracks and slag and gas inclusions, except that internal grinding and polishing is not required on product pipelines.

Product contact surfaces should not be painted.

4.2.15.3 All surfaces in direct contact with any product must be inert to the product, cleaning materials and other substances that it is likely to be exposed to under normal conditions of use.

4.2.15.4 The following materials must not be used in any equipment or product contact surface:

- a. toxic metals such as cadmium, lead and their alloys
- b. metals whose contact with liquid or other material may create harmful chemical or electrolytic action
- c. porous materials such as sponge rubber, stone slabs, linoleum, leather and fabrics (excluding strainers/filters)
- d. wood; and
- e. galvanised metal.

Stainless steel (300 series or better) is the preferred material for equipment that comes into contact with meat products.

Aluminium is not recommended. It has a tendency to warp and is susceptible to the effects of both oxidation and certain types of corrosion, especially from alkaline cleaning chemicals. The soft nature of the metal also leaves it susceptible to pitting and scratching.

Galvanised metal should not be used for product contact surfaces because the zinc coating wears off to expose the base iron sheet, which corrodes. In addition, the zinc coating is soluble in acidic food, and in acid and alkali detergents. Galvanised iron cages and trolleys may be used provided they do not come in direct contact with any exposed product.

Wood is not a suitable material for product contact surfaces because its porous nature allows products to penetrate the surface, and once impregnated it cannot be cleaned effectively. Residual product in the wood provides a nutrient source for microorganisms.

New equipment which will be used in direct contact with meat products should be provided with a letter of guarantee from the supplier certifying its acceptability for food use.

4.2.15.5 The product contact surfaces of conveyor belts must be constructed of smooth material (e.g. intralok type belting), be a colour which does not disguise contaminants, and be undamaged.

4.2.15.6 Containers used for holding ingredients, products, cleaning materials, wastes or other materials must be clearly identified and differentiated as to their use (e.g. by labels or colour coding).

4.2.15.7 Cutting boards must be smooth, shatterproof and of a colour that does not disguise contaminants, and be easily cleaned and sanitised.

4.2.15.8 Storage racks or shelving must be a sufficient height off the floor to allow cleaning underneath.

4.2.16 Monitoring equipment

4.2.16.1 The type of monitoring equipment (e.g. thermometers, relative humidity gauges), and its capability and accuracy, must be appropriate for the product, process, facility or equipment it is fitted to.

4.2.16.2 Monitoring equipment must be installed where it can be easily read, and accurate readings of the relevant parameter can be taken (e.g. warmest temperature of the refrigeration equipment or facility and the coldest temperature of the cooking equipment).

4.2.16.3 Measuring equipment that is used to carry out a critical measurement must be properly calibrated and function as intended. **[AP Reg 14]**

Refer to Section 10: Calibration of Measuring Devices

4.2.16.4 Monitoring equipment must be adequately protected from physical and chemical damage.

4.2.17 Cleaning facilities and equipment

4.2.17.1 Cleaning and sanitation facilities, and equipment, must be provided to ensure that the hygiene of personnel, equipment and the premises can be maintained. **[HC Spec 6(4)]**

4.2.17.2 Cleaning equipment must be maintained in a hygienic and good working condition.

4.2.18 Employee amenities

4.2.18.1 Amenities must be designed and constructed in a manner that:

- a. provides sufficient space and facilities for employees to consume food, change clothes, store personal belongings and to attend to personal hygiene
- b. facilitates cleanliness and tidiness and prevents the entry of pests
- c. provides adequate lighting and ventilation; and
- d. precludes direct opening into any processing area.

4.2.18.2 Lockers for storing employees' clothing and personal belongings must be constructed in a manner that allows for the lockers and surrounding area to be easily cleaned.

Lockers should be located off the floor to allow for easy cleaning underneath (e.g. at a height of 300mm above from the floor). Alternatively, lockers could be placed directly on the floor without any gaps between the floor and the lockers.

4.2.18.3 All opening windows or vents must be adequately screened against pests.

4.2.18.4 Toilet vents must be sited far enough from ventilation intakes so that there is little possibility of cross contamination.

4.2.19 Washing and sanitising units

4.2.19.1 Hand washing units must be:

- a. non-hand operable (e.g. foot, knee or automatic)
- b. located in areas that are readily accessible to all persons working in or entering a processing area
- c. provided with warm potable water, approved liquid soap and disposable paper towels or other hand drying facilities that do not contaminate washed hands or the surrounding area (e.g. roller towels fitted with a timed automatic retraction device that removes the soiled piece of towel immediately after use); and
- d. provided with a container for collection of waste towels.

4.2.19.2 Hand sanitising units (when these are used) must be:

- a. designed to minimise potential for cross contamination
- b. provided with suitable hand sanitiser; and
- c. located next to hand washing units.

RMP operators must use hand sanitisers from the list in the [Approved Maintenance Compounds \(Non-dairy\) Manual](#).

4.2.20 Facilities for washing, and sanitising, when necessary, of waterproof protective clothing (e.g. boots, aprons, gloves) must be provided.

The facilities should be located in or adjacent to the processing area; and designed and constructed in a manner that minimises splashes on to surrounding areas, products, and equipment.

4.3 Monitoring Procedures

Compliance to the requirements and procedures must be regularly checked by the responsible person at a frequency that will ensure consistent and ongoing effectiveness of the programme.

Examples of monitoring activities are: daily pre-operational checks of certain equipment or facilities, temperature checks of refrigerated rooms and other temperature-controlled rooms; and monthly maintenance checks.

4.4 Corrective Action Procedures

4.4.1.1 The operator must take corrective actions when any non-compliance occurs. The corrective actions must include an assessment to determine the cause and extent of the non-compliance, and must address:

- a. how the problem will be fixed (e.g. repair or replace equipment)
- b. the identification and disposition of any affected product; and
- c. the prevention of the recurrence of the problem (e.g. change design of equipment or facility; retraining of workers using the particular equipment).

4.5 Records

Records of the following must be kept:

- a. building layout, floor plans
- b. engineering designs and specifications
- c. equipment diagrams and specifications; and
- d. monitoring and corrective action records.

5 Potable Water

Amendment 0

February 2010

5.1 Scope

This section discusses the requirements for potable water used for processing, cleaning, personnel hygiene and other activities necessary to maintain the hygienic condition of the premises, facilities and equipment and to produce product that is fit for its intended purpose.

The sources of hazards controlled under this programme are summarised below.

Source	Examples of hazards
Faecal material (e.g. animal droppings, sewage)	Pathogenic microorganisms (e.g. <i>E. coli</i> spp, <i>Campylobacter</i> spp, <i>Cryptosporidium</i> , <i>Giardia</i> , viruses)
Agricultural chemicals (e.g. fertiliser, pesticides)	Nitrate
Soil	Pathogenic microorganisms (e.g. <i>E. coli</i> spp, <i>Campylobacter</i> spp, <i>Cryptosporidium</i> , <i>Giardia</i> , viruses) Toxic chemicals(e.g. arsenic, boron)
Pipes and tanks	Copper, lead
Roof paint for roof collected water	Lead

5.2 Control Measures

5.2.1 Supply of potable water

An adequate supply of potable water must be available and used:

- for processing of products (e.g. used as an ingredient, cooling of cooked meats)
- for cleaning
- for personnel hygiene

- d. in personnel hygiene equipment such as hand wash units, apron washes or sterilisers;
and
- e. for any other activity wherein water comes into direct or indirect contact with any product.

[HC Spec 8]

5.2.2 Summary of requirements for water from different sources

Source	Requirements
Town supply or other independent supply with no additional treatment ¹ by operator	<p>Management of reticulation system – see section 5.2.3.1</p> <p>Procedures for non-complying water – see section 5.2.3.2</p> <p>Handling and disposition of contaminated materials – see section 5.2.3.3</p>
Town supply or other independent supply with additional treatment ¹ by operator	<p>Management of reticulation system – see section 5.2.3.1</p> <p>Procedures for non-complying water – see section 5.2.3.2</p> <p>Handling and disposition of contaminated materials – see section 5.2.3.3</p> <p>Water management plan, including water sampling and testing – see section 5.2.4</p>
Operator's own supply (e.g. water sourced from a bore, river, stream, roof)	<p>Management of reticulation system – see section 5.2.3.1</p> <p>Procedures for non-complying water – see section 5.2.3.2</p> <p>Handling and disposition of contaminated materials – see section 5.2.3.3</p> <p>Water management plan – see section 5.2.5.1</p> <p>Water sampling and testing – see section 5.2.5.2</p> <p>Assessment² and reassessment of water supply status – see sections 5.2.5.1 and 5.2.5.3, and Schedule 1</p>

1. Examples of additional treatment are chlorination, filtration, boiling, ultraviolet radiation and reverse osmosis.

2. Assessment based on the completed Water Supply Assessment Checklist from Schedule 1 of the current version of the Animal Products (Specifications for Products Intended for Human Consumption) Notice.

5.2.3 Requirements for water from any source

The requirements given under this section apply to water from an independent supplier (e.g. council or town supply) and water supplied by the operator for their own use (e.g. roof water, river water, bore water).

An operator who uses town supply water without any additional treatment only needs to comply with the requirements given in this section 5.2.3.

5.2.3.1 Management of reticulation system (i.e. reticulation management plan) **[HC Spec 11]**

- a. The water reticulation system within the premises must be designed, installed and operated in a manner that prevents:
 - cross connections between potable and non-potable water
 - stagnant water (i.e. no dead ends and unused pipes); and
 - back flow that may cause contamination of the water supply.
- b. Water pipes, storage tanks and other parts of the reticulation system must be maintained in good condition.

The operator should ensure that any treatment applied for the maintenance of the reticulation system (e.g. periodic super chlorination) does not adversely affect the quality of the water.

- c. The reticulation system must be flushed (i.e. taps are opened at point-of-use to allow a significant flow of water to occur) when water is not used for an extended period, and after any repairs to the system, to ensure that stagnant water, rust, scale or other material is flushed out of the system.
- d. The operator must periodically check compliance against the reticulation management plan, and records of these checks must be kept.

Town supply water without any additional treatment is not required to be tested. However, it is recommended that operators periodically (e.g. every 6 months) have their water tested for the relevant parameters given in Table 1.

5.2.3.2 Procedures for non-complying water

All operations requiring the use of potable water must cease until the problem is rectified when:

- a. the independent supplier (e.g. local council) advises the operator that the water is not fit for drinking without additional treatment, or the operator has reason to believe that the water is not fit for use, and the operator has no other means described in the FSP or RMP to ensure the water is potable at the point of use; or

- b. if water used is supplied by the operator, and the operator fails to comply with any of the requirements of the water management plan (including corrective actions) and has no other means described in the FSP or RMP to ensure the water meets the original standard at the point of use. **[HC Spec 14]**

5.2.3.3 Handling and disposition of contaminated products

- a. if contamination with non-potable water occurs, the following actions must be carried out:
- affected product must not be used for human consumption, unless assessment by a suitably skilled person indicates that an alternative action (e.g. reprocessing) will render the product safe and suitable for human consumption
 - affected food contact surfaces must be cleaned and sanitised prior to re-use; and
 - affected packaging materials that cannot be effectively cleaned and sanitised must not be used for packing of any product.
- b. the requirements and procedures for non-complying products given in section 17 must be complied with.

5.2.3.4 Record of the assessment and corrective actions taken must be kept.

5.2.4 Additional requirements for water from an independent supply (e.g. council or town supply) with additional treatment

5.2.4.1 In addition to the requirements given in section 5.2.3 of this document, a water management plan must be documented and implemented for water from an independent supply that is further treated by the operator. **[HC Spec 12]**

Examples of additional treatment are: chlorination, ultraviolet treatment, heating or filtration.

5.2.4.2 The water management plan must include:

- a. information on any additional treatments (including type of treatment, operating parameters, procedures for control, monitoring/testing, acceptable limits)

- b. a water sampling and testing programme for monitoring the effectiveness of the specific water treatment applied (frequency as indicated in Table 2 or as necessary for the effective monitoring of any specific water treatment applied); and
- c. corrective action procedures for instances when the water source is found to be unsatisfactory based on the results of any test done.

The operator should obtain information from the supplier of the particular treatment method or equipment regarding the control and monitoring procedures (e.g. the types and frequency of water testing necessary to confirm the effectiveness of the treatment) to ensure the treatment's effectiveness and prevent it from adversely affecting the safety or quality of the water (e.g. clogging of filters).

5.2.5 Additional requirements for water supplied by the operator for their own use (e.g. water sourced from a bore, stream, river or roof)

5.2.5.1 Water management plan

In addition to the requirements given in sections 5.2.3 and 5.2.4 of this document, a water management plan must be documented and implemented for water that is supplied by the operator for their own use. It must include:

- a. an initial assessment of the water supply status by the operator by completing the *Water Supply Assessment Checklist* given in Schedule 1, part 2 of the current version of the Animal Products (Specifications for Products Intended for Human Consumption) Notice; and
- b. a documented water management plan, if required. The checklist provides a simple way of documenting the water management plan.

The *Water Supply Assessment Checklist* is used to determine whether the water source is secure or satisfactory, and if additional treatment and/or other corrective action must be applied by the operator.

Guidance on ways to keep roof water safe is provided in *Water Collection Tanks and Safe Household Water*, Ministry of Health, August 1999 (code 10148). Guidance on protecting bore and well water is provided in *Secure Ground Water (Bores and Wells) For Safe Household Water*, Ministry of Health, March 2000 (code 1129). Both documents are available from www.moh.govt.nz under the section on Information for the Public.

For more information on water safety and tank installation, *Household Water Supplies* (code 4602)

is available from the local public health service or local authority (council).

If you are concerned about your water supply, discuss with your NZFSA verifier ; or contact a Health Protection Officer at your local public health service or an Environment Health Officer at your local council. They will be able to recommend a local water testing laboratory.

5.2.5.2 Water sampling and testing

Operators with a water source which has been assessed as “secure” based on the *Water Supply Assessment Checklist* are not required to test their water after the initial testing which confirms compliance with Table 1. All other water sources are subject to ongoing testing according to the frequency given in Table 2.

- a. Potable water at the point of use must meet the criteria set out in Table 1. The minimum testing frequency required is given in Table 2.
- b. Microbiological testing must be performed by or under the supervision of a recognised signatory of a LAS (Laboratory Accredited Scheme) laboratory or an ISO/IEC 17025 accredited laboratory with the required tests in the laboratory’s scope of. A [list of LAS approved laboratories](#), including authorised representatives & general categories, is available on the NZFSA Animal Products web site under “Registers & Lists”.
- c. Water samplers must be trained by or receive instruction on how to correctly sample water from the laboratory selected.
- d. Chlorine, pH and turbidity measurements must be performed using documented methodologies (including calibration procedures) and/or calibrated equipment by a person who has the appropriate training and/or experience on the particular test.

Table 1: Quality of Potable Water

Measurement	Criteria
<i>E. coli</i> or faecal coliforms	Must not be detectable in any 100 ml sample
Chlorine (when chlorinated)	Not less than 0.2mg/l (ppm) free available chlorine with a minimum of 20 minutes contact time
pH (when chlorinated)	6.5 to 8
Turbidity	Should not routinely exceed 1 NTU, must not exceed 5 NTU

Table 2: Frequency of Testing

Daily water use	Microbiological testing	Turbidity testing	pH testing (for chlorinated water)	Chlorine testing (for chlorinated water)
< 2000 m ³ /day	1 every month	1 every month	1 every month	Daily
2000- 10,000 m ³ /day	1 every 2 weeks	1 every 2 weeks	1 every 2 weeks	Daily
> 10,000 m ³ /day	1 every week	1 every week	1 every week	Daily

5.2.5.3 Reassessment of the status of operator supplied water

The potable water supply must be reassessed by operators who supply their own water by completing the *Water Supply Assessment Checklist* at least once every 3 years and within the time specified as follows:

- in the case of a new source of water being used (that is, the source changes or a new source is added), the checklist is completed prior to use of the water; and
- in the case of any changes to the environment on or around the water source that may affect the water quality, the checklist is completed within 1 month.

5.3 Monitoring Procedures

Compliance with the documented procedures must be regularly checked by the responsible person (e.g. daily checks for chlorine level in chlorinated water).

5.4 Corrective Action Procedures

The operator must take corrective actions when any non-compliance to documented procedures occurs, or when the programme is found to be ineffective. The corrective actions must address the:

- a. restoration of control
- b. identification and disposition of affected product; and
- c. prevention of the recurrence of the loss of control.

5.5 Records

Records of the following must be kept:

- a. completed *Water Supply Assessment Checklist* (for operator supplied water)
- b. reticulation management plan
- c. water management plan, if applicable
- d. water testing results, if applicable
- e. training records; and
- f. monitoring, corrective action and verification records.

6 Control of Chemicals (Non-Food)

Amendment 0

February 2010

6.1 Scope

This section discusses the requirements and procedures for ensuring that chemicals are stored, handled, and used in a manner that minimises contamination of food, packaging, equipment, and the processing environment.

Chemicals include substances used for cleaning, sanitation, pest control, and the repair and maintenance of equipment. Chemicals are referred to as “approved maintenance compounds” under the Animal Products Act.

This programme does not apply to food additives, ingredients and processing aids, which are covered in Section 13.

The sources of hazards controlled under this programme are summarised below.

Source	Examples of hazards
Chemicals (e.g. cleaning agents, pesticides, lubricants)	Chemical residues
Chemical containers and dispensing equipment	Chemical residues

6.2 Control Measures

6.2.1 General requirement

6.2.1.1 Chemicals must be stored, handled, and used in a manner that minimises contamination of ingredients, products, packaging, equipment, and the processing environment. **[AP Reg 11(3)]**

6.2.1.2 Only approved maintenance compounds (i.e. from the [Approved Maintenance Compounds \(Non-dairy\) Manual](#)) may be used during processing operations or in the maintenance of processing areas, facilities and equipment. **[HC Spec 21(1)]**

This requirement is mandatory for businesses operating under an RMP, and recommended for those that have an FSP or operate under the Food Hygiene Regulations.

6.2.2 Inventory and labelling

6.2.2.1 A list of chemicals used and held in the premises must be maintained.

6.2.2.2 All containers of chemicals held and used within the premises must be clearly labelled with the name of the chemical. **[HC Spec 21(2)]**

For businesses operating under an RMP, it is mandatory that the chemical name on the label is in the form that it appears in the Approved Maintenance Compounds (Non-dairy) Manual, or current NZFSA letter of approval.

6.2.3 Storage

6.2.3.1 Chemicals must be stored in a designated area (e.g. shelf, cupboard, room) and kept separate from products, ingredients, packaging and other product contact materials.

6.2.3.2 Chemicals must be kept in sealed containers when not in use.

6.2.3.3 Any container or utensil used to measure, store or pour chemicals must be clearly identified (e.g. labelled as 'For Chemicals Only'), and must not be used for any other purpose.

6.2.3.4 Storage areas must be kept clean and tidy.

6.2.4 Use

6.2.4.1 All chemicals must be used according to the directions of the manufacturer and, if applicable, any conditions of the NZFSA approval.

6.2.4.2 Directions for use must be readily available to the user (e.g. given on the label, posted on the wall or in product information data sheets).

6.2.4.3 Chemicals must be handled and used by or under the supervision of suitably skilled persons.

6.2.4.4 Ingredients, products and exposed packaging must be removed from the area or kept protected (e.g. covered) prior to the use of any chemical which may result in their contamination.

6.2.4.5 Equipment and other product contact surfaces must be cleaned by thorough washing after exposure to any chemical, except for no-rinse-type chemicals that have been approved for that purpose.

6.2.5 Disposal of chemical containers

6.2.5.1 Empty chemical containers must be disposed of in a manner that will not contaminate any product or product contact surfaces, and in accordance with manufacturer's instructions.

6.2.5.2 Empty chemical containers must not be re-used for any other purpose within the premises.

6.3 Monitoring Procedures

Compliance to documented procedures must be regularly checked by the responsible person at a frequency that will ensure consistent and ongoing effectiveness of the programme (e.g. weekly checks of chemical storage and labelling; observations of personnel using chemicals).

6.4 Corrective Action Procedures

6.4.1 The operator must take corrective actions when any non-compliance to documented procedures occurs, or when the programme is found to be ineffective. The corrective actions must include an assessment to determine the cause and extent of the non-compliance, and must address the:

- a. restoration of control
- b. identification and disposition of any affected product; and
- c. prevention of the recurrence of the loss of control.

6.4.2 When chemical contamination occurs, the following actions must be carried out:

- a. affected food must be considered unfit for human consumption
- b. affected product contact surfaces must be cleaned and when appropriate, sanitised prior to reuse; and
- c. affected packaging materials that cannot be effectively cleaned and sanitised must not be used for packing of any product.

6.5 Records

Records of the following must be kept:

- a. list of chemicals used and held in the premises
- b. any chemical information sheets provided by the supplier, including instructions for handling and use
- c. training records; and
- d. monitoring, corrective action and verification records.

7 Cleaning and Sanitation

Amendment 0

February 2010

7.1 Scope

This section discusses the requirements and procedures for ensuring that all areas within the premises, facilities and equipment are maintained in a hygienic and sanitary condition.

The sources of hazards controlled under this programme are summarised below.

Source	Examples of hazards
Facilities and equipment	Bacterial pathogens (e.g. <i>Listeria monocytogenes</i> , <i>E. coli</i> spp.)
Waste	Bacterial pathogens (e.g. <i>E. coli</i> spp., <i>Salmonella</i> spp.)
Cleaning chemicals	Chemical residues
Cleaning implements (e.g. mops, cloths)	Bacterial pathogens (e.g. <i>Listeria monocytogenes</i> , <i>E. coli</i> spp)

7.2 Control Measures

7.2.1 Documented cleaning programme

7.2.1.1 The operator must develop and document a cleaning and sanitation programme for processing areas, storage areas, freezers and chillers, equipment, amenities, and external areas of the premises. **[AP Reg 11, Food Act Section 8G]**

7.2.1.2 The programme must include the following information:

- areas/equipment to be cleaned
- procedures and work instructions for all cleaning and sanitising operations, including instructions on how to dismantle and re-assemble equipment

- detergents/sanitisers to be used, their concentration, application method, and contact time required
- frequency of cleaning
- personnel responsible
- methods of monitoring and verifying the effectiveness of the cleaning and sanitation procedures; and
- records of compliance to the programme.

7.2.1.3 The cleaning programme must be appropriate to the type of product and the operation.

Most processing areas will require a wet cleaning routine. Dry cleaning will be more appropriate for areas where dry materials are handled and stored (e.g. dry store room, dry ingredient weighing or batching areas). Other areas will require a combination of both methods, for example, the packing area should be kept dry during operations and therefore should only be dry cleaned during processing, but will require wet cleaning at the end of the production day.

7.2.2 General cleaning procedures

7.2.2.1 Cleaning must be carried out in a manner that prevents the contamination of ingredients, products, equipment and other product contact materials (e.g. packaging material); or previously cleaned areas, facilities or equipment.

7.2.2.2 Workers must be adequately trained on the handling of cleaning chemicals and the implementation of the cleaning programme.

7.2.2.3 The cleaning method must be appropriate to the type of surface to be cleaned, and the type and characteristics of the material to be removed.

7.2.2.4 Cleaning compounds must be used in accordance with section 6.

The selection of the cleaning and sanitising method, and cleaning compound should be based on the:

- a. type of surface (e.g. metal, plastic, tile)
- b. type of contamination (e.g. blood, protein, fat, starch, cooked-on product)
- c. application method
- d. water quality (e.g. hardness)
- e. water temperature (hot water sets blood but melts fat); and
- f. time available for cleaning.

Cleaning can be done using various methods such as manual cleaning (e.g. scrubbing by hand); use of pressure, foam or gel; soaking; and in-place cleaning. Operators should consult reputable suppliers of cleaning chemicals on the most suitable detergent and application methods.

Sanitising can be done using:

- a. steam - all surfaces should be heated for a specified time and temperature
- b. hot water - for a specified time and temperature, usually for knives, gloves and small utensils; or
- c. chemicals - application of approved sanitisers (e.g. halogens, quaternary ammonium compounds) at the concentration and for the time recommended by the manufacturer.

7.2.3 Pre-operational check

7.2.3.1 Pre-operational checks of facilities and equipment must be conducted by a suitably skilled person to ensure that operations only begin after sanitation requirements have been met.

The person responsible for doing pre-operational checks should have good knowledge of the cleaning methods and the criteria for assessing cleanliness. He/she should be able to assess the potential effect of particular defects on product safety and determine appropriate corrective actions for any non-compliance.

Visual inspection of cleaned surfaces is the simplest and quickest way of assessing cleanliness. In addition to visual inspection, other methods may also be applied (e.g. ATP method, rapid microbiological test methods).

Defects observed during pre-operational checks should be categorised or ranked based on their potential effect on product contamination and product safety. This assists in the setting of appropriate corrective actions. It is common practice in the meat industry to categorise defects as:

- critical - a defect that will result in direct contamination of a product (e.g. dirty food contact surfaces; condensation from an overhead structure directly above exposed products or product contact surfaces)
- major - a defect that may result in direct or indirect contamination of a product (e.g. dirty/contaminated surfaces which are handled by workers which may lead to cross-contamination, e.g. residue build-up on door handles or equipment knobs; dirty surfaces that are in close proximity to a product contact surface).
- minor - a defect which is unlikely to result in contamination of a product (e.g. dirty surfaces that are not near a product contact surface and are unlikely to come into contact with exposed product, product contact surfaces, packaging or workers, e.g. an isolated speck of product residue on a table leg, wall or drain).

Defect scores are allotted to each category, with the scores reflecting the severity of the defect, and a limit for total defect scores is established. The daily total defect scores achieved can then be tabulated or graphed so that trends and repetitive failures can easily be detected.

7.2.3.2 Observations made during pre-operational inspection and corrective actions for any deficiencies identified must be documented in an appropriate checksheet or record form.

7.2.3.3 If immediate corrective action is required (e.g. for critical and major defects), the corrected item must be rechecked before operation begins, and the outcome of this recheck must also be included in the record.

7.2.3.4 The operator must investigate and correct the causes of repetitive failures of the cleaning and sanitation programme.

7.2.4 Wet cleaning of processing areas and equipment

7.2.4.1 Processing areas and equipment (except dry areas/equipment) must be wet cleaned using effective cleaning and sanitising procedures.

Cleaning should commence without delay after finishing the day's operation, because the more the dirt ages, the more difficult it is to remove from equipment surfaces. However, cleaning of facilities and equipment which are no longer in use should not be started if there are still exposed products and packaging within the area and there is potential for them to be contaminated from splashes and aerosols created during cleaning.

A basic cleaning and sanitising system includes the following steps:

- a. removal of gross contamination (e.g. removing scraps)
- b. rinsing the area with cold or warm water ($\leq 60^{\circ}\text{C}$ to prevent coagulation of protein, which makes it extremely difficult to remove)
- c. applying a detergent solution or foam and leaving it on all surfaces for the time specified by the manufacturer
- d. scrubbing surfaces to loosen and remove dirt
- e. rinsing detergent solution off with potable water, and draining
- f. if scale has to be removed, an acid detergent is used at this stage, followed by rinsing and draining
- g. applying a chemical sanitiser and leaving it on all surfaces for the time specified by the manufacturer
- h. rinsing off the chemical sanitiser with potable water and draining (not needed if a no-rinse sanitiser is used); and
- i. allowing surfaces and equipment to dry.

7.2.4.2 Potable water must be used for wet cleaning of facilities and equipment.

7.2.4.3 Ingredients, products, packaging material and other materials that may be contaminated during cleaning must be removed from the area and stored in appropriate locations, or they must be protected by covers, before wet cleaning is started.

7.2.4.4 Cleaning water and steam must be contained within the immediate area that is being wet cleaned.

7.2.4.5 Floors must be cleaned by hosing or other effective means daily. Water must be drained or removed completely.

Only low to medium pressure hosing should be used. High pressure hosing causes splashing, and can create aerosols capable of carrying contaminants and microorganisms for considerable distances.

Any pooling of water should be swept into the drain as soon as possible.

7.2.4.6 Drains must be kept clear during production without any obstruction to the continuous flow of waste water. Drain traps should be cleared regularly to prevent blockage causing back-up further up the line.

7.2.4.7 Drains, including covers and screens, must be cleaned and sanitised daily.

The cleaning of drains is part of routine cleaning at the end of the day's operation. Drains, particularly in cooked or RTE areas, should also undergo more intensive cleaning at regular frequencies (e.g. weekly) using chemicals suitable for removing any build-up of residues and microorganisms.

7.2.4.8 Walls and doors must be cleaned daily by hosing or other effective means to remove any visible contamination.

More intensive cleaning (e.g. foaming and scrubbing) at regular frequency (e.g. weekly) should be done to remove any build-up of residues and microorganisms.

Walls adjacent to and ceilings above, thermal processing equipment can develop stains which cannot be removed by regular cleaning. Stains may make it difficult to assess the visual cleanliness of the surface, so other means of demonstrating the effectiveness of cleaning may be necessary (e.g. microbiological testing of surfaces). Surfaces which become excessively stained should be replaced. Ways of effective containment or venting of heat or steam from thermal processing equipment should be considered to minimise staining of adjacent walls and ceilings.

7.2.4.9 Ceilings and overhead structures in processing areas must be checked regularly and cleaned at an appropriate frequency.

Any overhead structure which is a constant source of contamination should be regarded as a product contact surface and be cleaned at a frequency required for product contact surfaces. Condensation on overhead structures directly above product is regarded as a critical defect, and should be removed before processing can continue. Products should be removed from the area or be protected while the problem is being fixed, and when necessary, equipment and product contact surfaces should be cleaned and sanitised before processing is restarted.

7.2.4.10 Product contact surfaces, including processing and conveying equipment, must be cleaned:

- at least at the end of each working day
- whenever surfaces become contaminated or come into contact with waste; and
- whenever necessary to prevent cross-contamination between:
 - raw and RTE products
 - products of different allergenic status; and
 - products with specific claims (e.g. organic).

1. Processing equipment that must be cleaned daily include: grinders, injectors, bowl choppers and mixers, fillers, slicers, dicers, water cookers, water cooling tanks, and packaging equipment.
2. Water thawing tanks should be emptied and cleaned after each thawing cycle.
3. Tumblers and massagers should be cleaned daily, or after each tumbling/massaging cycle, if the cycle takes more than 24 hours.
4. Equipment or machinery (e.g. grinders) which is used intermittently during the day, and/or located in non-refrigerated rooms, may need to be cleaned more frequently to minimise the build-up of microorganisms on the equipment which may contaminate subsequent batches of product.

Equipment which has been used but is temporarily idle should be cleaned before re-use if the delay is in excess of 4 hours. More frequent cleaning may be necessary if the equipment is located in a non-refrigerated room.

5. The following areas of benches, tables, trolleys, racks and frames should be given

particular attention during cleaning:

- a. underside surfaces
 - b. legs
 - c. wheels and rollers; and
 - d. points where dirt and food scraps can accumulate.
6. Conveyors are usually difficult to clean because of crevices which are part of the design. Conveyors should be pre-cleaned to remove build-up of dirt and food scraps, followed by low pressure rinsing and application of foam detergent/sanitiser. Particular attention should be given to the following areas during cleaning:
- a. underside of belts
 - b. under drive motor covers
 - c. supports for plastic and fibre belts
 - d. hollow rollers; and
 - e. points where dirt and food scraps can accumulate.

7.2.4.11 Cleaning procedures for smoke houses and dry ovens, appropriate to their type and operation, must be developed and implemented to maintain them in a hygienic condition.

Scraps and gross contamination should be removed from ovens, smoke houses, oven trays and trolleys daily. All surfaces of this equipment, including smoke house drains, should be cleaned and sanitised weekly.

7.2.4.12 Worn or frayed conveyors and belts must be replaced because they are impossible to clean effectively.

7.2.4.13 Equipment and machinery that require disassembly for effective cleaning must be disassembled in accordance with manufacturer's instructions and to the extent necessary to ensure cleaning and sanitising of all parts and surfaces, including hard-to-reach areas where product residue can build up.

Cleaned equipment parts should be placed on clean tables, trolleys or shelves while drying to prevent their recontamination.

7.2.4.14 When footbaths are used, they must be maintained properly with effective concentrations of sanitiser so that they do not become a source of contamination.

An automated foam disinfectant spray may be used on the floor where people, carts, trolleys, etc. enter the area.

7.2.5 Dry cleaning of dry processing and storage areas

7.2.5.1 Dry processing areas and stores must be kept dry, and be cleaned regularly by appropriate dry cleaning methods.

Dry cleaning methods include brushing, scraping, sweeping, vacuuming, and blowing with compressed air. The cleaning method should minimise the creation of dust and air-borne contamination.

7.2.5.2 When vacuum cleaning systems are used:

- a. filters must be changed regularly
- b. dust bags must be removed and replaced in a way that will not result in the contamination of any product or product contact surface; and
- c. portable vacuum cleaners must not be dismantled for cleaning in a food area.

7.2.5.3 Products, dry ingredients, packaging and other materials must be stacked and stored in a tidy manner. Adequate space must be available to allow effective cleaning in storage areas.

Products, ingredients, packaging and other materials should be stored off the floor (e.g. on clean pallets).

7.2.5.4 Spills (e.g. dry ingredients) must be cleaned up immediately and disposed of appropriately.

7.2.6 Cleaning of post- processing areas and equipment

Post-processing or RTE areas include the processing, slicing and packing areas where exposed cooked or RTE products are handled, packed and stored. More stringent controls, including the effective implementation of cleaning and sanitation procedures, are required in these areas to prevent or minimise post-process contamination of products. Controls should be particularly targeted to prevent *Listeria* contamination of products, product contact surfaces and the processing environment.

7.2.6.1 Product contact and non-product contact surfaces, utensils, equipment, fixtures and fittings must be thoroughly cleaned and sanitised:

- a. after raw products have been handled or processed
- b. between processing of raw and RTE products; and
- c. at the end of each day.

When slicing and packing RTE products, the slicer, work tables and other food contact surfaces should be sprayed with a no-rinse sanitiser before starting slicing at the start of each day and at regular intervals during the day (e.g. before breaks).

7.2.6.2 Detergents and equipment sanitisers that have good activity against *L. monocytogenes* must be used for cleaning and sanitising.

7.2.6.3 Wet cleaning (e.g. hosing) of facilities and equipment during processing must not be done as this can cause splashing and create aerosols which may contaminate products and product contact surfaces.

7.2.6.4 The packaging room must be wet cleaned at the end of each day's operation.

7.2.6.5 The ceiling must be cleaned regularly to prevent contamination of products from condensation and other contaminants.

7.2.6.6 Condensation on the ceiling and any overhead structures due to the use of hot water or steam during cleaning must be removed before the start of operation.

7.2.6.7 Cleaning equipment and materials must be effectively sanitised regularly so that they do not become a source of contamination.

Different cleaning equipment and materials should be used for cleaning processing equipment and facilities in raw and RTE processing areas.

7.2.6.8 When footbaths are used, they must be maintained properly with effective concentrations of sanitiser so that they do not become a source of contamination.

An automated foam disinfectant spray may be used on the floor where people, carts, trolleys, etc. enter the area.

7.2.7 Cleaning of chillers and blast freezers

7.2.7.1 Chillers and freezers must be maintained in a tidy condition.

7.2.7.2 Chillers and freezers must be emptied, and cleaned and sanitised regularly.

The frequency of cleaning chillers is dependent on their use and the type of product held in them. Chillers used for cooling of cooked products or holding of unpackaged RTE products should be cleaned and sanitised more often (e.g. weekly) than storage chillers which hold packed products. The frequency of cleaning fans, evaporators and/or fumigating the room should be determined according to the type of product held in the room and any microbiological results from monitoring the air. In the absence of microbiological monitoring, the fans and evaporators should be cleaned at least once every three months and whenever any substantial maintenance work is carried out in the chiller or to its refrigeration equipment. Freezers used for tempering or freezing products (i.e. blast freezers - not storage freezers) should be emptied and cleaned periodically (e.g. once every six months).

7.2.8 Cleaning of air conditioning and refrigeration units

7.2.8.1 The cleaning coils, fans, drip trays, drainage pipes, and vents of air conditioning units must be cleaned regularly.

7.2.8.2 Filters of the cold air ducting system must be cleaned or replaced regularly.

The frequency of cleaning should take into consideration the nature of the operation and the type of product being handled within the area where the air conditioning or refrigeration unit is located. For example, for raw product areas, monthly cleaning may be sufficient, but for RTE areas cleaning may need to be done more frequently. The effectiveness of the cleaning procedures and the adequacy of the cleaning frequency can be verified by the environmental monitoring programme (refer to section 18.4).

The ducts which transport cold air from the refrigeration unit out to vents cannot be effectively cleaned and sanitised by the usual manual methods. Sanitising is best done using a fogging machine. If possible, the fogger should be placed in the ducting system and the sanitiser allowed to be blown through the overheads and down into the room.

7.2.9 Cleaning of amenities

Amenities must be cleaned at least daily and maintained in a hygienic condition throughout the day.

7.2.10 Maintenance and storage of cleaning equipment

7.2.10.1 Cleaning implements and equipment must be maintained in a hygienic condition and must not introduce any hazard or foreign object to any ingredient, product, packaging or product contact surface.

Porous and absorbent items (e.g. rags, wooden handled tools) should not be used in processing areas as they are difficult to clean and they harbour bacteria.

Steel wool should not be used for cleaning in processing areas.

Cleaning implements and equipment should be sanitised daily (e.g. soaked in sanitiser solution), and maintained in a good state of repair.

7.2.10.2 Different cleaning implements (e.g. brushes) must be used for product and non-product surfaces (they can be differentiated by colour-coding).

7.2.10.3 Hoses must be stored off the ground on reels or racks when not in use.

7.2.10.4 Cleaning equipment must be stored in a hygienic manner in designated facilities away from areas where unpackaged products are handled, processed or stored.

7.2.11 Removal of waste materials

7.2.11.1 Waste must be:

- a. collected in clearly identified waste containers
- b. kept under controlled conditions to ensure that it will not be mistakenly or fraudulently released as suitable for processing or fit for human consumption; and
- c. be disposed of in a manner that ensures that it will not become a source of contamination to other animal material or animal product. **[HC Spec 20]**

7.2.11.2 Waste must be removed from processing areas at least daily.

Waste should not be allowed to accumulate in processing areas. If necessary, waste should be periodically removed from processing areas during the working day.

7.2.11.3 Waste bins in processing areas that are taken to areas of lower hygienic status must be cleaned and sanitised before being returned to processing areas.

7.2.11.4 Outside waste bins must be covered, maintained in a tidy condition, and collected regularly so that they do not attract pests and create objectionable odours.

7.3 Monitoring Procedures

7.3.1 The operator or responsible person must regularly check for compliance to documented procedures and the effectiveness of the cleaning and sanitation programme. The frequency of monitoring must be sufficient to give confidence that the cleaning and sanitation programme is operating effectively.

The general criteria for clean product contact surfaces and facilities are:

- a. no visible contamination

- b. work surfaces should not feel greasy when rubbed with fingers
- c. a clean, white tissue should not be discoloured when rubbed over the surface of cleaned stainless steel (this does not apply to galvanised iron or aluminium)
- d. objectionable smells should not be noticeable
- e. cleaned surfaces should not show signs of excessive water break when wetted
- f. cleaned and sanitised surfaces should have a microbial population below a set maximum number, this number depending on the product, its stage of processing, and its required storage life.

It is difficult to suggest what is an acceptable number of microorganisms remaining on a surface after cleaning and sanitising as this is dependent on the food product, process, 'risk area' and degree of cleaning and sanitation undertaken. Microbiological guidelines for surfaces after cleaning in food premises vary widely. Various aerobic plate count (APC) levels have been suggested including $<2.5 \text{ cfu/cm}^2$ (Winfield and Campbell, 1990; Griffith, 2005), $<10 \text{ cfu/cm}^2$ (Brown and Baird Parker, 1982; EC Decision 2001/471/EC), and $<100 \text{ cfu/cm}^2$ (Holah, 2003).

It may be best to set internal standards as a measurement of what can be achieved by a given cleaning and sanitation programme. A typical approach suggested by Holah (2003) would be to assess the level of microorganisms on a surface after a series of 10 or so carefully controlled sanitation programmes in which detergent and disinfectant concentrations are correct, contact times are adhered to, water temperatures are checked, pressure hoses are set to specified pressures, sanitation schedules are followed, etc. The mean result will provide an achievable standard (or standards if specific areas differ significantly in their cleanability) which can be immediately used and can be reviewed as subsequent data points are obtained in the future. A review of the standard would be required if either the food product, process or the sanitation programme were changed.

As an example of microbiological levels achieved in commercial operations, APC_{30} for clean product contact surfaces in raw poultry processing operations in New Zealand is typically $<100 \text{ cfu/cm}^2$. Setting a lower maximum limit for surfaces that come into direct contact of cooked or RTE products is recommended.

In addition to determining APC levels on cleaned surfaces, testing for specific pathogens in the processing environment relevant to the product (e.g. *Listeria monocytogenes* in RTE meat products) should also be done to verify the effectiveness of the cleaning and sanitation programme (refer to section 18.4 for information on environmental testing).

References

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Winfield, J. and Campbell, A. (1990) Chapter 10: Assessment of cleaning efficiency. *In CIP: Cleaning in Place.* ed. Romney, A.J.D. The Society of Dairy Technology, Huntingdon, Cambridgeshire.

7.4 Corrective Action Procedures

The operator must take corrective actions when any non-compliance to documented procedures occurs, or when the cleaning and sanitation programme is found to be ineffective. The corrective actions must address the:

- a. restoration of control (recleaning, increase in monitoring)
- b. identification and disposition of affected product; and
- c. prevention of the recurrence of the loss of control (e.g. retraining of workers, changing procedures).

7.5 Records

Records of the following must be kept:

- a. cleaning records
- b. pre-operational checksheets
- c. list of cleaning chemicals
- d. microbiological test results
- e. training records; and
- f. monitoring, corrective action and verification records.

8 Pest Control

Amendment 0

February 2010

8.1 Scope

This section discusses the requirements and procedures for the effective control of pests. Pests include rodents, birds, insects, dogs and cats.

The sources of hazards controlled by this programme are summarised below:

Source	Examples of hazards
Insects, rodents, birds, cats and dogs and other pests	Bacterial pathogens (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>E.coli</i> spp., <i>Listeria monocytogenes</i>)
Pesticides	Chemical residues

8.2 Control Measures

8.2.1 Pest control programme

8.2.1.1 The operator must document and implement a pest control programme to minimise the exposure of ingredients, products, packaging, equipment, and the processing environment to hazards associated with pests. **[AP Reg 11(2) and (3)]**

8.2.1.2 The programme must include the following information:

- the identity of the person or agency responsible for the implementation of the programme
- procedures for the control of pests, and the monitoring and verification of pest control activities
- corrective action procedures that are to be applied in the event of loss of control; and
- records to be kept.

The operator may employ a pest control person or agency to develop and implement a pest control system (e.g. set up traps, spraying programme) and monitor the premises. The operator is responsible for ensuring that the pest control person or agency is competent to perform the task, and complies with the relevant requirements of this programme.

8.2.2 Prevention of infestation and access of pests

8.2.2.1 Premises, facilities, equipment and essential services must be designed, constructed, located and operated in a manner that minimises the exposure of products to hazards and other contaminants. **[AP Reg 10]**

8.2.2.2 Buildings and storage facilities (including water storage tanks) must be kept in good repair and condition to prevent pest access and to eliminate potential breeding sites.

8.2.2.3 Holes, drains and other places where pests are likely to gain access must be sealed, or provided with screens or similar materials that prevent the entry of pests.

8.2.2.4 External doors that are not screened must be kept closed at all times when not in use.

8.2.2.5 Internal and external areas of the premises must be kept clean and tidy. The external environment must be checked regularly and kept free of any food source and breeding sites (e.g. long grass, bird's nest, food waste).

Areas that are likely to attract flies and other insects should be sprayed, as necessary.

8.2.2.6 Dogs, cats and other mammalian pests must not be allowed access into the premises (i.e. buildings and external areas within the scope of an FSP or the boundaries of an RMP).

8.2.2.7 Waste materials must be kept in covered pest-proof containers, and regularly collected and disposed of.

8.2.3 Use of pesticides

8.2.3.1 Pest control chemicals (rodenticides and insecticides) must be handled, used and stored according to the procedures given in section 6.

8.2.3.2 Pest control chemicals must be used by suitably skilled personnel and in accordance with the directions of the manufacturer and, if applicable, any conditions of the NZFSA approval.

8.2.3.3 Insecticides that have any residual activity or are dispensed as continuous aerosols must not be used in any processing or storage area in a manner that could cause the contamination of products or product contact surfaces.

8.2.3.4 Products and exposed packaging must be removed from the area or kept protected (e.g. covered) prior to the use of pest control chemicals which may contaminate them.

8.2.3.5 Equipment and other product contact surfaces must be cleaned by thorough washing after exposure to any pest control chemical (i.e. after spraying with insecticide is completed).

8.2.4 Use of pest traps

8.2.4.1 Pest traps (including rodent boxes, bait stations and electric insect traps) must be located where they do not present a risk of contamination to any product.

8.2.4.2 Bait stations must not be located inside any processing area.

The location of pest traps should be identified on a site or building plan, or other suitable record.

8.2.4.3 Rodenticides must be used only in enclosed bait stations.

8.2.4.4 Bait stations must be checked regularly for the following:

- a. correct location as indicated in the plan or record, and presence of bait. The box should be cleaned and rebaited with an approved rodent bait, as necessary
- b. evidence of pest activity (e.g. nibbled bait, bait missing, droppings); and
- c. boxes are in good working condition and identification is easily legible.

8.2.4.5 Insect traps, which include ultra-violet lamps, pheromone traps and any form of attractant device, must:

- a. be constructed in a manner that facilitates the capture and removal of insects (e.g. by providing a suitable drawer, tray or adhesive mat for catching and securing insects)
- b. not cause any air-borne contamination; and
- c. not be located where insects may fall on to product, packaging, or product contact surfaces.

8.3 Monitoring Procedures

Compliance to documented procedures must be regularly checked by the responsible person at a frequency that will ensure consistent and ongoing effectiveness of the programme.

The frequency for monitoring of traps should be determined relative to the type of trap and the degree of pest activity noted. Increased monitoring and appropriate corrective actions should be implemented when increased rodent activity is observed.

8.4 Corrective Action Procedures

8.4.1 The operator must take corrective actions when any non-compliance to documented procedures occurs, or when the pest control programme is found to be ineffective. The corrective actions must address the:

- a. restoration of control
- b. identification and disposition of affected product; and

- c. prevention of the recurrence of the loss of control.

8.4.2 When there is evidence of contamination from pests, the following actions must be carried out:

- a. affected product must be considered unfit for human consumption
- b. affected product contact surfaces must be cleaned and sanitised prior to reuse; and
- c. affected packaging materials that cannot be effectively cleaned and sanitised must not be used for packing of any product.

8.5 Records

Records of the following must be kept:

- a. details of contracted pest control person or agency, if applicable
- b. location of bait stations or other traps (e.g. site plan)
- c. list of pest control chemicals used
- d. name, amount and point of use of any pest control chemicals used
- e. training records; and
- f. monitoring, corrective action and verification records.

9 Repairs and Maintenance

Amendment 0

February 2010

9.1 Scope

This section discusses the requirements and controls for the repairs and maintenance of buildings, facilities and equipment to ensure that they are maintained in a good working and hygienic condition.

The sources of hazards controlled under this programme is summarised in the table below:

Source	Example of hazards
Building, machinery, processing equipment	Bacterial pathogens (e.g. <i>Listeria monocytogenes</i> , <i>Salmonella</i> spp.) Chemical residues (e.g. lubricants) Metal pieces (e.g. bolts, screws, metal filings)
Maintenance personnel	Bacterial pathogens (e.g. <i>Salmonella</i> spp, <i>E. coli</i> spp., <i>Staphylococcus aureus</i>), Hepatitis A virus Metal or plastic pieces from personal items (e.g. jewellery, pens)
Maintenance tools, equipment, chemicals	Bacterial pathogens Chemical residues from maintenance compounds Parts of maintenance tools/equipment (e.g. metal pieces, plastic)

9.2 Control Measures

9.2.1 Documented programme

The operator must document and implement a repairs and maintenance programme for the premises, facilities and equipment to ensure that they are maintained in good working and hygienic condition. **[AP Reg 11 (1); Food Act Section 8G]**

The repairs and maintenance programme should include the following information:

- a. identity of the responsible person
- b. procedures for routine or programmed maintenance (i.e. preventive maintenance), including monitoring activities and their frequencies
- c. procedures for facilities and equipment breakdowns
- d. corrective actions
- e. procedures for inspection of any completed repairs or maintenance work; and
- f. records to be kept.

For small operations with simple processes, a checklist for repairs and maintenance, rather than a full documented programme, may be sufficient.

9.2.2 Hygienic practices

9.2.2.1 Repairs and maintenance work must be done in a manner that minimises contamination of ingredients, products, packaging, equipment and the processing environment.

9.2.2.2 Prior to any alteration, repair or maintenance work on buildings, facilities or equipment, a suitably skilled person must assess its potential for contaminating ingredients, products, packaging, equipment and the processing environment; and put in place appropriate controls to minimise their exposure to contamination.

When making the assessment, the suitably skilled person must take the following into consideration:

- a. the type and extent of the work (e.g. is it a major or minor repair, could it cause air-borne contamination or splashes)
- b. the potential for exposure of products, packaging, or equipment to contamination; and controls for protecting them
- c. the type of food and processing area affected (e.g. RTE area versus raw processing area)
- d. the movement of maintenance workers; and

- e. the maintenance equipment, tools and materials to be used (i.e. could they be a source of contamination).

9.2.2.3 Major alterations on the premises and facilities, and routine or programmed maintenance of equipment that may affect hygienic operations or cause contamination of ingredients, products, packaging and the processing environment must not be done during processing.

9.2.2.4 Corrective maintenance or minor repairs may be done during processing only when they can be carried out in a hygienic manner (i.e. ingredients, products, packaging, and other equipment are protected from contamination).

Note that normal in-process adjustments to machinery or equipment (e.g. changing of mincer blades) are not considered to be maintenance activities. In these circumstances, care is still needed to ensure that the products are protected from contamination and appropriate cleaning and sanitation occurs afterwards.

The person in charge of processing should be notified prior to any repair or maintenance work being done during processing.

9.2.2.5 All maintenance personnel must comply with the requirements for personnel hygiene appropriate to the area they are operating in, including access restrictions, hygienic practices, and protective clothing requirements.

9.2.2.6 Chemicals used during repairs and maintenance must be used in accordance with any specified conditions of their approval and the manufacturer's instructions.

RMP operators may only use approved maintenance compounds when carrying out repairs and maintenance activities. Refer to section 6.

9.2.2.7 Tools used for repairs and maintenance must not come in contact with, or cause the contamination of any ingredient, product, or packaging material.

Tools should be cleaned, and, whenever possible, be sanitised before being taken into processing areas.

Tools should be immediately removed from the area after maintenance or repair work is completed. Tools should be stored in a designated place (if owned by the operator), and be maintained in a hygienic condition.

When practical, it is recommended that operators have maintenance tools dedicated for use in specific areas of their operation to avoid cross-contamination.

9.2.2.8 After completion of any repair or maintenance work and prior to starting processing, the responsible person must check that:

- a. the facility or equipment has been repaired to a satisfactory working condition
- b. all maintenance tools and pieces of equipment (e.g. nuts, bolts) are removed from the area to prevent contamination of products; and
- c. the affected processing area and equipment are cleaned and sanitised, as needed.

9.2.2.9 Records of the checks must be kept.

9.2.3 Equipment breakdown during processing

9.2.3.1 When equipment breaks down during processing, and repairs cannot be carried out in a hygienic manner:

- a. the defective equipment must be removed from the processing environment to be repaired somewhere else while production continues; or
- b. products, ingredients and packaging that could potentially be contaminated while repairs are made must be protected from contamination or removed from the affected area prior to making the repairs.

9.2.3.2 A suitably skilled person must assess the fitness for intended purpose of any products affected by an equipment breakdown and determine their disposition.

9.3 Monitoring Procedures

Compliance to documented procedures must be regularly checked by the responsible person at a frequency that will ensure consistent and ongoing effectiveness of the programme.

Examples of monitoring activities are: daily pre-operational check of certain equipment; checks after completion of every repair work; and monthly preventive maintenance checks of facilities and equipment.

9.4 Corrective Action Procedures

The operator must take corrective actions when any non-compliance occurs. The corrective actions must include an assessment to determine the cause and extent of the non-compliance, and must address:

- a. how the problem will be fixed (e.g. repair or replace equipment)
- b. the identification and disposition of any affected product; and
- c. the prevention of the recurrence of the problem (e.g. change design of equipment or facility; retraining of workers using the particular equipment).

9.5 Records

Records of the following must be kept:

- a. repairs and maintenance work sheets
- b. pre-operational check sheets
- c. training records; and
- d. monitoring, corrective action and verification records.

10 Calibration of Measuring Devices

Amendment 0

February 2010

10.1 Scope

This section discusses the requirements and controls for the calibration of measuring devices to ensure they provide accurate measurements. Measuring devices include: temperature measuring/recording devices, timing devices, scales, temperature control units, metal detectors, water activity meters, pH meters and other specialised control instruments.

10.2 Control Measures

10.2.1 Measuring devices (whether stand-alone or forming part of a piece of equipment) must:

- a. have the accuracy, precision, and conditions of use appropriate to the task performed
- b. be calibrated against a reference standard showing traceability of calibration to a national or international standard of measurement (where available), or (if no such standard exists) be calibrated on a basis that is documented in, or incorporated by reference into, the FSP or RMP; and
- c. be uniquely identified (e.g. by using serial numbers, indelible tags or other permanent means of identification) to enable traceability of the calibrations and to identify calibration status. **[HC Spec 28 (1)]**

10.2.2 The operator must document a calibration programme that includes:

- a. a list of the measuring devices and their identification marks
- b. the calibration frequency for each measuring device
- c. the calibration method/procedures for each measuring device, taking into consideration the stability of the device, the nature of the measurement, and the manufacturer's instructions **[HC Spec 28 (2)]**

- d. the person or agency who will perform the calibration
- e. how the calibration date and any correction factor will be affixed to the measuring device
- f. the maximum error allowed before corrective action is taken (e.g. $\pm 1\text{g}$, $\pm 1^\circ\text{C}$)
- g. the corrective action to be taken when the measuring device does not meet specification; and
- h. the records to be kept.

Records of all calibration activities should include the:

- a. identification and location of equipment
- b. date
- c. person in charge of calibration
- d. reason for calibration
- e. calibration results; and
- f. calibration corrective action.

10.2.3 Safeguards must be in place to prevent unauthorised adjustments to the calibration of the measuring device, including movement of the device when this may invalidate the calibration. **[HC Spec 28 (3)]**

10.2.4 Reference standards (e.g. reference thermometer or reference weights) must have a current calibration certificate before they can be used. The certificate must be issued by an accredited person or agency.

Aside from a calibration certificate or certificate of accuracy, newly purchased measuring devices should be provided with written calibration instructions, including methods and frequencies.

10.2.5 Devices used for making critical measurements (i.e. for monitoring of critical limits), including reference thermometers, metal detectors and scales, must be calibrated by an accredited agency, or the equipment manufacturer must provide assurance or guarantee of the instrument's accuracy.

The reference thermometer should only be used for checking working thermometers.

10.2.6 In-house routine checks of measuring devices must be carried out against reference standards at regular and established frequencies by suitably skilled personnel.

Table 3: Recommended Calibration Methods and Frequencies

Measuring device	Method	Frequency	Person/agency responsible
Standardised thermometer (reference thermometer)	Standardised against a national or international standard	Once every 1- 5 years	Accredited/ approved laboratory
Working thermometers	Calibrated against a reference thermometer	Annually	Accredited person or agency
	Ice point and/or boiling point method, as appropriate (Refer to methods in following box)	Those used daily for monitoring critical limits – weekly or fortnightly Other working thermometers - monthly	Suitably skilled person
CATR	Calibrated against a reference thermometer	Annually	Accredited person or agency
Smokehouse/cooker probe and temperature recorder (e.g. data logger)	Calibrated against a reference thermometer	Data logger and probe - annually	Accredited person or agency
	Calibrated against a reference thermometer (in-house check)	Probe - monthly, if used to determine the final product temperature and the cooking schedule	Suitably skilled person
Weighing scales (ingredient and product scales, platform scales)	Check against test weights	Daily	Suitably skilled person
Weighing scales (e.g. final product scales)	Certify for accuracy as per the Weights and Measurements Act 1987	Annually	Accredited person or agency

Measuring device	Method	Frequency	Person/agency responsible
Test weights	Standardised against a national standard	Annually	Accredited/ approved laboratory
Water activity meter	Calibration against standard solutions; manufacturer's instructions	Before each day's use, or as recommended by manufacturer	Suitably skilled person
	Servicing and calibration	Annually	Instrument specialist
pH meter	Check against standard solutions; manufacturer's instructions	Before each day's use, or as recommended by manufacturer	Suitably skilled person
Metal detector	Test against metal test pieces	At least daily	Suitably skilled person
	Servicing and calibration	Annually	Instrument specialist

Ice point and boiling point calibration methods

Hot point calibration is used when monitoring temperatures higher than room temperature (e.g. cooking temperatures). A combination of the ice point and hot point methods is recommended for a more accurate calibration of thermometers used to monitor a wide range of temperatures.

1. Ice point method

- a. Use enough crushed ice in a container to allow immersion of most of the probe stem. Add just enough water to remove the air around the ice particles and to form a slush. Wait for the ice to appear clear.
- b. Stir the mixture (do not use the probe for mixing), tip off excess water, insert the probe and leave it for about 2 minutes. Ensure that the tip of the probe is in good contact with the slush ice at the center of the container.
- c. Stir the mixture again and check the reading on the thermometer. Accept if the deviation from 0°C is within the declared limits of accuracy.
- d. If the deviation from 0°C is greater than the limit of accuracy, or greater than $\pm 1.0^{\circ}\text{C}$,

adjust the thermometer accordingly or discard and replace the thermometer.

2. Boiling point method

- a. Place the probe in a container with boiling water for about 2-3 minutes until the thermometer reading stabilises. The probe should be at the center of the container.
- b. Accept if the deviation from 100°C, or appropriate temperature according to elevation, is within the declared limits of accuracy.
- c. If the deviation from 100°C is greater than the limit of accuracy, or greater than $\pm 1.0^{\circ}\text{C}$, adjust the thermometer accordingly or discard and replace the thermometer.

10.3 Monitoring Procedures

The responsible person must carry out regular checks for compliance with documented procedures.

10.4 Corrective Actions Procedures

The operator must take corrective actions when any non-compliance to documented procedures occurs, or when the calibration programme is found to be ineffective. The corrective actions must include an assessment to determine the cause and extent of the non-compliance, and must address the:

- a. actions to be taken when a measuring device is damaged, or provides inconsistent or inaccurate readings
- b. identification and disposition of any product produced when the device was out of calibration; and
- c. prevention of the recurrence of the problem (e.g. retraining of personnel involved).

10.5 Records

Records of the following must be kept:

- a. identification, location and calibration status of equipment
- b. certificates of accuracy or calibration
- c. training records; and

- d. monitoring, corrective action and verification records.

11 Health of Personnel and Hygienic Practices

Amendment 0

February 2010

11.1 Scope

This section discusses the requirements and procedures for ensuring that personnel are medically fit to perform their tasks, and hygienic practices are implemented by all personnel. Personnel include all workers, contractors providing services, and visitors.

The sources of hazards controlled under this programme are summarised below.

Source	Examples of hazards
Person	Bacterial pathogens (e.g. <i>Salmonella</i> spp., <i>E. coli</i> spp., <i>Staphylococcus aureus</i>) Hepatitis A virus
Clothing, footwear	Bacterial pathogens (e.g. <i>Salmonella</i> spp., <i>E. coli</i> spp., <i>Clostridium</i> spp.) Objects (e.g. buttons)
Personal items	Objects (e.g. jewellery, pens, hair clips, hair, plasters)

11.2 Control Measures

11.2.1 Health of workers

11.2.1.1 The operator must document and implement procedures to ensure that a person (including any visitor or contractor) who is:

- infected with, or a carrier of, an infectious disease in a communicable form as described in Section A, Part 1, of the First Schedule of the Health Act 1956 and that is likely to be transmitted through food or associated things

These include infections or diseases caused by *Salmonella* spp., *Shigella* spp., *E. coli* spp., *Campylobacter*, and the Hepatitis A virus.

- suffering from acute respiratory infection; or

- c. suffering from boils, sores, infected wounds, or any other condition that cannot be adequately protected from becoming a source of contamination;

does not work as a product handler or enter an area where he or she may adversely affect the suitability for processing or the fitness for intended purpose of any product. **[HC Spec 23 (1)]**

11.2.1.2 The operator must ensure that all workers (including office staff), contractors and visitors understand the company's health and sickness policy.

A documented health policy may be useful, covering matters such as working with wounds, communicable diseases, and notification procedures for workers suffering from any illness or injury. The NZFSA's [Health and Sickness Template](#) provides guidance on the exclusion of infected persons.

11.2.1.3 Workers must inform the person responsible for operations if they are (or suspect that they are) suffering from diarrhoea, acute respiratory infection; or if they are diagnosed with illness caused by *Salmonella*, *Shigella* spp., *E. coli* spp., *Campylobacter*, or the Hepatitis A virus, or other infections likely to be transmissible via food.

11.2.1.4 A product handler, or any other person who may affect the suitability for processing or fitness for intended purpose of any product, after suffering from an illness described in section 11.2.1.1 (a) or (b) above, must provide a certificate from a registered medical practitioner confirming that the person is no longer likely to contaminate the product, prior to resumption of work in that role. **[HC Spec 23 (2)]**

11.2.1.5 A product handler, or any other person who may affect the suitability for processing or fitness for intended purpose of any product, who suffers from a condition described in section 11.2.1.1 (c) above must, before resuming work, be assessed by a suitably skilled person to confirm that the condition is no longer likely to contaminate product, or that the handler or other person is adequately protected from being a source of contamination. **[HC Spec 23 (3)]**

11.2.1.6 Any injury, wound, or cut must be treated immediately and dressed with a secure waterproof dressing to prevent contamination of any ingredients, product, packaging or equipment with blood or other fluid discharge. The dressing must be kept clean and properly secured to prevent it from becoming loose or falling off.

Wound dressings should be protected from becoming wet (e.g. use of impervious gloves for wounds on the hands, and protective sleeves or clothing over other wounds).

Brightly coloured or metallised wound dressings should be used as they are more easily detected in products if they become dislodged.

11.2.2 Documented procedures on hygienic practices

The operator must document and implement hygienic practices and procedures for all personnel (including product handlers, cleaners, office workers, maintenance personnel, contractors and visitors), appropriate to their task and area of work.

11.2.3 Protective clothing

11.2.3.1 All personnel who enter any processing or storage areas must wear suitable, clean protective clothing and footwear.

Protective clothing may be of any colour, provided the presence of any contaminant, relative to the type of work, is clearly distinguishable.

Workers handling unpackaged food must wear waterproof sleeves over fabric sleeves. This does not apply when the fabric sleeves are rolled up to above the elbow.

Workers should wash and clean footwear before entering processing areas.

11.2.3.2 Hair restraints, for both head and facial hair, must be worn in processing areas.

Hair restraints may be paper, cloth or plastic hats, or hair nets. Beard masks or all-over-type hats should be used by personnel with full beards.

11.2.3.3 Personnel who work in raw product areas must change their protective clothing, and clean or change their footwear, before entering areas where cooked or RTE product is produced.

Refer to Part 3, section 9.2 for other procedures for preventing post-process contamination of

cooked and RTE products.

11.2.3.4 Personnel assigned to work in areas where materials for animal consumption or waste are handled must remove their outer clothing, footwear or coverings; and change to clean protective clothing before entering processing areas.

Personnel assigned to work in areas where materials for animal consumption or waste are handled should wear some form of identification to distinguish them from other product handlers.

11.2.3.5 All protective clothing must be:

- a. kept in good condition
- b. changed at least daily or more often if it becomes excessively contaminated; and
- c. stored in a manner that protects it from contamination.

Re-usable aprons should be cleaned and sanitised at least daily. Plastic sleeves should be cleaned and sanitised every 4 hours.

11.2.3.6 Disposable aprons, gloves and plastic sleeves must be discarded after use, or when torn, damaged or contaminated.

11.2.3.7 Workers must not wear waterproof protective clothing (e.g. aprons, plastic sleeves, gloves) or equipment (e.g. knives and steels) outside the processing area.

11.2.3.8 Workers must not wear protective clothing outside the premises.

11.2.4 Gloves

11.2.4.1 Hands must be cleaned before gloves are put on and after gloves are removed.

11.2.4.2 Disposable gloves must be replaced periodically during the day's operations (i.e. at every break as a minimum), and discarded whenever they come in contact with any contaminated material or surface, or are damaged or punctured.

11.2.4.3 Re-usable gloves (e.g. mesh gloves) must be cleaned and sterilised periodically during the day's operations (e.g. at every break) and at the end of the day's operation or shift.

The following are acceptable procedures for cleaning and sterilising/sanitising protective cut-resistant gloves:

- a. all protective cut-resistant gloves - soak in quarternary ammonium sanitiser overnight, rinse with warm water prior to use
- b. chain-mesh gloves - hose with high pressure 82°C water to remove visible soil, soak in alkaline cleaner (20-25%) for no less than 15 minutes, soak in 90°C water for no less than 15 minutes, rinse with high pressure hot water, and hang to dry; or
- c. knitted gloves - hose with high pressure 82°C water to remove visible soil, soak in quarternary ammonium sanitiser (0.2%) for no less than 30 minutes, rinse with high pressure hot water, and hang to dry.

11.2.5 Hands

11.2.5.1 All personnel must thoroughly wash hands and exposed portions of the arms with hand detergent and water, sanitise (when appropriate) and dry them:

- before entering any processing or packing areas
- before handling any ingredient, product or exposed packaging
- after using the toilet
- after handling or coming into contact with waste and contaminated surfaces or material
- after hand contamination from coughing, sneezing, and blowing the nose; and
- if working in a raw product area, before entering a cooked or RTE product area. (Refer to Part 3, section 9.2 for other procedures for preventing post-process contamination of cooked and RTE products).

11.2.5.2 Suitable hand sanitisers should be used in areas where cooked or RTE product is processed or packed. Sanitisers must be used in accordance with the manufacturers' instructions.

RMP operators must use hand sanitisers from the list in the [Approved Maintenance Compounds \(Non-dairy\) Manual](#).

11.2.5.3 After washing, hands must be thoroughly dried using disposable paper towels, or other hand drying facilities that do not contaminate washed hands or the surrounding area (e.g. roller towels fitted with a timed automatic retraction device that removes the soiled piece of towel immediately after use).

11.2.5.4 Workers processing, packing or handling unprotected product must not wear false finger nails or finger nail polish. Finger nails must not be excessively long and must be kept clean.

11.2.6 Jewellery and other personal items

11.2.6.1 Personnel in processing areas must not wear jewellery except for plain wedding bands (i.e. no stone). Plain wedding bands may only be worn provided they cannot be easily dislodged and they can be effectively cleaned in the same manner as hands.

11.2.6.2 Medical alerts may be worn provided they are protected so they cannot be easily dislodged and they can be effectively cleaned in the same manner as hands.

11.2.6.3 Workers must not take personal items (e.g. sweets, cigarettes, mobile phones and other electronic items) in processing or packing areas.

Certain supervisory or management staff (not product handlers) may be allowed to keep their cellphones when entering processing areas provided the operator has documented procedures for managing their use so GMP is not compromised.

11.2.7 The following activities are not permitted inside processing or packing areas:

- eating of any food
- smoking

- spitting; or
- any other activity that may cause contamination of any product or product contact surface.

Drinking in processing areas should only be allowed in certain processing areas where it is necessary for the comfort of workers (e.g. very warm rooms). The operator must have documented procedures for managing the use of drink bottles (e.g. identification of bottles, holding area, cleaning) so it does not compromise GMP.

11.2.8 Visitors and contractors

11.2.8.1 Visitors and contractors must report to the responsible person on arrival at the premises. They must be supervised by an assigned staff member while within the premises unless they have been inducted and are familiar with the required hygienic practices. It is the responsibility of the assigned staff member to ensure that the visitor or contractor follows hygienic practices and procedures.

Visitors and contractors who wish to enter a processing or packing area should sign a visitors' logbook on arrival.

11.2.8.2 Visitors and contractors must not be allowed to handle product in processing and packing areas unless they have complied with all the hygiene requirements for product handlers.

11.3 Monitoring Procedures

Compliance to documented procedures must be regularly checked by the responsible person at a frequency that will ensure consistent and ongoing effectiveness of the programme (e.g. daily checks of workers' compliance to protective clothing requirements and hygienic practices).

11.4 Corrective Action Procedures

11.4.1.1 The operator must take corrective actions when any non-compliance to documented procedures occurs, or when the programme is found to be ineffective. The corrective actions must include an assessment to determine the cause and extent of the non-compliance, and must address the:

- a. actions to be taken when personnel do not comply with documented procedures
- b. identification and disposition of any affected product (see 11.4.1.2); and
- c. prevention of the recurrence of the problem (e.g. retraining of personnel involved).

11.4.1.2 If contamination from human blood or any body discharge occurs, the following actions must be carried out:

- a. affected product must be considered unfit for human or animal consumption
- b. affected product contact surfaces must be cleaned and sanitised prior to reuse, and, if necessary processing must cease until the area is cleaned and sanitised; and
- c. affected packaging materials must not be used for packing of any product.

11.5 Records

Records of the following must be kept:

- a. medical certificates
- b. register for injuries
- c. visitors' logbook; and
- d. monitoring, corrective action, and verification records.

12 Training and Competency

Amendment 0

February 2010

12.1 Scope

This section discusses the requirements for the training and competencies of personnel to ensure that they have the knowledge and skills necessary to perform their assigned tasks effectively.

12.2 Control Measures

12.2.1 An FSP or RMP must specify the identity (either by position, designation or name) of:

- a. the day-to-day manager or person responsible for the day-to-day running of the FSP or RMP
- b. those persons authorising all or part of the FSP or RMP on behalf of the operator; and
- c. those persons performing key tasks under the FSP or RMP including monitoring, corrective action, and operator verification activities. **[RMP Spec 15 (1); Food Act Section 8G]**

12.2.2 The operator must document the skills or competencies needed by the persons identified in section 12.2.1 to enable the effective operation of the FSP or RMP. **[RMP Spec 15 (2); Food Act Section 8G]**

These competencies may be documented in job descriptions or training records.

- a. The day-to-day manager or person authorising all or part of the FSP or RMP should be familiar with the FSP or RMP, and have the following competencies:
 - have knowledge on product safety, and hygienic procedures and practices documented in this code of practice
 - have knowledge of relevant regulatory requirements, including responsibilities,

related to the effective development and implementation of the FSP or RMP

- have technical knowledge and experience in the manufacture of processed meats; and
 - is able to liaise and communicate effectively with workers and the regulator.
- b. The person responsible for the development and review of the HACCP application within the FSP or RMP should have knowledge on HACCP principles and how they are applied to the manufacture of processed meats. Ideally, the person should have training on HACCP. Examples of NZQA Unit Standards on HACCP are:
- Unit Std 12624 – Monitor a meat processing operation under a HACCP system
 - Unit Std 12625 – Supervise a meat processing operation under a HACCP system
 - Unit Std 12626 – Coordinate the development and/or verification of a HACCP plan or application for a meat processing operation
 - Unit Std 19514 - Explain the application of HACCP principles.
- c. Workers performing key tasks including monitoring, corrective action, and operator verification must have the following competencies:
- have knowledge and skill in implementing the particular task; and
 - be familiar with, and able to consistently comply with hygienic practices and procedures.
- d. For further information on qualifications available on meat processing (smallgoods), refer to the NZ Industry Training Organisation.

12.2.3 The operator must ensure that the skills of those persons involved in key tasks that could have a significant impact on the suitability or the fitness for intended purpose of product, are maintained on an ongoing basis. **[HC Spec 26 (1); Food Act Section 8G]**

The operator should develop a training programme which covers: the identification of skills required for key tasks, skills maintenance, monitoring and corrective action procedures, and record keeping. On-going training may take the form of induction training, regular in-house meetings, on-the-job training, or external training courses.

Clear task instructions should be written and made available to relevant workers.

12.2.4 The operator must keep records demonstrating that skills identification, achievement and maintenance is being carried out effectively. **[RMP Spec 15(3); HC Spec 26 (2)]**

12.2.5 New workers must be informed of their job description, health requirements, and hygienic practices and procedures before starting work.

The operator should provide new employees and regular service contractors with an induction programme. New workers should be supervised until they are adequately trained to perform their assigned tasks.

12.3 Monitoring Procedures

Compliance to documented procedures must be regularly checked by the responsible person at a frequency that will ensure consistent and ongoing effectiveness of the programme.

Examples of monitoring activities are: daily personal hygiene checks, checks to confirm that persons who carry out key tasks (e.g. those responsible for monitoring and corrective action under the RMP) are appropriately skilled and are performing those tasks correctly, and periodic checks to confirm that training of workers is up-to-date.

12.4 Corrective Action Procedures

The operator must take corrective actions when any non-compliance to documented procedures occurs, or when procedures are found to be ineffective. The corrective actions must include an assessment to determine the cause and extent of the non-compliance, and must address the prevention of the recurrence of the problem (e.g. retraining of personnel involved, review of procedures and making amendments, if necessary).

12.5 Records

Records of the following must be kept:

- a. training records for each employee
- b. copies of training certificates/results; and
- c. monitoring, corrective action and verification records.

13 Specifications, Handling and Storage of Inputs

Amendment 0

February 2010

13.1 Scope

This section discusses the requirements for receiving, handling and storage of inputs such as raw materials, ingredients and packaging materials.

13.2 Control Measures

13.2.1 General requirements

13.2.1.1 The operator must document and implement procedures for checking raw materials, ingredients, and packaging on receipt or before they are used to ensure that:

- a. they are fit for their intended purpose and comply with any agreed specifications
- b. packaging is not damaged to the extent that product is exposed and potentially contaminated; and
- c. sufficient information is provided (i.e. on labels or accompanying documentation) for their effective identification, storage and use.

The documented procedures should include the checks to be undertaken, the criteria for acceptability, the person responsible for checking the incoming goods, and corrective actions to be taken when non-compliance occurs.

13.2.1.2 All process inputs, including ingredients, additives, processing aids, and packaging must be stored, handled, and transported in a manner that minimises any potential contamination or deterioration. **[HC Spec 115]**

13.2.1.3 Rejected goods must be clearly identified and held in a designated area.

13.2.1.4 Once an input has been accepted, it should be:

- a. moved to storage or directed to processing as soon as possible
- b. maintained at appropriate temperatures for safety and quality
- c. protected against contamination or damage
- d. stored on racks, shelves or pallets to ensure no contact with the floor; and
- e. used on a first-in-first-out basis, as appropriate.

13.2.1.5 Storage areas must be kept clean and tidy, and free from pests.

13.2.2 Meat

13.2.2.1 Meat of New Zealand origin used in the production of processed meats must be sourced from slaughter and dressing premises that operate under a registered RMP.

13.2.2.2 All imported meat must comply with relevant Import Health Standards and Biosecurity requirements.

Import Health Standards can be obtained from the MAF Biosecurity website
<http://www.biosecurity.govt.nz/ihs/search>.

13.2.2.3 Meat must not show any signs of deterioration (e.g. off odours) or possible temperature abuse (e.g. cartons badly stained with drip).

13.2.2.4 Chilled meat must be received at a maximum of 7°C.

Frozen meat should be frozen hard with no signs of thawing.

13.2.2.5 Chilled meat must be stored at a maximum of 7°C, and frozen meat at a maximum of -12°C.

13.2.3 Ingredients and additives

13.2.3.1 The identity and purity of additives, processing aids, vitamins, minerals, and other added nutrients must comply with the Food Standards Code, part 1.3 “Substances added to Food”, Standard 1.3.4 “Identity and Purity”. **[HC Spec 17]**

13.2.3.2 Ingredients must comply with the [Food Standards Code](#).

For example, the microbiological limit for pepper, paprika and cinnamon is: *Salmonella* = 0 in 25g.

13.2.3.3 The operator must develop procedures for sourcing ingredients and additives that meet regulatory requirements and agreed specifications.

The operator should implement a Supplier Quality Assurance programme which includes the following:

- a. sourcing of ingredients from preferred suppliers
- b. provision of product specification or information sheets by suppliers (including information on individual ingredients contained in a pre-mix or blend of ingredients, and the presence of allergens)
- c. auditing of suppliers, when needed
- d. provision of certificates of analysis or supplier guarantees by suppliers; and
- e. operator verification of compliance to agreed specifications (e.g. periodic physical inspection and microbiological testing of ingredients).

13.2.3.4 Ingredients and additives must be:

- a. stored under conditions appropriate for the product, and which will maintain their quality and functionality within the specified shelf life or period that it is held in storage (e.g. some items may require dry storage, others may require refrigeration)
- b. stored in a designated area (e.g. shelf, cupboard, or room) and kept separate from chemicals and other materials which may contaminate or be mistaken for them
- c. kept in sealed or covered containers when not in use; and
- d. labelled with the name or names of the additives and other ingredients.

13.2.3.5 Any ingredient or additive must be discarded when:

- a. it is no longer safe (e.g. contaminated with rodent droppings, chemicals) or suitable for use (e.g. it has signs of spoilage, it is past its use-by date)
- b. it is contaminated so that its allergen status is affected; or
- c. important information needed for its safe use is lost (e.g. identity).

13.2.4 Ice

13.2.4.1 Ice must comply with the microbiological limit specified in Standard 1.6.1 of the Food Standards Code. The microbiological limit for packaged ice is: *E. coli* = 0 in 100 ml.

The operator should obtain a certificate of analysis from the ice supplier, and/or do their own tests to verify that the standard is being met.

13.2.5 Packaging

13.2.5.1 The composition and, where appropriate, the conditions of use of packaging must:

- a. comply with the requirements specified in the current US Code of Federal Regulations, Title 21, Parts 170-199 (21 CFR 170 – 199), which applies equally to coatings and linings of containers and cartons where these are the direct product contact surface
- b. comply with the requirements specified in the current “Australian Standard for Plastic Materials for Food Contact Use, Australian Standard AS2070-1999”; or

- c. be determined by the operator to be suitable for use, based on an analysis of hazards from the packaging. **[HC Spec 30 (1)]**

Operators should obtain a written guarantee from the supplier stating that the packaging meets mandatory requirements for composition and conditions of use.

Operators should discuss with their supplier how the packaging is to be used (e.g. whether it is to be used for frozen or chilled products, or whether it needs to be microwavable). This will need to be taken into consideration by the supplier when the supplier guarantee is given.

13.2.5.2 Packaging must be protected from contamination, and stored off the floor.

Packaging materials should be wrapped or contained in covered cartons to prevent contamination from dust and pests.

13.3 Monitoring Procedures

Compliance to documented procedures must be regularly checked by the responsible person at a frequency that will ensure consistent and ongoing effectiveness of the programme.

Examples of monitoring activities are: checks of all inputs on arrival, weekly checks to confirm proper storage of ingredients and packaging materials.

13.4 Corrective Action Procedures

The operator must take corrective actions when any non-compliance to documented procedures occurs, or when procedures are found to be ineffective. The corrective actions must include an assessment to determine the cause and extent of the non-compliance, and must address the:

- a. restoration of control
- b. identification and disposition of affected product; and
- c. prevention of the recurrence of the problem (e.g. retraining of personnel involved, review of procedures and making amendments, if necessary).

13.5 Records

Records of the following must be kept:

- a. register of goods
- b. list of suppliers
- c. raw material and ingredient specifications
- d. supplier guarantees or certificates of analysis
- e. supplier audit results, if any
- f. test results
- g. training records; and
- h. monitoring, corrective action and verification records.

14 Allergen Management

Amendment 0

February 2010

14.1 Scope

This section discusses the requirements and procedures for the management and labelling of allergenic meat products and ingredients regulated under the Food Standards Code.

The allergen substances covered by Standard 1.2.3 of the Food Standards Code are:

- cereals containing gluten and their products, namely wheat, rye, barley, oats, spelt and their hybridised strains other than where these substances are present in beer and spirits standardised in Standards 2.7.2 and 2.75. respectively.
- crustacea and their products
- egg and egg products
- fish and fish products
- milk and milk products
- peanuts and soybeans and their products
- added sulphites in concentrations of 10 mg/kg or more; and
- tree nuts and sesame seeds and their products.

More detailed information on allergen management and labelling is available from the [Allergen Bureau](#) website and [The Food Industry Guide to Allergen Management and Labelling](#).

14.2 Control Measures

14.2.1 General

The operator must develop and document procedures for the management and labelling of allergenic meat products and ingredients regulated under the Food Standards Code. This document is usually called an Allergen Management Plan.

A HACCP approach is recommended for a systematic identification of food allergens relevant to a particular product and process, and control measures for managing them. This involves evaluating the hazards associated with the whole 'lifecycle' of the product, starting with the sourcing of raw materials, and assessing every step of the process through to labelling and packaging of the final product. The points in the process where allergens can be introduced into products during processing should be identified, controls put in place at these points, and a system established to monitor them, to ensure that unintentional cross-contamination is minimised. The hazard identification and analysis should be documented in the RMP or FSP.

14.2.2 Raw materials

14.2.2.1 Accurate allergen information must be obtained from suppliers for all raw materials.

Operators should source their raw materials from suppliers with good allergen practices. Allergen information should be provided by the suppliers for each raw material to identify any products that contain allergens, or that are derived from allergenic foods, or have a high likelihood of cross contact with allergenic substances. For example, premixes of fillers or binders may contain milk or egg powder which should also be declared on the label.

An example of a [product information form](#) which could be used for obtaining allergen information from suppliers is available from the Allergen Bureau website.

The operator should have a system of notification from the ingredient supplier if the allergen status of an ingredient, additive or processing aid changes.

14.2.2.2 All raw materials and ingredients must be handled and stored in a manner that prevents cross-contamination between materials and ingredients of different allergen status.

Raw materials and ingredients should be checked on receipt to ensure that they are the correct items and they meet agreed specifications. Allergenic materials should be stored separately from those that are non-allergenic or contain different types of allergens. They may be segregated by

storing them in separate rooms, cupboards, or sealed containers.

14.2.3 Formulations

14.2.3.1 Product formulations or recipes must be developed and documented in accordance with the procedures given in Part 3 section 2.5. The documented formulations must identify all ingredients, including compound ingredients, substitute ingredients, additives and processing aids, and any rework.

14.2.3.2 There should be a system for verifying that formulations are being adhered to.

The verification system could involve checks to confirm that the product formulation matches the records of ingredient use (e.g. weighing checklists) and testing of final products for allergens.

14.2.3.3 The person responsible for developing formulations must assess the effect of any change in a product formulation and/or ingredient on allergens in the product, and ensure that any necessary change in labelling is made before the new formulation is used.

14.2.4 Processing

14.2.4.1 The operator must identify sources or causes of unintended exposure or contact of the product to allergens during processing and establish controls for them.

Unintended exposure or contamination of products to allergens may result from:

- use of incorrect formulation
- inadequate separation of materials, equipment and processes
- changes to product scheduling
- use of rework
- insufficient or ineffective cleaning and sanitation of equipment, containers and other product contact surfaces; or
- contamination from air-borne allergens.

14.2.4.2 The weighing and assembly of raw materials and ingredients must comply with the procedures given in Part 3, Section 3.5.

14.2.4.3 Products and processes of different allergen status must be physically separated from each other; or they must be separated by time or distance; as appropriate to the type and size of the operation, and based on an assessment of the potential for product contamination and risk to human health posed by the product.

Ideally, processors should use dedicated processing equipment or have separate processing lines for products of different allergen status to minimise potential cross-contamination.

When separation is achieved by a time difference, production and cleaning schedules should be organised in a way that prevents cross-contamination. For example, non-allergenic products should be processed first at the start of the day, when the equipment is clean, before processing allergenic products. Processing of products of different allergenic status can also be done on different days. When process scheduling is not practical, thorough cleaning of facilities and equipment should be done between products of different allergen status.

When products and processes of different allergen status are separated by distance or location within a room or area, the distance between them should be such that any contact or contamination between products, equipment, processes or personnel is avoided. Consideration should be given to airborne contaminants (e.g. flour dust).

14.2.4.4 The use of rework must comply with the procedures given in Part 3, Section 3.11.

14.2.5 Cleaning

14.2.5.1 Cleaning procedures must be documented and comply with section 7.

The cleaning programme should cover:

- a. the cleaning of all surfaces, equipment, utensils, clothing and hands of product handlers that may have come in contact with products that contain allergens
- b. the cleaning of spills
- c. the identification and cleaning of hidden or static areas and dismantling of equipment to remove residues; and
- d. verification of cleaning effectiveness (e.g. visual inspection, sampling or testing for allergen residues).

14.2.5.2 Production and cleaning schedules must be organised in a way that prevents cross-contamination between products and processes of different allergen status.

14.2.5.3 Facilities, equipment and utensils must be thoroughly cleaned and sanitised, and protective clothing of workers must be changed:

- a. before processing a non-allergenic product if the product previously processed contains an allergen; and
- b. between the processing of products that contain a different type of allergen.

14.2.5.4 A pre-operational check must be performed (refer to section 7.2.3) after cleaning and before starting processing of the next product.

14.2.6 Packing and labelling

14.2.6.1 Labelling of processed meat products must comply with [Standard 1.2.3](#) of the Food Standards Code which requires the mandatory declaration of certain allergenic substances and their products (refer to section 14.1 for the list of substances).

There are a number of tools or programmes available which can assist processors in their decision making about allergen declarations on their labels. An example is [VITAL](#) which provides processors a systematic way of assessing the impact of allergen cross contact and assists in determining appropriate precautionary allergen labelling.

14.2.6.2 If there is a formulation change, or a change to raw material supplier that results in the introduction of new allergenic materials, new labels with the correct allergen information must be designed and used on all products affected by the formulation change.

14.2.6.3 Procedures for ensuring that correct labels are applied to products consistently must be developed and implemented.

The procedures should cover the identification, storage, inventory and use of labels; and the disposition of obsolete labels or labels with wrong information.

Operators should also consider developing procedures for the traceability of packaging materials and labels. This will enable the tracking of defective packaging and labels (e.g. those with labelling errors such as missing allergen information).

14.2.7 Training

14.2.7.1 The operator must ensure that all relevant personnel are aware of food allergens and the consequences of unintentional consumption by allergic consumers, and are adequately trained on good practices in allergen management specific to their area of work or responsibility.

14.2.7.2 Training records must be kept.

14.3 Monitoring Procedures

Compliance to documented procedures must be regularly checked by the responsible person at a frequency that will ensure consistent and ongoing effectiveness of the programme.

Testing for allergens can provide confirmation of the effectiveness of allergen management.

The most commonly used analytical method for detecting the presence of food allergens is the Enzyme Linked Immuno Sorbent Assay (ELISA) technique. A number of allergen ELISA test kits are currently available for the routine detection of allergens in foods.

14.4 Corrective Action Procedures

The operator must take corrective actions when any non-compliance to documented procedures occurs, or when procedures are found to be ineffective. The corrective actions must include an assessment to determine the cause and extent of the non-compliance, and must address the:

- a. restoration of control
- b. identification and disposition of affected product; and
- c. prevention of the recurrence of the problem (e.g. retraining of personnel involved, review of procedures and making amendments, if necessary).

14.5 Records

Records of the following must be kept:

- a. cleaning records

-
- b. formulations
 - c. product information sheets
 - d. supplier agreements
 - e. labelling decision making records (e.g. VITAL)
 - f. training records; and
 - g. monitoring, corrective action and verification records.

15 Labelling

Amendment 0

February 2010

15.1 Scope

This section discusses the requirements for labelling of processed meats.

15.2 Control Measures

15.2.1 The operator must develop procedures for ensuring that:

- a. labels are designed to meet regulatory requirements
- b. all information printed on a label or on packaging is correct and accurate
- c. any claims on product labels are accurate and evidence is available to support the claims
- d. the correct label is applied to each product unit
- e. labels are stored in a manner that maintains them in good condition; and
- f. damaged or obsolete labels are disposed of appropriately.

15.2.2 Labelling of packaged products for retail sale

Product that is packaged for retail sale must be labelled in accordance with the requirements of the Food Standards Code.

The [NZFSA Food Labelling Guide](#) gives detailed information on what a food label needs to include.

15.2.3 Labelling of transportation outers

15.2.3.1 Labelling must be provided on transportation outers and must state:

- a. the product name or description

- b. storage directions, when necessary to maintain the product as suitable for processing or as fit for intended purpose; and
- c. lot identification (except that this requirement is optional if the application of lot identification to the retail packaging is a mandatory requirement under other legislation and that legislation is complied with). **[HC Spec 32 (3)]**

15.2.3.2 Mandatory labelling must be clear, legible, indelible, and use terms that are commonly used in the English language or other language approved by the NZFSA. **[HC Spec 32 (4)]**

15.2.3.3 The label of the transportation outer, or accompanying documentation, of any product that is not intended for human consumption but has the appearance of, or could be mistaken for, product that is intended for human consumption, must clearly indicate that the product it contains is not intended for human consumption. **[HC Spec 32 (5)]**

15.2.4 Labelling and accompanying documentation changes

15.2.4.1 If the status of a product's suitability for processing, or fitness for intended purpose changes, all affected labelling or the accompanying documentation (when there is no label) must be amended to reflect its new status prior to its release for trade, or the packaging (including labelling) must be replaced. **[HC Spec 32 B (1)]**

15.2.4.2 If any product is downgraded and is no longer intended to be traded for human consumption, any labelling, accompanying documentation, inspection legends and any other identification of product as being suitable for human consumption must be removed or defaced at the consigning premises. **[HC Spec 32B (2)]**

15.2.4.3 Any false or misleading labelling on re-used or recycled packaging resulting from previous uses must be removed or defaced at the consigning premises. **[HC Spec 32B (3)]**

15.2.5 Cooking instructions

Labels on retail packs of products that are not RTE must indicate that the product requires cooking, and include validated instructions on how to cook the product safely.

This requirement is particularly important for pre-cooked meat products which require further cooking but may be assumed by consumers to be RTE. Certain pre-cooked meat products, despite undergoing a full cooking schedule, require further cooking for food safety reasons because they are not handled in the same stringent manner after cooking as RTE products. For example, due to differences in post-process handling, frankfurters and chorizos are produced by some companies as RTE, whereas other companies produce these same products as non-RTE. **It is therefore very important to clearly indicate on the label whether the product requires cooking or not.**

15.2.6 Date markings

The operator must determine the shelf-life of products to support the setting of any required date mark (e.g. use-by date) on product labels, and keep records detailing the basis of the shelf-life.

Guidance on shelf-life testing can be found in the NZFSA booklet "[A Guide to Calculating the Shelf-life of Foods](#)".

Shelf-life trials should be conducted at temperatures that the product is normally exposed to in the distribution and retail system, and in the home, and should consider fluctuations in temperature as the product moves through the distribution chain.

Operators should verify the shelf-life of each product periodically (e.g. by implementing a rolling testing scheme that covers all products within a certain period).

15.3 Monitoring Procedures

Compliance to documented procedures must be regularly checked by the responsible person at a frequency that will ensure consistent and ongoing effectiveness of the programme.

Examples of monitoring activities are: daily labelling checks, and checking of new labels at the design phase.

15.4 Corrective Action Procedures

The operator must take corrective actions when any non-compliance to documented procedures occurs, or when procedures are found to be ineffective. These must include an assessment to determine the cause and extent of the non-compliance; and actions to fix the problem, and prevent of the recurrence of the problem (e.g. retraining of personnel involved, review of procedures and making amendments, if necessary).

15.5 Records

Records of the following must be kept:

- a. label checklists
- b. copies of labels that have been checked and comply with requirements
- c. shelf-life trial records; and
- d. monitoring, corrective action and verification records.

16 Traceability and Inventory Control

Amendment 0

February 2010

16.1 Scope

This section discusses the requirements and procedures for traceability and inventory control of all raw materials, ingredients and products.

16.2 Control Measures

16.2.1 The operator must document and implement a tracking system that:

- a. allows for the identification of all raw materials, ingredients and products; and
- b. enables the movement of raw materials and ingredients to be traced from the supplier; and to the next person or company that any product is transferred to for further processing, packing, storage, distribution or sale. **[AP Reg 18(10)]**

Operators should also consider developing procedures for the traceability of packaging materials and labels. This will enable the tracking of defective packaging and labels (e.g. barrier films with defective or missing barrier components which may adversely affect the product's shelf-life, printed materials with labelling errors such as missing allergen information).

16.2.2 The operator must document and implement procedures for inventory control. **[HC Spec 34(3)]**

16.2.3 Inventory records (i.e. stock records) must be maintained for all raw materials (e.g. meat, additives, other ingredients); finished products; returned products; and any non-complying products.

16.2.4 All outgoing products must be clearly identified and accompanied by appropriate documentation.

16.3 Monitoring Procedures

Compliance to documented procedures must be regularly checked by the responsible person at a frequency that will ensure consistent and ongoing effectiveness of the programme.

16.4 Corrective Action Procedures

The operator must take corrective actions when any non-compliance to documented procedures occurs, or when the traceability and inventory control programme is found to be ineffective.

The corrective actions should include: an assessment to determine the cause and extent of the non-compliance, and any consequential effects on other documents or records, and programmes; and actions necessary to prevent the recurrence of the problem (e.g. retraining of personnel involved, review of procedures and making amendments, if necessary).

16.5 Records

Records of the following must be kept:

- a. records for incoming and outgoing goods/raw materials (e.g. delivery dockets, invoices, consignment forms)
- b. inventory records; and
- c. monitoring, corrective action and verification records.

17 Handling and Disposition of Non-complying Products, and Recall

Amendment 0

February 2010

17.1 Scope

This section discusses the requirements and procedures for the handling and disposition of non-complying products. A non-complying product is any product that does not meet regulatory requirements, including relevant regulatory or operator-defined limits; or has not been processed in accordance with regulatory requirements or a validated and/or verified process.

17.2 Control Measures

17.2.1 Non-complying products

17.2.1.1 The operator must document procedures for the identification, handling, storage, and disposition of non-complying products. The procedures must facilitate the traceability and inventory of non-complying products.

17.2.1.2 Non-complying products must be handled and stored in a manner that prevents contamination and deterioration of other products, and contamination of the storage environment.

17.2.1.3 Non-complying products must be clearly identified, separated from other products, and held within the premises until disposition is determined by a suitably skilled person or, in certain cases, by the regulator.

Non-complying products may be separated from other products by holding them in a separate room or cage, or by wrapping the products with plastic.

17.2.1.4 Disposition of non-complying products must be determined by a suitably skilled person based on an assessment of factors such as: product safety and suitability, the amount of product affected, whether the product has been released for distribution or not; and whether it can be reprocessed to a safe product.

Appropriate actions should include one or a combination of the following:

- a. restricted release when the operator is able to manage the problem appropriately
- b. regrading to an alternative use when the product conforms to the alternative requirements (e.g. for petfood or rendering)
- c. reworking
- d. reprocessing to ensure that the product conforms to the requirements
- e. rejection (i.e. destruction of the product); or
- f. recall

17.2.1.5 An RMP operator must notify the recognised RMP verifying agency in writing, without unnecessary delay, when there is any significant concern about the fitness for intended purpose of any of their products. **[RMP Spec 13 (3a)]**

17.2.1.6 An FSP operator must notify their local Public Health Unit, or if based in Auckland or Christchurch, contact the NZFSA Food Officer, when there is any significant concern about the fitness for intended purpose of any of their products.

17.2.2 Recall

17.2.2.1 The operator must document recall procedures, including:

- a. the criteria for deciding when a recall will be initiated; and
- b. how retrieval and disposition of the relevant product will be managed. **[RMP Spec 14 (1), Food Act Section 8G]**

17.2.2.2 The operator must document a system for notifying the following people, as soon as possible, when product is recalled from trade, distribution or from consumers because it is not or may not be suitable for processing or fit for its intended purpose:

- NZFSA and the recognised RMP verifier **[RMP Spec 14(2)]**; and
- PHU or Food Act Officer.

Refer to the "[Recall Guidance Material](#)" for guidance on recall procedures.

17.3 Records

Records of the following must be kept:

- a. list of non-complying products
- b. records of assessment and disposition of non-complying products
- c. records of recall activities
- d. inventory records; and
- e. any correspondence with the verifier or auditor, and the regulator.

18 Operator Verification

Amendment 0

February 2010

18.1 Scope

This section discusses the requirements for operator verification of the effectiveness of the documented FSP or RMP.

18.2 Control Measures

18.2.1 The operator must document an operator verification system including:

- a. the activities to be performed, and their frequencies
- b. any actions to be taken when all or part of the FSP or RMP is not effective; and
- c. any recording and reporting requirements. **[RMP Spec 16(1)]**

Operator verification includes activities such as internal audits, reviews of the FSP or RMP, and other activities undertaken to confirm the effectiveness of hygiene and sanitation programmes (e.g. environmental testing), achievement of regulatory and operator defined limits (e.g. product testing), compliance to specifications (e.g. ingredient testing) and validated processes.

18.2.2 Internal audits

18.2.2.1 Internal audits must be undertaken by a suitably skilled person at a frequency sufficient to ensure ongoing compliance with documented FSP or RMP procedures, and to enable prompt identification and correction of any problem.

The person responsible for undertaking internal audits should have: auditing skills, a good understanding of the operations, processes and supporting systems covered by the RMP, and a good understanding of relevant regulatory requirements. He/she should be able to take appropriate corrective actions, when required, and communicate effectively with the regulator, managers and workers.

The frequency for internal audits of the different programmes comprising the FSP or RMP will

depend on factors such as: the importance of the particular programme on the safety of the product and hygienic operations, the frequency of non-compliances, the effectiveness of the programme, skills and training of personnel implementing the particular programme, and the cost of doing the audits. For example, GMP programmes covering hygiene and sanitation (e.g. cleaning and sanitation, repairs and maintenance) and process control, particularly at critical control points, should be verified at a higher frequency (e.g. every 2-4 weeks). Other programmes, such as calibration, document control, traceability and inventory control, can be audited less frequently. The operator should increase the frequency of audits when repetitive non-compliances occur or the programme is ineffective.

All programmes of the FSP or RMP should undergo an internal audit within a given year. The internal audits may be staggered throughout the year based on an established timetable (e.g. review certain parts of the FSP or RMP each month).

In addition to the regular internal audits of the different GMP programmes, a review of the entire FSP or RMP should be undertaken at least annually, and when significant changes to the product, process or premises are made, or the FSP or RMP, or parts of it are not working effectively. This review should look at the overall effectiveness of the FSP or RMP, any trends or repetitive failures or non-compliances, whether the product and process descriptions are still correct, and whether the HACCP application is still appropriate.

Indications that the FSP or RMP or parts of it are not working effectively include:

- a. a series or trend of non-compliances or out of specification product test results
- b. customer complaints
- c. product recall; and
- d. unacceptable outcomes of external verification audits.

18.2.2.2 The operator must keep records of observations made during the internal audit, and any corrective actions taken.

Internal audits should consist of a review of records, reality checks and confirmation that deficiencies or non-compliances identified from the last audit have been rectified.

- a. Records should be reviewed for:
 - completeness and accuracy of required information
 - appropriateness of corrective actions taken
 - any trends, new hazards, recurring problems

- compliance with documented control procedures.

The person performing the audit should sign the records or indicate in some other way that they have been subject to an internal audit.

b. Reality checks should include observations of:

- workers' performance and compliance to hygienic practices and process control procedures
- compliance to established process parameters such as processing times and temperatures; and
- the hygienic status of the premises' internal and external environment, facilities and equipment.

c. All deficiencies found at previous audits should be followed up.

18.2.3 When ongoing or recurring non-compliances occur, the operator must take the following actions:

- a. investigate and determine possible causes of non-compliance
- b. take appropriate corrective actions to regain control and prevent recurrence of the problem
- c. increase surveillance of the system; and
- d. review the relevant parts of the FSP or RMP, and amend them, as necessary.

Refer to Section 3: Document Control and Record Keeping for amendment requirements.

18.3 Ingredient and Product Testing

18.3.1 Product testing must be done when necessary to demonstrate achievement of relevant regulatory limits or operator-defined limits documented in the FSP or RMP.

18.3.2 The operator must document the product testing programme, which may also include any testing done on raw materials and ingredients.

The programme should include information on: products or ingredients to be tested, frequency of testing, number of samples, tests to be done, and the identity of the suitably skilled person or laboratory that will perform the tests. Corrective actions to be taken when requirements are not met should also be documented.

18.3.3 Samples must be representative of the particular batch or lot of product or ingredient being tested.

18.3.4 Samples of products must be hygienically collected by a person who has appropriate training and/or experience in hygienic sampling techniques. They must be held and transported under conditions which will not affect the particular parameter that the ingredient or product is being tested for.

18.3.5 In-house testing for chemical and physical parameters (e.g. moisture content, water activity, pH) must be done using documented methodologies and/or calibrated equipment by a person who has appropriate training and/or experience in the particular test.

Microbiological testing should be done by an IANZ (International Accreditation New Zealand) or LAS (Laboratory Accredited Scheme) accredited laboratory.

18.3.6 All results of product tests must be kept.

18.4 Environmental Testing

This section is pending. The NZFSA has developed a *Listeria monocytogenes* risk management strategy to meet its performance target of achieving “no increase in reported incidence of foodborne listeriosis after five years”. Part of this strategy involves the development of a COP for operators producing RTE foods. This will contain sections on good operating practice, appropriate monitoring programmes and management practices for handling events when *Listeria* is detected on product or in the processing environment. The draft COP is expected to be released for external consultation in mid 2010.

Operators who produce RTE products should implement a monitoring programme for *Listeria*. Until the development of the monitoring programme for *Listeria* is completed, processors should follow a *Listeria* monitoring programme from other sources, such as the [USDA FSIS Compliance Guideline to Control *Listeria Monocytogenes* in Post-lethality Exposed Ready-to-eat Meat and Poultry Products](#).

18.5 Records

The operator must keep records giving the following information:

- a. internal audit reports
- b. FSP or RMP review records
- c. training records; and
- d. records of other verification activities (e.g. test results).



Processed Meats Code of Practice

Part 3: GMP – Process Control

Prelims

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Disclaimer

IMPORTANT DISCLAIMER

Every effort has been made to ensure the information in this report is accurate.

NZFSA does not accept any responsibility or liability whatsoever for any error of fact, omission, interpretation or opinion that may be present, however it may have occurred.

Website

A copy of this document can be found at: <http://www.nzfsa.govt.nz/animalproducts/index.htm>

Review of Code of Practice

This Code of Practice will be reviewed, as necessary, by the New Zealand Food Safety Authority. Suggestions for alterations, deletions or additions to this code of practice, should be sent, together with reasons for the change, any relevant data and contact details of the person making the suggestion, to:

Assistant Director (Production and Processing)

New Zealand Standards Group

New Zealand Food Safety Authority

P O Box 2835

Wellington

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1 Introduction

Amendment 0

February 2010

1.1 Purpose and Scope

This Code of Practice (COP) has been developed by the New Zealand Food Safety Authority (NZFSA) and the Pork Processors Association to assist meat processors comply with the requirements of the Food Act 1981 and the Animal Products Act 1999 (APA), and produce processed meats that are safe and suitable for their intended purpose.

This COP has been written for processors of processed meats, including smallgoods, operating a Food Safety Programme (FSP) under the Food Act, or a Risk Management Programme (RMP) under the APA. However, the guidance provided is also recommended for those operating under the Food Hygiene Regulations 1974.

Parts 2 and 3 provide guidance on Good Manufacturing Practice (GMP). Part 2 covers hygiene and sanitation, and quality assurance programmes. Part 3 focuses on process control at key processing steps. Processors should comply with both parts to ensure the safe production of processed meats. Examples of processed meat products covered by this COP are:

- fresh sausages
- cooked comminuted meat products (e.g. luncheon, bologna, cooked sausages)
- uncooked comminuted fermented meat products (UCFM) (e.g. salami, pepperoni)
- cooked cured meat products (e.g. ham, corned beef, pastrami)
- cooked uncured meat products (e.g. roast beef)
- bacon
- dry-cured meat products (e.g. prosciutto)
- dried meat products (e.g. jerky, biltong)
- meat patties.

1.2 Contents of Part 3

Section 2 of this part gives the general requirements, including regulatory requirements that apply to all products and processes covered in this COP. Sections 3 to 9 discuss the specific requirements and procedures for the process steps commonly used in the production of processed meats.

The procedures given in each section are the accepted or industry agreed means of achieving or complying with regulatory requirements. These procedures cover control, monitoring, corrective action, and verification. The operator must comply with the procedures that are applicable to their product and process unless they have proposed an alternative process, procedure or parameter that is not provided for in this COP. The operator must demonstrate the validity and effectiveness of any proposed alternative. Any alternative process, procedure or parameter must be documented in the FSP or RMP, and be approved by the NZFSA (through registration of the RMP or a significant amendment to an RMP, or approval of the FSP).

Guidance material is presented in a box. It provides explanatory information, recommendations and options for achieving a particular requirement.

1.3 Definitions

Cooling medium - any solid, liquid or gaseous medium that is introduced and comes in contact with wrapped or unwrapped product with the objective of removing heat.

Cooking - the application of heat to a product to destroy vegetative pathogens that may pose a hazard to human health.

Comminution - process of reducing meat or meat product in size by methods such as mincing, flaking, slicing, dicing, but does not include mechanical separation.

Control measure - any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Corrective action - any action to be taken when the results of monitoring a process step or control measure indicate a loss of control.

Critical Control Point (CCP) - a step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Critical limit - a criterion which separates acceptability from unacceptability at a CCP.

Lethality - measure of the ability of a process to destroy a particular pathogen.

Food additive - any substance not normally consumed as a food in itself and not normally used as an ingredient of food, but which is intentionally added to a food to achieve one or more technological functions.

Food Standards Code - the code incorporated into New Zealand law by the New Zealand (Australia New Zealand Food Standards Code) Food Standards 2002 and issued by the Minister under section 11C of the Food Act 1981.

HACCP (Hazard Analysis and Critical Control Point) - a system that identifies, evaluates and controls hazards that are significant for food safety.

Manufactured meat - processed meat containing no less than 660g/kg of meat.

Minimise - to have taken all practical steps to substantially reduce the potential hazard of concern, consistent with what is technologically feasible.

Monitor - the act of conducting a planned sequence of observations or measurements of control parameters to assess whether a process step or control measure is under control.

Operator-defined limit - a measurable limit established by an operator to manage the fitness for purpose of a particular product.

Pathogen - a microorganism which causes illness.

Post-processing - process steps or activities undertaken after the application of a lethal heat or preservation treatment such as cooking, fermentation, or drying.

Process control - all conditions and measures applied during the production process that are necessary to produce a safe and suitable product.

Processing areas/rooms - include all areas where raw materials and ingredients are prepared (e.g. thawed, cut, weighed, pre-mixed, injected, cured, massaged, tumbled, emulsified, filled), processed (e.g. cooked, cooled, dried, fermented, sliced), and packed.

Processed meat - a meat product containing no less than 300 g/kg meat, where meat either singly or in combination with other ingredients or additives, has undergone a method of processing other than boning, slicing, dicing, mincing or freezing, and includes manufactured meat and cured and/or dried meat flesh in whole cuts or pieces.

Ready-to-eat (RTE) product - product that is ordinarily consumed in the same state as that for which it is sold. RTE products do not require additional preparation to achieve food safety, however, they may receive additional preparation for organoleptic reasons (i.e. to make them taste and/or look better). They can include frozen processed meat products.

Regulatory limit - a measurable regulatory requirement that is critical to the fitness for intended purpose of a particular product.

Rework (noun) - product which has been partially or fully processed and is incorporated and reprocessed into another batch of product.

Rework (verb) - to incorporate rework into another batch of product.

Separate by distance - to separate products or processes by location or distance within a room or area so that any contact or contamination between products, equipment, processes or personnel is avoided.

Separate physically - means to separate by floor to ceiling walls and doors, or to fully protect product by containing it in enclosed pipelines, vats, etc.

Separate by time - to separate products and processes by means of a time difference.

Smallgoods - term commonly used in New Zealand to refer to manufactured meat products such as hams, bacons, other cured products, and cooked meats.

Spoilage microorganism - microorganisms which cause deterioration of food and limit the shelf-life of foods by producing objectionable flavours, odours and slime.

Suitably skilled person - a person who in the opinion of the operator is skilled in a particular activity or task through training, experience, or qualifications.

Tempering - in the case of frozen product, tempering means the elevation of the temperature to any point that is lower than the freezing point of the product. (Meat begins to freeze at about -2°C).

Thawing - the elevation of the temperature of frozen product to temperatures that are higher than the freezing point of the product.

Validation - process of obtaining evidence to demonstrate that a particular product will be fit for intended purpose, through the achievement of any regulatory limit or operator-defined limit.

Verification - the application of methods, procedures, tests and other checks to confirm compliance to the documented Food Safety Programme or Risk Management Programme, and legislative requirements.

Water activity (a_w) - a measure of the water in the food which is available for microbial growth. It is the ratio of the water vapour pressure of the food (p) to that of pure water (p_o) at the same temperature, $a_w = p/p_o$.

2 General Requirements

Amendment 0

February 2010

2.1 Scope

This section gives the regulatory requirements and other industry agreed requirements that apply to all products and processes covered in this COP.

To identify a regulatory requirement, the legislation from which the particular requirement is taken is cited at the end of the sentence. In most cases, the mandatory requirements have been paraphrased. Operators should refer to the legislation for the actual wording. Legal requirements from the APA are mandatory for businesses operating under an RMP, and they are strongly recommended for those operating under an FSP. The abbreviations used for legislation cited are:

- AP Reg - the current version of the [Animal Product Regulations](#)
- HC Spec - the current version of the [Animal Products \(Specifications for Products Intended for Human Consumption\) Notice](#)
- RMP Spec - the current version of the [Animal Products \(Risk Management Programme Specifications\) Notice](#)
- AC Spec - the current version of the [Animal Products \(Specifications for Products Intended for Animal Consumption\) Notice](#)
- FSC - the current version of the [Food Standards Code](#)

2.2 Regulatory Standards

The operator must meet all relevant product and processing requirements set out in the Food Standards Code, the Food Act and the APA, including but not limited to the following:

- a. meat and meat product standards (FSC Standard 2.2.1)
- b. substances added to food, e.g. additives and processing aids (FSC Part 1.3)

- c. microbiological limits ([FSC Standard 1.6.1](#))
- d. processing standards (e.g. [UCFM Standard](#))
- e. labelling and other information requirements (FSC Part 1.2)

2.3 Hygienic Practices

2.3.1 Operators must establish and carry out procedures to:

- a. ensure appropriate and adequate maintenance, cleaning, and sanitation of premises, facilities, essential services, and equipment
- b. manage waste
- c. control pests; and
- d. implement effective personnel hygiene practices. **[AP Reg 11; Food Act Section 8G]**

Refer to Part 2 for requirements and procedures for hygiene and sanitation.

2.3.2 All inputs, including raw materials, ingredients, additives and packaging must be handled, processed, and stored in a manner that minimises any potential contamination or deterioration. **[AP Reg 9, HC Spec 115]**

2.3.3 Rooms used for the processing of meat products must be operated in such a manner that minimises the growth of microorganisms likely to affect human health. **[HC Spec 114(1)]**

Processing areas should be maintained at a temperature not exceeding 12°C, except when:

- a. temperature conditions are sufficient to maintain the temperature of the meat and/or mix at not more than 7°C; and/or
- b. processing areas are used for thermal processing or fermentation, or where a higher temperature is either not detrimental to product safety or is required for its manufacture.

If the raw meat processing areas are operating at ambient temperatures, equipment and other product contact surfaces located in this area may require more frequent cleaning. The frequency of cleaning must be justified by the operator (refer to Part 2, section 7.2.4.10).

2.3.4 All steps in the process must be performed without unnecessary delay, and under conditions which will prevent or minimise contamination, deterioration, and growth of pathogenic and spoilage microorganisms in the product.

2.3.5 There must be effective separation to prevent cross-contamination between raw and cooked or ready-to-eat products, or cured and uncured products, or products of different allergen status.

2.4 Documentation and Records

2.4.1 Operators must document any regulatory limit and/or operator-defined limit relevant to their product or process. **[RMP Spec 7 and 11]**

Regulatory and operator-defined limits are measurable limits that are critical to the fitness for intended purpose of a particular product, and must be consistently met for food safety. Regulatory limits are defined by the regulator, whereas operator-defined limits are established by the operator.

These limits may be expressed as a:

- a. product requirement (e.g. microbiological limit, pH, a_w)
- b. process parameter (e.g. minimum cooking time-temperature combination); or
- c. performance criteria (e.g. 6D reduction in *Listeria monocytogenes*).

Regulatory limits are specified in legislation (e.g. Food Standards Code, HC Spec). When no regulatory limit is specified and when necessary for food safety, the operator is expected to define and justify their own limits. Operator-defined limits may be taken from sources such as reputable codes of practice, peer-reviewed scientific information, predictive models, scientific information from a person or organisation known to be competent, or developed from the operator's own trials and experiments.

2.4.2 Operators must document the following in their FSP or RMP:

- a. processing procedures, and product and process parameters
- b. procedures for monitoring and verifying compliance to established processing procedures and parameters, particularly critical limits at identified critical control points

- c. corrective actions for any non-compliance or deviation to any regulatory limit or operator-defined limit, procedures, and product and process parameters. **[RMP Spec 8 and 11; Food Act Section 8G]**

2.4.3 Operators must maintain accurate records, particularly those for the monitoring and verification of product and process parameters critical to food safety. **[RMP Spec 20(2); Food Act Section 8G]**

Refer to Part 2, Section 3: Documentation and Record Keeping.

2.5 Product Formulations

2.5.1 Product formulations must be developed by a suitably skilled person, and be documented.

The suitably skilled person should have technical skills and experience in developing formulations, be familiar with permitted levels of ingredients and additives, and understand the effect of any change in the formulation on product characteristics, allergen status of the product, process parameters, labelling, etc.

2.5.2 A suitably skilled person must assess the effect of any change in a product formulation on any regulatory or operator-defined limits and/or processing parameters, and ensure that any consequential changes in processing are made before the new formulation is used commercially.

For example, a different proportion of meat and cereals in emulsion sausage formulations may require changing the cooking cycle.

2.5.3 Product formulations must be properly adjusted to account for the addition of any rework. The operator must establish a limit for the amount of rework which can be added to a batch since this can affect its functionality and the additive levels (e.g. nitrite) in the finished product.

2.5.4 Product formulations must result in additive levels in the finished product that comply with any permitted levels specified in the [Food Standards Code, Standard 1.3.1.](#)

2.5.5 The operator must be able to provide evidence that additive levels in finished products comply with permitted levels in the Food Standards Code.

Operators are not required to routinely test all batches of products against these criteria, but it is recommended that samples of products are occasionally tested as part of the verification programme.

2.6 Traceability

The operator must document and implement a tracking system that:

- a. allows for the identification of all raw materials, ingredients, products, and packaging (when appropriate); and
- b. enables the movement of raw materials and ingredients to be traced from the supplier; and to the next person or company that any product is transferred to for further processing, packing, storage, distribution or sale. **[AP Reg 18(1)(b)(i)]**

Refer to Part 2, Section 16: Traceability and Inventory Control.

3 Preparation Steps

Amendment 0

February 2010

3.1 Scope

This section covers the process steps commonly undertaken in the preparation of processed meats before the application of a heat or preservation treatment such as cooking, fermentation, or drying.

3.2 Tempering and Thawing

3.2.1 General procedures

3.2.1.1 Tempering or thawing of frozen meat must be done in a manner, and under conditions, that minimise contamination of the meat and the growth of microorganisms.

3.2.1.2 Tempering and thawing procedures and parameters (e.g. time and temperature) must be documented in the FSP or RMP.

3.2.1.3 Any equipment used for the tempering or thawing of meat (e.g. microwave) must be operated according to the manufacturer's instructions.

3.2.1.4 Thawed meat must be processed without unnecessary delay, or it must be held under refrigeration while waiting to be further processed.

Frozen meat cuts should be thawed throughout the cut. Improperly thawed meat could cause insufficient cure penetration or failure to reach a required cooking temperature.

When the temperature of any part of the product during thawing exceeds 10°C, the temperature should be reduced to less than 7°C within a period of time calculated as the thawing lag time at the warmest temperature recorded for the process according to the following formula (Lowry *et. al*, 1988): $y = 0.00185x^2 - 0.136x + 2.841$

where x = the temperature of the product in °C, and y = log lag time in hours.

3.2.1.5 Procedures for the removal of plastic liners entrapped in the meat must be established and documented.

The occurrence of entrapped plastic in the meat may be reduced by using thicker gauge liners which are less likely to tear, and using blue liners which are easier to see.

3.2.2 Tempering and thawing in air

3.2.2.1 Carcasses or cartons must be spaced apart to allow good air circulation.

3.2.2.2 Thawing must not result in contamination of other products with thaw drip.

1. Frozen cartoned meat may be thawed at:
 - a. a maximum air temperature of 10°C for 72 hours; or
 - b. a maximum air temperature of 7°C for 96 hours; or
 - c. a maximum air temperature of 15°C provided: no part of any product exceeds 7°C, the temperature of the product is constantly monitored, and the whole thawing process is under an automatic control system. The temperature of the product at the top leading corner of the carton (i.e. the corner that first intercepts the air flow, at the warmest location in the chiller) should be used as the reference to monitor and control the temperature.
2. A two-stage thawing cycle has been suggested by MIRINZ as an alternative thawing regime which results in faster thawing without causing unsafe high temperatures at the centre of the top surface (Fleming, 1989).

Their study showed that higher air temperatures in the early stages of the thawing cycle can be tolerated without compromising meat hygiene because pathogenic bacterial growth is impeded after a freeze/thaw cycle by an unusually long “lag phase” when no growth takes place. The combination of cold surface temperature and long lag phase can allow meat to be subjected to warm air for a short period at the start of the thawing process, to reduce the thawing time required. For example, a standard 27 kg carton of boneless beef, which would take 3 days to thaw in air held at 10°C, will take only 2 days to thaw if air temperature is held at 20°C for the first 16 hours and then lowered to 10°C.

A thawing regime based on this concept may be proposed by the operator provided that it is validated.

3. Frozen meat for grinding or slicing is usually tempered to about -5 to -2°C. In 'warm air' (10°C or higher), it is difficult to get even tempering of frozen meat to a uniform temperature. The meat surface may be completely thawed and soft while the centre of the meat blocks remains frozen. Tempering to a uniform temperature requires an air temperature either at, or just above, the desired meat temperature (e.g. tempering at 0°C chiller). Under such conditions, tempering of large blocks of cartoned meat may take several days to complete.

3.2.3 Thawing in water

3.2.3.1 Fresh potable water must be used for each thawing cycle.

3.2.3.2 Thawing must be carried out at a temperature that minimises the growth of microorganisms and allows the product to thaw within the desired thawing period.

The temperature of the thawing water should not exceed 10°C. A higher thawing temperature (e.g. up to 15°C) may be considered provided the operator can demonstrate that it will not result in unacceptable microbiological growth considering the holding time at the particular temperature, and any subsequent steps which may inhibit microbiological growth. For example, a higher temperature may be justifiable if the meat is injected or immersed in cold brine soon after thawing.

3.2.3.3 The thawing tank must not be overloaded with product. There must be adequate space to allow effective circulation of the thawing water around each product item.

Good water circulation is essential for efficient thawing. A system for circulating water evenly around the tank helps avoid large temperature gradients and uneven thawing throughout the tank.

3.2.3.4 The thawing tank must be emptied, cleaned and sanitised after each thawing cycle (i.e. after thawing a batch of meat).

3.2.4 Other tempering or thawing methods

Operators may use other tempering and thawing methods (e.g. microwave thawing) provided that the outcomes given in section 3.2.1 can be met, and evidence is provided to demonstrate this.

3.3 Cutting, Boning and Trimming

3.3.1 Carcasses, sides and quarters must be checked for visible defects prior to the start of cutting and boning, and any defect found must be removed in a hygienic manner.

Visible defects include rail dust, grease, bruises, lesions, blood clots, clusters of hair, dirt or other extraneous material.

3.3.2 Defective material and contaminated meat (e.g. dropped meat) must be immediately disposed of to waste bins or containers for animal consumption materials, as appropriate.

3.3.3 Different species of meat must be processed separately (i.e. on different tables or at different times) unless the finished product includes a mixture of those species.

3.3.4 The operation must be managed so carcasses and cuts are maintained at a temperature that prevents microbial growth during cutting and boning, or trimming.

Meat temperature should be maintained at $\leq 7^{\circ}\text{C}$ during and after cutting and boning. The operator should establish how many carcasses, sides or quarters should be taken out of the chiller at a time in order to maintain the correct temperature and minimise exposure of the meat. Cuts and trimmings should not be allowed to accumulate. Unless they are to be used immediately, they should be periodically transferred to a chiller or freezer during the working period.

3.4 Comminution

3.4.1 Comminution must be done in a manner that minimises contamination and growth of microorganisms in the product.

3.4.2 Procedures for preventing metal contamination from grinders and flakers, and corrective actions when metal contamination occurs must be established and documented.

Grinders and flakers should be checked and maintained regularly to prevent metal contamination from equipment. Some companies also have procedures for preventing metal contamination from newly installed blades. For example, when a new or resharpened blade is installed, the first few kilograms of mince produced after installation is dumped to waste.

3.4.3 Comminuted meat must be further processed without unnecessary delay, or it must be held under refrigeration while waiting to be further processed.

When grinding or flaking frozen or tempered meat, the latent heat of melting limits temperature increase during comminution. However, grinding of chilled or thawed meat can lead to an increase in temperature to as high as 10°C. If the meat is not going to be used immediately after comminution, it should be refrigerated so that its temperature is reduced and/or maintained at ≤ 7°C while waiting to be further processed.

3.4.4 Grinders, flakers and other equipment must be maintained in a hygienic condition during the production period.

Grinders, flakers and other equipment that are used intermittently during the day, and/or located in non-refrigerated rooms, may need to be cleaned more frequently to minimise the build-up of microorganisms on the equipment which may contaminate subsequent batches of meat.

Equipment which has been used but is temporarily idle should be cleaned before re-use if the delay is in excess of 4 hours. More frequent cleaning may be necessary if the equipment is located in a non-refrigerated room.

Material left in “dead spots” of the grinder are likely to have high microbial counts. Therefore, residual meat in the screw and plates which are removed during disassembly of the grinder (i.e. at the end of the each working day, and every time the grinder is cleaned after standing idle for a long period) should be discarded.

3.5 Weighing and Assembly of Ingredients

3.5.1 General procedures for weighing of ingredients

3.5.1.1 Correct formulations or recipes must be available to, and used by, the person responsible for weighing ingredients.

3.5.1.2 The weighing and assembly of ingredients and additives must be carried out only by designated and trained personnel.

3.5.1.3 Accurate scales with appropriate capability must be used for weighing ingredients and additives.

For example, a 5 g amount should not be weighed on a 25 kg scale having 100 g graduations.

Weighing scales should be checked daily against test weights. Refer to Part 2, Section 10: Calibration of Measuring Devices.

All ingredients should be measured by weight so a single standard unit of measure is used for formulations. Uncalibrated or non-standard containers (e.g. drinking mugs or cups, or buckets) should not be used for measuring since they give inaccurate measurements and mistakes can easily happen when the container is changed.

3.5.1.4 The identity of ingredients and additives used, and their amounts, must be recorded (e.g. in a checklist).

Restricted additives, such as nitrite, should be kept in a locked container or facility. The amount of nitrite used should be regularly reconciled (e.g. weekly) against the amount held in storage.

Nitrite can be toxic to consumers at excessive levels and its addition to the product should be controlled. The use of pre-blended curing mixtures (i.e. nitrite mixed with salt and other ingredients, and which are usually tinted pink) prevents the addition of excessive amounts of nitrite into the product. When pure nitrite is used, it is possible that the person weighing the ingredients might confuse the quantity required with that of salt and mistakenly add excessive amounts of nitrite.

3.5.1.5 The weighing procedures must facilitate the traceability of ingredients used in all batches of products.

3.5.1.6 Containers and utensils used for weighing must be dedicated for the purpose. They must be clean and not be a source of contamination.

3.5.1.7 Dedicated containers and utensils must be used for ingredients containing allergens.

Containers and utensils used for weighing should be clearly identified (e.g. by colour or label).

3.5.1.8 Handling and weighing of allergenic ingredients must be done in way that minimises the potential for cross-contamination of allergens.

Refer to Part 2, Section 14: Allergen Management.

3.5.2 Pre-weighing and assembly of ingredients (i.e. batching)

3.5.2.1 Pre-weighing and assembly of dry ingredients must be performed in a dry ingredient room, or in an area specifically designated for dry ingredient preparation and/or storage.

Some companies have one or two designated workers who are trained in batching ingredients. To minimise mistakes during weighing, they should not leave the weighing area or be interrupted until a batch is completed.

3.5.2.2 Procedures for managing foreign matter from ingredients must be established and documented.

Ingredients with a history of foreign matter contamination should be sieved before weighing. Other ingredients should be randomly checked for the presence of foreign matter.

Findings of foreign matter should be recorded and the object, bagged and labelled with the product details (e.g. name, product code, batch code/ID, production date). Appropriate action should be taken by the operator to prevent re-occurrence (e.g. notify the supplier).

Processors should ensure that they and their ingredient suppliers do not use staples or metal clips for sealing ingredient bags, as they can easily get into the product. The use of string for tying ingredient bags is also a potential source of foreign matter, and should be avoided.

3.6 Preparation of Curing Brines

3.6.1 The weighing of ingredients and additives must be done in accordance with the procedures given in section 3.5.

To prevent mistakes in the use of nitrite, only one bag of pre-weighed nitrite should be present in the preparation area at a time.

Before adding whole cartons or whole bags of an ingredient, such as salt or phosphate, the weights should be checked. A bag of salt or phosphate may not necessarily weigh exactly the net weight declared on the bag.

If the amount of water used is determined by filling the brine tank to a certain level, the tank should be properly calibrated and marked.

3.6.2 Potable water and ice must be used for preparing the curing brine.

3.6.3 The curing brine must be maintained cold.

Curing brine should be maintained at $\leq 5^{\circ}\text{C}$ to minimise nitrite and ascorbate depletion.

3.6.4 Unused curing brine remaining at the end of a day's operation must be kept in the chiller. It must be checked for salt and nitrite content, and adjusted to the required level before being used.

Guidance on the preparation of curing brines (Sadler, 1987):

- a. Batches of brine should be formulated to be as small as possible to prevent leftover solution, while still being economical to the process operation.
- b. Water for preparing the brine should be as cold as possible – preferably near 4°C . Warm water causes nitrite depletion. If ice is used in the preparation of the brine, its weight must be included in the calculations.
- c. Ingredients should be mixed in the following order to permit complete solution and to protect the nitrite and ascorbate: (i) water, (ii) phosphates, (iii) salt, sugar, dextrose and flavourings, (iv) nitrite, (v) ascorbate.
If phosphates are first dissolved in a small quantity of warm water prior to adding to the curing tank, the quantity of warm water must be included in the total weight of the brine.
- d. Brines should be monitored using an accurate working salinometer. The influence of phosphates on a salinometer reading may be 10-12%; this influence must be corrected for. When possible, in addition to a salinometer reading, laboratory analysis of brines is also recommended.
- e. Brines should be maintained constantly, cold and temperature changes should be avoided. Any increase in temperature causes nitrite depletion. Curing brines should be continuously held at about 5°C . Keeping brines cold not only retards nitrite depletion but also increases product yield.
- f. Excess or severe agitation of the brine by steam, air or mechanical means causes nitrite depletion and should be avoided.

- g. Brine transfer lines should not be exposed to warm temperatures. Brines held in a pump line at 26.7°C will undergo nitrite and ascorbate breakdown.

3.7 Curing

The common methods of curing whole muscle meat products are: injection, immersion and dry curing, or a combination of these methods. For example, ham or bacon may be injected with a curing brine, tumbled, and then equilibrated under cover brine for one to two days.

3.7.1 Injection curing

3.7.1.1 The person responsible for operating the injector must check and ensure that the injector needles are in good working condition (i.e. no breakage, not bent or blunt, no blockage) before the start of injection.

3.7.1.2 The injector must be set to consistently deliver the curing brine at the required injection rate.

Correct delivery of curing brine should be determined by measuring the green weight (uninjected) and injected weight of several samples per batch, and adjusting the machine setting until the correct injection rate is achieved.

3.7.1.3 Used curing brine must not be recirculated back to the fresh brine tank.

3.7.1.4 Used curing brine must be discarded at the end of each day's operation. An alternative may be proposed by the operator provided the procedure is validated and can be shown to be microbiologically acceptable. The used curing brine must be checked for salt and nitrite content, and adjusted to the required level before being used.

Fresh brines are likely to carry a microflora of between 100-1000 organisms/ml (Lowry, 1987). Generally, the microbial loading of recirculating brines is approximately ten-fold higher than that of fresh brine. The microflora of such brines is primarily made up of organisms of low spoilage potential, and contains some of high spoilage potential for vacuum packaged product, notably lactic acid bacteria and enterococci. These latter species are present in extremely low numbers in fresh brines, but characteristically increase up to 100-fold over a period of recirculation. The use of highly contaminated brines will, therefore, lead to reduced product shelf-life.

The practice of batch processing (i.e. matching volume of brine with product volume) increases the numbers of contaminating organisms as the volume of the recirculating brine decreases. Because the brine volume is constantly decreasing during processing, microorganism washed off the last product processed are suspended in up to 10 times less brine than is the case for the first product. One way of overcoming this problem is to regularly top up the recirculating brine with fresh brine when the level falls to half-full. In this way, the maximum concentration effect that could result would only be two-fold.

3.7.1.5 The injector must be maintained in a hygienic condition during processing, and must be cleaned and sanitised at least daily.

Sanitation of multi-needle injection machines is very important. Even traces of meat tissue left in the machine at the end of processing can give rise to significant contamination of the brine. Organisms introduced into the brine through poor sanitation and cleaning of equipment are normally those of high spoilage potential. Therefore, cleanliness is critical in assuring optimum shelf-life for products.

Injection machines that are used intermittently during the day may need to be cleaned more frequently (e.g. between batches) to minimise the build-up of microorganisms on the equipment which may contaminate subsequent batches of meat.

3.7.2 Immersion curing

3.7.2.1 Curing procedures and conditions must minimise the growth of pathogenic and spoilage microorganisms, and facilitate uniform curing.

Meat pieces should be uniform in size, and periodic mixing of the batch may be necessary to ensure uniform cure penetration.

The curing brine should be maintained at $\leq 5^{\circ}\text{C}$.

3.7.2.2 The meat must be completely immersed in the brine during curing.

3.7.2.3 As a minimum, curing tanks must be emptied and cleaned between batches.

Re-use of cover brines is not recommended because all ingredients in it are diluted during curing. It will also contain extracted components from the meat, large numbers of salt-tolerant bacteria, and probably some bacterial pathogens.

If cover brines are re-used, the processor should establish how long it should be kept, and the procedures (e.g. temperature control) for ensuring that it remains in an acceptable condition. The quality of the cover brine should be periodically checked (e.g. turbidity, salt level, colour), and the salt and nitrite levels adjusted before being re-used.

After about two to three weeks, depending on the temperature, harmless bacteria in cover brines are gradually replaced by pathogenic bacteria (Sadler, 1987). Therefore, it is recommended that curing brines not be kept longer than this period, and if there is an adverse change (e.g. milkiness, off-odour), the brine should be discarded earlier.

Generally, cover brines can be expected to have microbial loads of $1-6 \times 10^6$ cfu/ml (Wilkinson, 1989). Brines with microbial loads greater than this will give poor quality products.

3.7.3 Dry curing

These requirements apply to the dry curing of bacon and ready-to-eat dried meats such as prosciutto. Additional requirements for ready-to-eat dry-cured meats are given in Section 6: Drying.

3.7.3.1 The meat must be salted and cured under conditions that minimise contamination, inhibit the growth of pathogenic and spoilage microorganisms, and facilitate uniform curing.

3.7.3.2 The correct amount of salt must be used and it must be evenly distributed on all exposed surfaces of the meat.

3.7.3.3 During curing, the temperature of the meat must be low enough to avoid spoilage and growth of pathogens while the ingredients equilibrate across the piece.

Pathogens present on the raw meat (e.g. salt tolerant *S. aureus*) could grow if salt is not evenly distributed or is added at too low a level.

Meat pieces should be uniform in size to facilitate uniform curing. The meat should be rotated and all surfaces of meat should be rubbed with the dry cure mixture at intervals of sufficient frequency to ensure cure penetration.

The temperature of the product should be controlled between 2°C and 7°C during dry curing of muscle cuts (FDA 2001, Food Code Annex 6). The lower temperature is set to limit microbial growth and the upper temperature is set for the purpose of ensuring cure penetration.

3.8 Tumbling and Massaging

3.8.1 The meat must be loaded into, and unloaded from, the tumbler or massager in a hygienic manner.

3.8.2 The tumbling and massaging conditions (e.g. temperature and time) must minimise the growth of microorganisms.

Depending on the product, machine and rotating speed, tumbling and massaging may be done for a short period (e.g. 30-45 min), or it may be done intermittently for longer periods (e.g. 15-20 min activity out of each hour, for 18 hours). Temperature control is important particularly for products that undergo long tumbling/massaging times.

3.8.3 Tumblers and massagers must be maintained in a hygienic condition.

Tumblers and massagers should be cleaned at least daily; or after each cycle, if tumbling or massaging takes more than 24 hours.

3.9 Bowl Chopping and Mixing

3.9.1 Correct formulations or recipes must be available to, and used by, the person responsible for bowl chopping or mixing.

3.9.2 The identity of ingredients and additives used, and their amounts, must be recorded (e.g. in a checklist).

3.9.3 Packaging or containers of pre-weighed ingredients or premixes must be handled and disposed of properly so that they do not become a source of physical hazard or foreign matter (e.g. plastic bag, pieces of paper, string).

3.9.4 The temperature of the meat mixture during chopping must be controlled.

The required cutting temperature varies for different types of products. For cooked sausage products, chopping temperatures of 14°C allow for the desired product appearance and maximum extraction of the binding proteins. Other sausages, such as bierstick and chorizo, are cut or mixed at lower temperatures (e.g. 4°C). Temperatures greater than 15°C to 20°C can result in emulsion

breakdown (Baumgartner, 1987).

3.9.5 The mixture or emulsion must be used (i.e. filled into casings) without unnecessary delay, or it must be held under refrigeration while waiting to be further processed.

3.9.6 The incorporation of rework into any product must be in accordance with the procedures given in section 3.11.

3.9.7 Procedures for preventing metal contamination from bowl choppers and mixers, and corrective actions when metal contamination occurs must be established and documented.

3.10 Filling, Stuffing and Pressing

3.10.1 The meat mixture or emulsion must be hygienically filled into food grade casings, nets or moulds.

3.10.2 Potable water must be used for pre-soaking casings, and the water must be changed regularly.

3.10.3 The filling machine must be adjusted properly to achieve portioning accuracy and evacuation of air pockets from the product. Casings must be filled to the correct diameter.

Under-filling and over-filling can affect the quality of the end product. Diameter size influences the rate of cooking, drying and smoking, and ultimately the flavour and texture of the finished product.

3.10.4 Procedures for preventing the mixing of products from one batch to the next must be established and documented.

The filler should be cleaned between different products (e.g. when products have different allergen status); or the mixture from one batch should be completely purged from the filler before filling the next batch.

3.10.5 Procedures for preventing contamination from metal clips must be established and documented.

3.10.6 Presses or moulds must be regularly checked for rough or sharp edges which can puncture the casing.

3.11 Rework

Examples of product used as rework are:

- a. products that do not meet quality specifications (e.g. broken pieces, leakers, misshapen pieces, and discoloured products)
- b. ends of meat pieces; and
- c. products that do not meet the required heat treatment.

3.11.1 Rework must be handled and stored in a manner and under conditions that minimise contamination and growth of microorganisms.

3.11.2 Rework must be clearly identified and kept separate from other products during storage.

3.11.3 Formulations must be properly adjusted to account for the addition of any rework. The operator must establish a limit for the amount of rework which can be added to a batch since this can affect its functionality and the additive levels (e.g. nitrite) in the finished product.

Because the protein in rework has been denatured, rework has no water or fat binding ability. Therefore, the incorporation of large amounts of rework could have a destabilising effect on the new product. The amount of rework added to a batch should not exceed 5% of the total weight of batch (Rust, 1996).

The use of rework could also have a diluting effect on the functionality of additives, such as nitrite, phosphates or ascorbates in the new batch of product, since all these have reacted with the appropriate components of the original formulation and therefore have little if any residual functionality.

3.11.4 The person responsible for developing and adjusting formulations must also consider any potential effect of using rework on labelling, shelf-life and allergen status, and the introduction of hazards.

Maintaining the acceptable microbiological condition of rework can be difficult due to the extra handling that rework undergoes. Therefore, rework can potentially increase the microbial load of the batch it is added to. The microbiological condition of rework becomes even more significant in dry or semi-dry product (e.g. salami) where no cooking step is applied, thus, more rigid control is necessary for rework used in this type of product (i.e. when manufacturing UCFM, only product that has been through the complete validated process may be reworked back into new product). For this reason, some processors only use rework in cooked products.

Processors should establish a cut-off period for reworking products from one batch to the next to facilitate traceability and recall procedures; and prevent the potential build-up of microbiological resistance against certain inactivation treatments (e.g. cooking).

Recycling of rework through the system for prolonged periods has the potential to cultivate strains of unwanted microorganisms that may be very difficult to destroy with normal cooking cycles (i.e. recycling inadvertently selects for heat resistant strains of certain organisms) (Rust, 1996).

Therefore, the operator should periodically clear out all rework. For example, some manufacturers have a weekly cut-off (i.e. material produced in a previous week is not reworked into the current week's production).

3.11.5 Any material or product, whether in stock or returned, which may have been mishandled or exposed to contamination must not be reworked into new product.

3.11.6 Procedures for tracing the batches of reworked materials and the batches of products they have been used in must be established and documented.

3.12 Metal Detection

3.12.1 Metal detectors must have the appropriate sensitivity for the type and size of metal identified as a hazard in the particular product.

Metal can get into meat products from a number of sources (e.g. grinder blade, broken needle from the needle injector, metal clips, metal pieces from worn equipment). The metal detection system should be sensitive to 'ferrous', 'non-ferrous' and stainless steel metals.

3.12.2 Metal detectors must be located at the point(s) where contaminated products can be effectively isolated and the product is unlikely to be exposed to further metal contamination at subsequent steps.

3.12.3 Metal detectors must be checked against appropriate test pieces daily, and must be calibrated regularly.

Refer to Part 2, Section 10: Calibration of Measuring Devices.
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3.12.4 All products that fail metal detection must be isolated from the process line and from acceptable products, and then broken down to determine the reason for failure.

3.12.5 Corrective action must immediately be taken when a batch of product is suspected to have been contaminated with metal.

4 Cooking

Amendment 0

February 2010

4.1 Scope

This section discusses the requirements for the validation and implementation of cooking processes. It applies to the cooking methods commonly used for processed meats in New Zealand. These methods include cooking in water, steam or dry heat.

Processors should also refer to the Heat Treatment section of the [Draft Meat and Seafood Code of Practice Processing](#). Note that once finalised, this section will form part of the [Further Processing Code of Practice](#).

4.2 Outcome of the Cooking Process

4.2.1 The cooking process for a product must be sufficient to render the product microbiologically safe for its intended purpose.

4.2.2 Cooked cured/salted meat products must meet the microbiological limits given in the Food Standards Code, Standard 1.6.1:

	n	c	m	M
Microorganism				
Coagulase positive <i>staphylococci</i> /g	5	1	100	1000
<i>Listeria monocytogenes</i> /25g	5	0	0	-
<i>Salmonella</i> /25 g	5	0	0	-

n = number of samples examined from a lot of food

c = maximum number of samples allowed to have results greater than m but less than M

m = acceptable microbiological level in a sample

M = maximum level which when exceeded in one or more samples would cause the lot to be rejected

These microbiological limits must be identified as regulatory limits in the FSP or RMP.

4.2.3 When cooking is used to control pathogens in ready-to-eat (RTE) products, the cooking process must achieve a 6 decimal reduction of *Listeria monocytogenes* (a 6D process).

This process criterion, or a specific cooking time-temperature that will deliver a 6D process, must be identified as an operator-defined limit in the documented FSP or RMP.

A 6D process for the destruction of *L. monocytogenes* is generally accepted as sufficient to inactivate other vegetative forms of pathogens of concern in a particular meat product. A 6D process delivers a 10^6 fold reduction of the pathogen (i.e. will reduce the number of bacteria from 1,000,000 to one).

The following time and temperature combinations will deliver a 6D reduction in *L. monocytogenes*. The temperature is the minimum that must be achieved and maintained for at least the corresponding time at the slowest heating point of the product (to be determined based on the product's shape and size).

Temperature (°C)	Time (minutes)
60	44
61	33
62	24
63	18
64	13
65	10
66	7
67	6
68	4
69	3
70-72	2
73-75	1
76 or higher	< 1

(Source: Guidelines for the Safe Manufacture of Smallgoods. Meat and Livestock Australia Ltd, 2003)

4.2.4 The operator may propose an alternative from the 6D process for *L. monocytogenes*. The alternative process must be validated by the operator, and approved by the NZFSA before being implemented.

Reasons for proposing an alternative to the 6D process for *L. monocytogenes* can be:

- a. lower microbiological loading of the raw material and, therefore, the required lethality of the cooking process may be reduced
- b. *L. monocytogenes* is not identified as the target microorganism to be destroyed during cooking; or
- c. additional preservation factors are used to preserve the product and, therefore, the required lethality of the cooking process may be reduced.

NZFSA approval of the alternative process is given through the registration of the RMP or a significant amendment to an RMP, or approval of the FSP.

4.3 Validation

4.3.1 The cooking process must be developed and validated by a suitably skilled person for each product or product group. The process must be revalidated whenever there is a change to the process or product that could impact on its safety.

Validation often involves running trials and collecting data to show that a process is safe and will produce safe product.

4.3.2 The operator must demonstrate that the validated process is capable of consistently achieving the relevant regulatory and/or operator-defined limits.

4.3.3 Smokehouses, steam cookers, water cookers and other types of cookers must be properly installed and set up so they provide uniform temperature distribution throughout the unit.

Temperature distribution studies should be conducted at least annually, or whenever there are changes to the equipment set-up or product arrangement that could impact on heat distribution and transfer. Each cooking unit should be set up so that normal loads of sufficiently spaced and similar sized product can be shown, by core temperature measurements at random sites throughout the unit, to have uniform cooking rates.

If the cooking unit does not have good heat distribution, the cooking process should be validated based on a worst-case scenario (i.e. based on the cooking rate of the product at the coldest part of the cooking unit).

4.3.4 The variation in size and weight of meat pieces must be minimised to ensure uniform cooking in each batch.

4.3.5 The operator must document the validated process parameters and conditions (e.g. cooking times and temperatures, loading capacity, cooker set up) in the FSP or RMP.

Data should be obtained based on a worst-case scenario considering the different factors that could affect the lethality of the heating process (e.g. type and size of the product, type and performance of the cooker, loading configuration of the cooker, loading capacity). Temperature distribution in the cooking equipment, and whether there are hot or cold spots, should be taken into account when validating the process.

In determining the appropriate number of trials to conduct, consideration should be given to equipment performance, product homogeneity and safety margin of the process. As a minimum, for a well controlled process with low variability, at least three confirmatory runs should be conducted. This number should be increased in situations where there is large or unacceptable variation within and between runs, as determined by the suitably skilled person.

4.3.6 Records of all aspects of the validation work must be kept by the operator, including records of the temperature distribution studies.

4.4 Implementation of the Validated Process

4.4.1 Cooking must be operated in accordance with the validated process and procedures.

4.4.2 If the smokehouse or cooker is operated using pre-programmed cooking schedules (e.g. computerised smokehouses), unauthorised access to the programmed parameters must be prevented.

4.4.3 The smokehouse or cooker must be operated within the capacity for which the cooking schedule has been validated for.

The smokehouse or cooker should not be overloaded. Adjustments to cooking cycles may need to be made for partially loaded batches, if this had not been previously considered in the development and validation of the process.

4.4.4 Products must be adequately separated in the smokehouse or cooker to prevent products touching each other.

4.4.5 If a product is cooked in a hot water bath, the product must be completely submerged in the water.

The products should be held at least 10 cm below the water surface with equipment such as a metal screen.

4.4.6 When the cooking step is a critical control point, the process must be carried out and/or supervised by appropriately trained personnel.

The operator must ensure that adequate training is provided and records of the training are kept. The training should cover the operation, control and monitoring of that step.

4.4.7 Calibrated temperature measuring devices must be used for determining internal product temperatures, and cooker temperatures.

Refer to Part 2, Section 10: Calibration of Measuring Devices.

The internal temperature of the cooked meat product must be measured at the coldest spot in the cooker and in the centre of the largest piece of meat.

4.4.8 Records of the cooking process must be kept for each production batch (e.g. cooking times and temperatures, and the product temperature).

4.4.9 The operator must verify that microbiological limits for the product are met.

Routine microbiological testing of all batches of products is not required, but it is recommended that samples of products are occasionally tested as part of the verification programme.

4.4.10 The procedures for preventing post-process contamination of ready-to-eat products given section 9.2 must be complied with.

4.4.11 Cooked products must be immediately cooled after cooking.

4.5 Non-compliance to the Validated Process

4.5.1 The operator must take immediate action when any non-compliance occurs that results in the product or process not meeting the validated process and parameters, including any regulatory or operator-defined limits.

4.5.2 Non-compliant products must be identified and segregated until their safety and disposition has been determined by a suitably skilled person.

Refer to Part 2, Section 17: Handling and Disposition of Non-complying Products, and Recall.

4.5.3 A suitably skilled person must investigate any incidence of non-compliance or process failure, determine the cause of the failure, and determine the appropriate corrective action.

4.5.4 The corrective actions must address the:

- a. restoration of control (e.g. stop processing until the assessment is completed and any necessary changes made to the product or process)
- b. identification and disposition of affected product (including initiating a recall, if necessary); and
- c. prevention of the recurrence of the loss of control.

4.5.5 A record of the assessment and corrective actions taken must be prepared by the suitably skilled person.

The record should be appropriate to the nature of the non-compliance and should include:

- a. date and time of non-compliance or process failure

- b. description of the nature and scope of the non-compliance
- c. description of equipment involved, when appropriate
- d. description of affected product, including code and quantity
- e. corrective action taken, including restoration of control, product disposition and prevention of recurrence
- f. records of any tests undertaken; and
- g. the name and signature of the suitably skilled person.

5 Cooling

Amendment 0

February 2010

5.1 Scope

This section discusses the requirements for the cooling of cooked processed meats. It applies to the different methods commonly used for cooling processed meats, including:

- a. water showers (e.g. inside or outside of oven)
- b. immersion in water or ice water baths; or
- c. refrigerated air flow.

5.2 Outcome of the Cooling Process

5.2.1 Cooked processed meat products must be cooled in a manner and under conditions that minimises the growth of bacterial sporeformers (e.g. *Clostridium perfringens*).

5.2.2 The cooling procedures and parameters must be documented in the FSP or RMP.

Most processors are likely to base their cooling parameters on information from a reputable agency or research institute, or published science journal. The operator may also propose an alternative cooling regime which must be scientifically validated.

Examples of acceptable cooling regimes/criteria for cooked meats are:

1. Australian Standard (AS 4696:2006)

		<u>Maximum time (hours)</u>	
	<u>Temperature</u>	<u>Uncured products</u>	<u>Cured products</u>
Stage 1	52°C to 12°C	6	7.5
Stage 2	12°C to 5°C	Within 24 hours of completion of cooking	

The temperature must be measured at the slowest cooling point of the product. Note that this

cooling regime does not apply to the cooling of fermented meats which have been cooked.

2. USDA FSIS Directive 7111.1

The cooling regime must meet the following criteria:

- a. no growth of toxigenic microorganisms such as *C. botulinum*; and
- b. growth of *C. perfringens* within the product does not exceed 1 log₁₀ accounting for the presence of a lag phase.

3. Alternative to the USDA FSIS criteria (NZFSA)

- a. no growth of toxigenic microorganisms such as *C. botulinum*; and
- b. growth of *C. perfringens* within the product does not exceed 2 log₁₀ where lag phase is not accounted for.

5.3 Validation

The operator must provide evidence that the established cooling parameters can be consistently achieved by all products.

Data should be obtained based on a worst-case scenario considering the different factors that could affect the cooling process (e.g. type and size of the product, type and performance of the cooling facility, loading configuration, loading capacity).

5.4 Implementation of the Validated Process

5.4.1 Cooling must be done in accordance with the validated process and procedures.

5.4.2 The procedures for preventing post-process contamination of cooked or ready-to-eat products given in section 9.2 must be complied with.

5.4.3 Internal product temperatures and/or cooling medium temperatures must be monitored during cooling using calibrated temperature measuring devices in a manner which will not contaminate the product.

5.4.4 Water cooling

5.4.4.1 Water and ice used for cooling (e.g. water sprays or in immersion cooling) must be potable.

The cooling water should be tested regularly and corrective actions taken (e.g. chlorination) to address any identified problem.

5.4.4.2 Cooked products must be transferred into the cooling water tank in a hygienic way. The cooked products must not come into contact with non-product contact surfaces.

5.4.4.3 Products being cooled in water tanks must be completely submerged in the water.

5.4.4.4 Cooling tanks must be emptied and the water replaced as frequent as necessary to maintain it in a hygienic condition.

5.4.5 Air cooling

5.4.5.1 Chillers and freezers must be used within their design capabilities and capacity.

5.4.5.2 Products must be arranged and loaded in the chiller or freezer in a way that will ensure the cooling of all products within the required cooling rate.

5.4.5.3 The addition of warm product into the chiller or freezer must not result in significant warming of cooled product already present in the room, and/or to condensation.

5.4.5.4 Products must be protected from contamination from condensates from refrigeration units and other surfaces.

5.4.5.5 There must be effective separation between raw and cooked products.

Raw products and cooked products should not be held in the same chiller or freezer.

5.5 Non-compliance to the Validated Process

Procedures for addressing any non-compliance to the validated process is given in section 4.5.

6 Drying

Amendment 0

February 2010

6.1 Scope

This section discusses the requirements for the validation and implementation of drying processes. It applies to the processing of ready-to-eat dried meat products such as dry-cured meats (e.g. prosciutto) and jerky-type products (e.g. beef jerky, biltong). The requirements for UCFM products are separately discussed in section 7.

References which would be useful for jerky processors are:

- a. Quick Guide on Processing Jerky and Compliance Guideline for Meat and Poultry Jerky Produced by Small and Very Small Plants
http://www.fsis.usda.gov/PDF/Compliance_Guideline_Jerky.pdf
- b. [Further Processing Code of Practice, Part 3, Section 3: Concentration and Drying.](#)

6.2 Outcome of the Drying Process

6.2.1 The drying process and any additional controls (where used) must render the product microbiologically safe for its intended purpose.

Dried meat products are preserved primarily by the reduction of water activity, however, additional controls are normally applied during their commercial production, which contribute to the lethality of the process to inactivate or inhibit bacterial pathogens of concern. Examples of these additional controls are: the use of salt, nitrite, and/or anti-microbial agents; application of smoke; and heating of the meat before drying.

6.2.2 The product must be dried to a water activity (a_w) that will stabilise the product for food safety purposes. The operator must define this a_w , provide justification for its selection, and identify it as an operator-defined limit in the FSP or RMP.

Standard 1.6.2 of the Food Standards Code (which is mandatory only for Australia) requires dried meat (excluding slow dried cured meat) to be dried to an a_w of ≤ 0.85 . The USDA recommends the same a_w for jerky. At this a_w , the growth of all bacterial pathogens of concern is controlled. The growth of moulds and yeast during storage can be prevented by drying to an $a_w < 0.80$ and vacuum packing, or by drying and maintaining the a_w at ≤ 0.70 (ICMSF, 1988).

Most commercially produced jerky in New Zealand have an a_w of 0.75 to 0.80.

Dry-cured ham ready for sale should have an $a_w \leq 0.90$. At this a_w , dry-cured ham can be regarded as generally safe even when stored without refrigeration (Untermann and Muller, 1992).

6.2.3 The operator must define microbiological limits for any ready-to-eat dried meat product, provide justification for their selection, and identify them as operator-defined limits in the FSP or RMP.

The Food Standards Code does not provide microbiological limits for dried meat products. The operator can establish their own limits based on microbiological limits for similar ready-to-eat meat products; or criteria obtained from a reputable agency or research institute, or published scientific journal.

The following documents can assist operators in defining their limits:

- a. [Guidelines for the microbiological examination of ready-to-eat foods](#)
- b. [Microbiological reference criteria for food](#)

6.3 Validation

6.3.1 The drying process must be developed and validated by a suitably skilled person. It must be revalidated whenever there is a change to the process or product that may impact on its safety.

The person who is responsible for validating drying processes should have good knowledge of the required regulatory and/or operator-defined limits for the product (e.g. a_w , microbiological limits), and the factors that are critical to the drying process and the consistent achievement of the defined limits. The suitably skilled person should also have a good understanding of food microbiology,

process control and the procedures for validation (e.g. preparing a protocol, designing trials, collecting data, product sampling and testing).

6.3.2 The operator must demonstrate that the overall process (i.e. drying and any additional controls) is capable of consistently achieving the defined regulatory and/or operator-defined limits for the product.

The overall process needs to control, reduce, or eliminate the biological hazards identified in its hazard analysis. These hazards will most likely include pathogens such as *Salmonella* spp., *Listeria monocytogenes*, *Staphylococcus aureus* and *E. coli* O157:H7. Drying by itself may not provide enough lethality to inactivate these hazards to an acceptable level, therefore, other additional controls may need to be considered to increase the lethality of the process. For example, in the United States, a heating step prior to drying is mandatory for jerky because studies have shown that traditional air drying methods used were not sufficient to destroy certain pathogens present in raw meat (e.g. *Salmonella*, *E. coli* 0157).

For dried meats which do not undergo a microbiological kill step, such as heating, the safety of the process is mainly dependent on ensuring that:

- a. only meat of good microbiological quality is used for the production of dried meats because there are limitations to the numbers of pathogenic bacteria that can be destroyed during drying; and
- b. the drying conditions (e.g. time, temperature) are such that undesirable microbial growth and toxin formation is prevented, and any existing pathogens are inactivated to acceptable levels.

6.3.3 The operator must document the validated process parameters and conditions (e.g. drying times and temperatures, air velocity, relative humidity, loading capacity, drier set up) in the FSP or RMP.

6.3.4 Drying equipment or facilities must be properly installed and set up so they provide uniform drying throughout the unit.

Validation of the process should be obtained based on a worst-case scenario considering the different factors that could affect the process (e.g. type and size of the product, formulation, type and performance of the drying facility, loading configuration and capacity of the drying facility, air velocity, relative humidity, time and temperature).

6.3.5 Records of all aspects of the validation work must be kept by the operator.

6.4 Specific Procedures for Jerky-type Dried Meats

Jerky and biltong are commonly made by marinating slices of meat and then heating them in a hot air oven under controlled temperature and relative humidity conditions.

6.4.1 Marination and tumbling/massaging of the meat pieces must be done in a manner and under conditions that minimise contamination and the growth of microorganisms.

The meat should be kept at $\leq 7^{\circ}\text{C}$ during marination and tumbling/massaging.

The reduction of water activity by using high concentrations of salt or sugar in the marinade, or the reduction of pH by using acidic marinades (e.g. with vinegar) may slow microbial growth during marination and provide additional preservative effect to the product. For example, traditional biltong is left to cure in salt overnight prior to drying. However, most New Zealand processes use marinades for flavour reasons, rather than for any possible effect on water activity or pH.

6.4.2 Procedures for the preparation, storage and re-use of marinades must be documented in the FSP or RMP.

Some processors recycle or reuse their marinades. This may have a significant effect on the microbiological loading of subsequent batches, and should be considered carefully during hazard analysis.

6.4.3 The drier must be operated within the capacity for which the drying schedule has been validated for.

6.4.4 Products must be evenly spaced in the drier, and pieces of products must not touch each other.

6.5 Specific Procedures for Dry-cured Meats

Microbiological inhibition and inactivation in dry-cured meats are mainly achieved by low moisture content (and low a_w), curing salts, and sodium chloride. Other factors like pH and redox potential (Eh) may also play a role in selecting against undesirable microorganisms.

Traditionally, the processing of dry-cured hams consists of three basic phases (Blanco *et al.*, 1997): (i) the salting phase, in which salt is applied to the surface of the pork leg and the temperature is maintained at low temperature (e.g. below 5°C) (ii) the post-salting phase, in which is salt is distributed uniformly or equalises throughout the ham and temperature continues to be

maintained at a low level for 30 to 45 days, and (iii) the drying and maturation phase, in which a gradual increase of temperature brings about a lowering of the moisture content of the ham allowing for maturation. The duration of the third phase and final phase is highly variable (between 3 and 20 months) and determines the desired type of ham, whose sensory characteristics are influenced by both tissue enzyme – the meat's own enzymes – and microbial activity.

Microbiological stabilisation is achieved with concentrations of sodium chloride below 4.5 to 5%, while the a_w should also be less than 0.96. Only when these conditions are met should the ham be passed from the salting phase, where the temperature is less than 5°C, to the drying phase, where the temperature is gradually increased to 20 to 25°C.

6.5.1 Meats pieces must be salted and cured in accordance with the procedures given in section 3.7.3.

6.5.2 The cured meats must be dried under controlled conditions (e.g. temperature and relative humidity) until the required a_w is achieved.

6.6 Implementation of the Validated Process

6.6.1 The process must be operated in accordance with the validated process and procedures.

6.6.2 If the drier is operated using pre-programmed drying schedules (e.g. computerised driers), unauthorised access to the programmed parameters must be prevented.

6.6.3 The process must be monitored and verified at a frequency necessary to ensure that the established process and product parameters are consistently being met.

6.6.4 Process parameters (e.g. temperature, humidity) and product parameters (e.g. a_w , moisture content) must be measured using calibrated instruments.

Selection of samples for testing is important in drying operations as there may be large variation throughout a batch or run. The operator needs to have good knowledge of their process to ensure that the wettest samples are selected for testing.

Water activity can be determined using a calibrated water activity meter. Processors who do not have access to such equipment can measure moisture content or weight loss instead, but it is necessary to establish their correlation to a_w for the particular product. Establishing the correlation between moisture content or weight loss and a_w for each product produced can be done by having the a_w of product samples that have achieved the intended moisture content or weight loss analysed by a laboratory. Provided that the formulation and processing parameters don't change, their correlation with a_w should remain constant.

Refer to Part 2, Section 10: Calibration of Measuring Devices.

6.6.5 Records of the process must be retained for each production lot.

6.6.6 When the drying step is a critical control point, the process must be carried out and/or supervised by appropriately trained personnel.

The operator must ensure that adequate training is provided and records of the training are kept. The training should cover the operation, control and monitoring of that step.

6.6.7 The operator must verify that a_w and microbiological limits for the product are met.

Routine microbiological testing of all batches of products is not required, but it is recommended that samples of products are occasionally tested as part of the verification programme. Moisture or a_w testing should be conducted on each batch.

6.6.8 Post-process handling, packaging and storage of the dried product must be done in a way that minimises moisture re-absorption and contamination, and maintains the fitness for intended purpose of the product.

It is important to maintain packaging integrity so that the product does not absorb moisture during storage which could allow moulds and yeasts to grow.

6.7 Non-compliance to the Validated Process

Procedures for addressing any non-compliance to the validated process is given in section 4.5.

7 Fermentation

Amendment 0

February 2010

7.1 Scope

This section discusses the requirements for the processing of fermented meat products, such as salami and pepperoni, which are fermented using a starter culture. It does not cover acidulated sausages which use an acidulant (e.g. glucono-delta-lactone) and does not use a starter culture to reduce the product's pH.

Acidulated sausages are expected to be cooked and must comply with the requirements for cooked products given in section 4. An alternative process may be proposed by the operator, which must be validated.

7.2 Uncooked Comminuted Fermented Meats (UCFM)

Processors of UCFM products (e.g. dry and semi-dry fermented sausages such as salami and pepperoni) must meet the requirements of the [Food \(Uncooked Comminuted Fermented Meat\) Standard 2008](#) and comply with the procedures given in [Guidelines for the Production of UCFM Products](#).

7.3 Cooked Comminuted Fermented Meats (CCFM)

7.3.1 CCFM products must meet the microbiological limits for cooked cured/salted meat products specified in the Food Standards Code, Standard 1.6.1 (refer to section 4.2.2). These limits must be identified as regulatory limits in the FSP or RMP.

7.3.2 A CCFM product that is intended to be shelf stable (i.e. the product can be stored at ambient or room temperature) must have a pH and/or water activity (a_w) which will not allow the growth of any pathogenic or spoilage microorganisms at ambient temperatures. The operator must define these parameters, provide justification for their selection, and identify them as operator-defined limits in the FSP or RMP.

7.3.3 CCFM products which do not meet the established pH and a_w for shelf stability must be refrigerated and stored at $\leq 5^\circ\text{C}$.

It is generally accepted that fermented meat products with a combination of $\text{pH} < 5.2$ **and** $a_w < 0.95$ are shelf stable under ambient conditions (Ross and Shadbolt, 2001). The operator may propose other combinations of pH and a_w , but they must be able to scientifically justify the selected parameters, and validate them, if necessary.

7.3.4 CCFM products must be fermented and dried in a manner, and under conditions, that inhibit the growth of pathogens (e.g. *Staphylococcus aureus*) and the formation of toxins.

Refer to [Guidelines for the Production of UCFM Products for further guidance](#).

7.3.5 The cooking process must be validated and implemented in accordance with the requirements and procedures given in Section 4: Cooking.

8 Smoking

Amendment 0

February 2010

8.1 Scope

This section discusses the requirements for smoking of processed meats. It applies to various types of smoked meats such as ham, bacon, salami and other smoked sausages.

Smoking of processed meats in New Zealand is generally done to produce a sensory effect (aroma, flavour, colour). It is used in combination with other preservation steps, for example, some products may be cooked and smoked, and others may be smoked and dried. Smoke may be produced by burning wood chips or using an acceptable liquid smoke preparation.

Processors should also refer to the [Further Processing Code of Practice, Part 3, Section 5: Smoking](#).

8.2 Procedures

8.2.1 Smoking must be done in a manner and under conditions that minimise contamination of the product and the proliferation of microorganisms.

8.2.2 When smoking contributes to the preservation of a particular product and is necessary for food safety, the smoking process and its effect must be considered in the validation of the overall process.

8.2.3 Smoke flavours are considered as food additives and must comply with the specification listed under Standard 1.3.4 Identity and Purity of the [Food Standards Code](#).

8.2.4 Wood or other plant material used for the generation of smoke must:

- a. not contain toxic substances, either naturally occurring or through contamination with chemicals including paints, wood treatments or other impregnating materials; and
- b. be free from visible microbiological or fungal growth.

There is currently no standard in the Food Standards Code for wood that is used to generate smoke for food processing. Wood product suppliers should follow good manufacturing practice. Operators should obtain supplier guarantees from their suppliers to confirm that untreated wood has been used to produce the wood shavings or sawdust.

Wood shavings and sawdust should be sufficiently dry on delivery and should not be stored in large containers, heaps or silos to prevent spontaneous heating and growth of moulds. Most commercial operations use sawdust which is easier to manage and gives greater smoke volume. The sawdust is often wet down to control burning and smoke density.

Liquid smokes are increasingly being used instead of wood smoke as the process is more repeatable, the composition of the smoke is more constant, it is easier to apply and the carcinogenic compounds (e.g. polycyclic aromatic hydrocarbons) have been minimised. Liquid smokes may be added directly to the product, or may be applied by dipping, spraying, or atomising the liquid smoke and injecting it into the smokehouse, vaporising the liquid on a hot surface, or by using smoke treated casings.

8.2.5 The operator must consider the potential for the formation of chemical hazards such as polycyclic aromatic hydrocarbons (PAH) during the process, and when possible minimise product exposure to them.

There is currently no standard requiring the measurement of PAHs in a smoked product. However, the operator should be aware of the conditions under which higher levels of PAHs are generated and wherever possible, manage those conditions to minimise their formation.

The PAH level in the final product is dependant on a number of factors. For example, the following can result in lower levels of PAH levels:

- a. use of hard wood rather than soft wood (traditionally only hardwoods have been acceptable for smoke generation)
- b. indirect smoking rather than direct smoking
- c. shorter processing times
- d. bigger distance between the product and the heat source (i.e. product located closer to the heat source can have higher PAH levels)
- e. filtering or cooling the smoke prior to use
- f. washing or water cooling the product after smoking; and
- g. keeping equipment clean and maintained.

The operator also needs to be mindful that changes in certain process conditions to reduce PAH may lead to increased levels of other chemical contaminants from the smoke or reduced microbiological safety of the product.

9 Post-processing

Amendment 0

February 2010

9.1 Scope

This section discusses the process steps or activities undertaken after the application of a heat or preservation treatment such as cooking, fermentation, or drying.

9.2 Prevention of Post-process Contamination

9.2.1 The operator must document and implement procedures for preventing post-process contamination of cooked or ready-to-eat (RTE) products.

9.2.2 Separation between raw and RTE product and processes.

9.2.2.1 The design and layout of processing facilities and equipment in the premises must:

- a. facilitate separation between raw and RTE products and processes
- b. facilitate the control of movement of personnel, raw materials and products, and equipment from raw to RTE product areas
- c. facilitate effective cleaning and sanitation between raw and RTE operations; and
- d. prevent cross-contamination between raw and RTE products.

Refer to Part 2, Section 4.2.4.4: Design and Construction of Building and Facilities for further details on design and layout.

9.2.2.2 Raw and cooked or RTE products and processes must be physically separated from each other; or they must be separated by time or distance; as appropriate to the type and size of the operation, and based on an assessment of the potential for product contamination and risk to human health posed by the product.

When processing of raw and RTE products is separated by time, RTE products should be

processed first at the start of the day, when there is no raw product around and when equipment is clean, before processing raw products. Slicing and packing of raw and RTE products could also be done on different days.

When raw and RTE products and processes are separated by distance or location within a room or area, the distance between them should be such that any contact or contamination between products, equipment, processes or personnel is avoided.

9.2.3 Personnel hygiene and movement control

9.2.3.1 Personnel must comply with the hygienic practices and procedures given in Part 2, Section 11.

9.2.3.2 Procedures must be established for controlling the movement of personnel between raw and RTE product areas.

Whenever possible, employees should not work in both raw and RTE areas. Where unavoidable, employees must complete an appropriate hygiene routine every time they move from raw to RTE areas (see section 9.2.3.3).

Different coloured smocks or hats can be used so that workers in the raw and RTE areas can readily be distinguished.

9.2.3.3 Personnel must undergo a hygiene routine before handling RTE products, and every time there is a change from raw to RTE operations. They must:

- a. thoroughly wash their hands
- b. change their protective clothing
- c. clean and sanitise their footwear
- d. discard and replace disposable gloves (or wash and sanitise multi-use gloves); and
- e. ensure that they are free from any contamination originating from raw products/processes and other sources.

9.2.3.4 Outer protective clothing (e.g. smocks, aprons, or disposable protective coverings) used in RTE processing areas must be removed before leaving the area.

9.2.4 Equipment

9.2.4.1 Dedicated equipment (e.g. slicers, conveyors, packing machines, containers, trolleys), maintenance tools and utensils must be used for the RTE and raw product areas; or they must be thoroughly cleaned and sanitised before being used in RTE areas or for RTE products.

Colour-coding may be used to identify portable equipment and utensils (e.g. containers, knives, cutting boards and slicers) for exclusive raw or RTE use.

Different slicers should be used for slicing raw and cooked meat since they can be a major source of recontamination of RTE products.

Pallets are difficult to clean and can serve as a source of cross-contamination. Pallets that are used for raw materials should not be used in RTE areas.

9.2.4.2 Procedures must be established for controlling the movement of equipment between raw and RTE product areas.

9.2.4.3 Wheels of transport equipment (e.g. carts, forklifts, mobile racks) must be cleaned and sanitised before entry to RTE product areas.

9.2.5 Cleaning and sanitation

Cleaning of post- processing areas and equipment must be in accordance with the procedures given in Part 2, section 7.2.6.

9.2.6 Dropped meat procedures

Procedures must be established and implemented for the handling and disposition of products that come into contact with the floor (i.e. dropped meat) and other non-product-contact surfaces.

The procedures should clearly indicate the actions that should be taken (e.g. trim, wash, reprocess or dump) for the different types of products, and how these actions should be done in a hygienic manner.

9.3 Slicing and Dicing

9.3.1 Slicing / dicing and packing must be done in a manner and under conditions that minimises contamination of products and microbiological growth.

Products should be cooled to $\leq 5^{\circ}\text{C}$ before slicing / dicing and / or packing.

9.3.2 The removal of casings, cook-in-bags and other product packaging prior to slicing or repackaging must be done in a way that minimises the contamination of the product.

Some companies dip packaged RTE products in a sanitising solution prior to removing the packaging to prevent contamination of product contact surfaces and products.

9.3.3 Edible trimmings (e.g. sausage and ham ends) must be collected in clean containers. If they are not sliced/diced and then packed or reworked immediately, they must be protected from contamination and placed in a chiller so that their temperature is maintained at $\leq 5^{\circ}\text{C}$.

9.3.4 There must not be any unnecessary delay between slicing and packing.

Products should be packed immediately after slicing.

9.4 Packing and Labelling

9.4.1 The specifications, handling and storage of packaging materials must meet the requirements given in Part 2, Section 13: Specifications, Handling and Storage of Inputs.

9.4.2 Only new packaging must be used for RTE products.

9.4.3 Adequate separation, to prevent product contamination, must be maintained between packaging materials brought into the room for use and exposed product (e.g. use separate tables).

Only enough packaging materials for one shift should be moved into the packing room. Packaging materials must not be stored in the packing room past the end of the shift.

9.4.4 Packaging materials must be dispensed in a manner that protects the materials and the product from contamination.

9.4.5 Packaging machines must be set up correctly so that they produce effective seals.

9.4.6 Packaging seal or closure integrity must be checked regularly to ensure the safety of the product. This may include visual or physical testing (e.g. complete seal, no cracking or wrinkling, maintenance of vacuum).

9.4.7 Products must be labelled in accordance with the requirements given in Part 2, section 15.

9.4.8 Products must be transferred promptly to the chiller or freezer after packing.

9.5 Storage

9.5.1 Chilled products must be maintained at $\leq 5^{\circ}\text{C}$.

9.5.2 The chiller temperature must be monitored continuously (with an automatic temperature reading device), or it must be read manually and recorded at regular intervals.

9.5.3 Chillers must not be loaded beyond their capacity.

9.5.4 Procedures must be in place for identifying and holding finished product awaiting test results for release.

Records should include the total amount of product in the lot or batch and its location.
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9.5.5 A first-in-first-out or plant specific rotation inventory control system must be maintained for finished products.

9.5.6 Doors on chillers and freezers must not be left open for extended periods.

Doors should be closed immediately after use.

9.5.7 Products with damaged packaging must be handled in a manner that will minimise:

- a. the exposure or spillage of the product (e.g. products can be wrapped and sealed)
- b. contamination or deterioration of the product; and
- c. contamination of other products and the storage area.

9.6 Repacking

9.6.1 Finished products that do not meet packaging specifications (e.g. coding, labels) may be repacked without receiving any additional treatment provided that the products:

- a. have not been dispatched
- b. are not past their shelf life; and
- c. are of acceptable quality and have been handled properly.

9.6.2 Repacking of product due to damaged packaging must be done in a manner that minimises contamination. Any product that has been detrimentally affected as a result of the packaging damage must be considered as non-complying product.

Refer to Part 2, Section 17: Handling and Disposition of Non-complying Products, and Recall.

9.6.3 The label of repacked products must indicate the original production code and any shelf-life given must be based on the original date of production of the product.

10 References

Amendment 0

February 2010

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Processed Meats Code of Practice

Part 4: HACCP Application

Prelims

Amendment **1**

February 201**2**

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Disclaimer

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Review of Code of Practice

This Code of Practice will be reviewed, as necessary, by the Ministry of Agriculture and Forestry. Suggestions for alterations, deletions or additions to this code of practice, should be sent, together with reasons for the change, any relevant data and contact details of the person making the suggestion, to:

Manager (Animal Products)

Standards

Ministry of Agriculture and Forestry

P.O Box 2526

Wellington

Telephone: 04 894 2500

1 Introduction

Amendment 1

February 2012

1.1 Purpose and Scope

Part 4 of the Code of Practice (COP) was developed by the Ministry of Agriculture and Forestry (MAF) and the Pork Processors Association to provide guidance on the application of Hazard Analysis and Critical Control Point (HACCP) principles to the manufacture of processed meat products, including small goods.

HACCP is a systematic and science-based control system for assuring food safety. Food safety is achieved by assessing hazards and developing controls for them. HACCP focuses on preventative measures and ensures that process control moves away from dependence on a traditional approach of endpoint product testing.

Operators of New Zealand food businesses are required to apply the HACCP principles to the different processes covered under their Food Safety Programme (FSP) or Risk Management Programme (RMP). This document will assist operators in the development and implementation of their FSP or RMP.

1.2 Definitions

Control (verb) - to take all necessary actions to ensure and maintain compliance with standards and other applicable criteria.

Control (noun) - the state where correct procedures are being followed and standards and other applicable criteria are being met.

Control measure - any action and activity that can be used to prevent or eliminate a hazard or reduce it to an acceptable level.

Corrective action - any action to be taken when the results of monitoring at a CCP indicate a loss of control.

Critical Control Point (CCP) - a step at which control can be applied and is essential to prevent or eliminate a hazard or reduce it to an acceptable level.

Critical limit - a criterion which separates acceptability from unacceptability at a critical control point.

Good Manufacturing Practice (GMP) - documented procedures of manufacturing and management practices that are designed to ensure products are fit for intended purpose (may also be referred to as Good Operating Practice (GOP)).

HACCP - a system which identifies, evaluates, and controls hazards which are significant for food safety.

Hazard - a biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.

Hazard analysis - the process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP plan.

Monitor - the act of conducting a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control.

Operator-defined limit - a measurable limit established by an operator to manage the fitness for purpose of a particular food.

Process flow diagram - a systematic representation of the sequence of steps or operations used in the production or manufacture of a particular food.

Regulatory limit - a measurable regulatory requirement that is critical to the fitness for intended purpose of a particular food.

Step - a point, procedure, operation or stage in the food chain including raw materials, from primary production to final consumption.

Validation - process of obtaining evidence to demonstrate that a particular food will be fit for intended purpose, through the achievement of any regulatory limit or operator-defined limit.

Verification - the application of methods, procedures, tests and other checks to confirm compliance to the documented Food Safety Programme or Risk Management Programme, and legislative requirements.

2 Hazards and their Sources

Amendment 1

February 2012

2.1 Types of Hazards

A hazard is a biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.

- Biological hazards include pathogenic microorganisms (e.g. *Salmonella* spp., *Listeria monocytogenes*, *Staphylococcus aureus*), parasites (e.g. *Trichinella spiralis*), and viruses (e.g. Hepatitis A virus).

Microorganisms that are non-pathogenic are not considered as hazards. For example, spoilage organisms such as certain *Pseudomonas* spp. and *Lactobacillus* spp. are undesirable organisms in processed meats, but they are not considered as hazards because they do not cause human illness.

- Chemical hazards include heavy metals, pesticides, veterinary medicines, cleaning compounds, and allergens. Some food additives (e.g. nitrite) may also be hazardous if present in excessive or toxic amounts.
- Physical hazards are objects that may cause illness or injury. Some examples are: glass, metal, hard plastic, and bone fragments.

2.2 Sources of Hazards

Hazards may occur in the product as a result of:

- the addition or use of an input (e.g. raw material, additive, packaging)
- the process itself; and
- direct or indirect contamination from personnel and environmental sources (e.g. water, pests, wastes, equipment, internal and external environs).

The identification of hazards and their controls for personnel and the various environmental sources are covered under the supporting systems for Good Manufacturing Practice in Part

2 of this COP. The operator is only required to apply the HACCP principles to the actual process, including all inputs to the process.

3 Good Manufacturing Practice

Amendment **1**

February 201**2**

Good Manufacturing Practice (GMP) is the foundation for HACCP. GMP programmes or supporting systems must be developed and documented prior to HACCP application. The HACCP approach used in this COP is based on the expectation that these GMP systems are effectively being implemented. GMP is covered in Parts 2 and 3 of this COP.

4 Application of HACCP Principles

Amendment **1**

February 201**2**

4.1 HACCP Principles

4.1.1 The essential steps for the application of HACCP consist of:

- the establishment of the scope, the product description and intended purpose, and the process description; and
- the application of the seven HACCP principles.

4.1.2 The HACCP principles, as defined by Codex are:

1. conduct a hazard analysis
2. determine the Critical Control Points (CCP)
3. establish critical limits
4. establish a system to monitor control of the CCP
5. establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control
6. establish procedures for verification to confirm that the HACCP system is working effectively; and
7. establish documentation concerning all procedures and records appropriate to these principles and their application.

The operator is required to apply these HACCP principles to all processes covered under their FSP or RMP. The application must be documented, and supported using information such as historical company records, technical publications or information provided by the regulator. The person or people involved in this activity must have the appropriate knowledge and skills regarding HACCP, the product and the process.

The operator must reassess their HACCP application whenever changes in the product, process and/or premises are made.

Each of the steps and HACCP principles is discussed in the succeeding sections. Examples of the step-by-step application of the HACCP principles for different types of processed meats are given in the HACCP models in sections 5 to 12.

4.2 Scope

The scope should identify the products and processes covered by the HACCP application. When the HACCP application forms part of an FSP or RMP, these details will be included in the scope of the FSP or RMP.

4.3 Product Description and Intended Purpose

4.3.1 The operator must give a full description of the product or product groups. When there are multiple products, they should be categorised into groups of products with similar characteristics, processing steps and/or intended use, in order to simplify the HACCP application.

Examples of product categories or groups are:

- fresh sausages
- cooked comminuted meat products (e.g. luncheon, bologna, cooked sausages)
- uncooked comminuted fermented meat products (UCFM) (e.g. salami, pepperoni)
- cooked cured meat products (e.g. ham, corned beef, pastrami)
- cooked uncured meat products (e.g. roast beef)
- bacon
- dry-cured meat products (e.g. prosciutto)
- dried meat products (e.g. jerky, biltong);and
- meat patties.

4.3.2 The product description for each product category should include the following information:

- product name(s)
- intended use of the product(s)
- intended consumer
- any regulatory limit and/or operator-defined limit; and
- other product details (e.g. packaging specifications, shelf-life and storage requirements; labelling requirements).

This information will provide a profile of the product(s), which is necessary for the setting of appropriate limits, and hazard identification and analysis. For example, the microbiological criteria for ready-to-eat cooked ham are different from those for bacon, which is cooked before consumption.

4.3.3 Intended use and consumer

The intended use should be based on the expected uses of the product by the end user or consumer (e.g. cooked before consumption or ready-to-eat without cooking). In some cases, it may also be important to identify whether the product is intended for any specific consumer group, particularly vulnerable groups of the population such as infants, elderly, or immuno-compromised individuals.

4.3.4 Regulatory or operator-defined limits

The operator must include any regulatory limit and/or operator-defined limits appropriate to their product or process. These limits are critical to the safety of a particular food and must be consistently met. Regulatory limits are defined by the regulator, whereas operator-defined limits are established by the operator.

Examples of regulatory limits are:

- microbiological criteria related to food safety (e.g. microbiological standards specified in standard 1.6.1 of the Food Standards Code)
- levels of chemical hazards (e.g. maximum residue limits for certain chemicals)

- levels of additives (e.g. permitted additive levels specified in standard 1.3 of the Food Standards Code); and
- process criteria or parameters set by the regulator (e.g. cooking time and temperature).

Examples of operator-defined limits are:

- intrinsic parameters of a product (e.g. pH of UCFM products, moisture content or water activity of dried meats)
- process criteria or parameters set by the operator (e.g. cooking time and temperature); and
- levels of physical hazards (e.g. limit for metal).

The operator should first check if there are any regulatory limits appropriate for their specific product(s) and the hazard(s) of concern. When no legal requirement is specified and when necessary for food safety, the operator is expected to define their own limits. For example, MAF has not established a moisture content limit for jerky, but since this is important to the stability and suitability of the product, it is expected that the operator will define an appropriate moisture content limit for the product.

The operator must have evidence to show that the limits they have set are appropriate to the product considering its intended use and consumer. The types of evidence which could be used include:

- published information from approved codes of practice, guidelines produced by government and reputable industry organisations
- peer-reviewed scientific information
- outcomes of validated predictive models
- scientific information from a person or organisation known to be competent; and/or
- data from the company's monitoring and verification programmes, trials and experiments.

4.4 Process Description

An accurate description of the process is necessary to be able to do a proper hazard analysis. The simplest way to describe the process is to develop one or more process flow

diagrams showing all inputs, process steps, and outputs. These diagrams provide a basis for a systematic (i.e. step-by-step) hazard analysis.

The main steps in the process should be shown, including any rework or recycling of materials. Inputs that should be included are all raw materials, additives and other ingredients, and packaging that will form part of the end product.

The process flow diagram should be confirmed by a person or persons with sufficient knowledge of the operation to ensure that it is accurate and reflects what is actually happening.

4.5 Hazard Analysis

4.5.1 Hazard identification

Hazards that are “reasonably likely to occur” should be considered in hazard identification. Reasonably likely to occur means that:

- the particular hazard is known to occur in the particular product based on scientific reports, industry or company results, codes of practice, and information from **MAF**; and
- the hazard is known to occur in New Zealand (care should be taken when considering overseas information).

Hazards should be identified specifically when necessary to identify specific controls for the particular hazard/product combination. Examples of these are: *Listeria monocytogenes* in ready-to-eat products, and metal in clipped sausages.

For certain hazard/product combinations, it may be acceptable to identify hazards as a group based on their common characteristics, source and/or control (e.g. enteric pathogens in raw meat).

Vague descriptions of hazards should be avoided. For example, “foreign objects in a manufactured processed meats product” could mean metal, glass, or plastic. These objects are from different sources and have different characteristics, and would therefore require different control measures.

4.5.2 Identification of hazards from inputs

The operator should identify the hazards that are reasonably likely to occur in each input, considering any supplier assurances or agreed specifications, and supplier performance.

In most cases, the best option for the operator is to require that the supplier controls the hazard to acceptable levels in incoming raw materials and ingredients. This can be addressed under a supplier quality assurance programme which may include: having agreed material specifications, provision of certificates of analysis, conducting supplier audits, and testing of incoming materials.

4.5.3 Identification of hazards at the process steps

The operator should identify the hazards that are introduced or transferred to the product as a consequence of applying the process step itself. The potential impact of the process step on any existing hazard (e.g. microbiological growth, toxin formation) should also be considered during hazard analysis. Hazard analysis should be done for each step.

4.5.4 Identification of control measures

The operator should identify any control measures for each identified hazard.

A control measure is any action or activity that is applied to:

- control the initial levels of hazards (e.g. supplier assurances, testing and rejection of unacceptable ingredients, good animal production practices)
- prevent an unacceptable increase of the hazard (e.g. hygienic processing techniques, chilling, reduction of water activity levels, use of preservatives, acidification); and
- reduce or eliminate the level of the hazard (e.g. pasteurisation, commercial sterilisation, use of antimicrobial agents, metal detection).

Most control measures are likely to be covered by GMP.

If control measures do not exist or are inadequate, the operator should consider the need for redesign of the process, the implementation of new control measures or leaving the hazard as uncontrolled (if appropriate).

4.6 CCP Determination

A critical control point (CCP) is a step at which control can be applied and is essential for food safety as defined by a regulatory limit or an operator-defined limit. The operator should determine whether there are any CCPs for the process.

A control measure is essential if:

- it substantially contributes to the elimination of a food safety hazard, or its reduction to an acceptable level
- without it, an unacceptable level of hazard is likely to occur in the final product; and
- loss of control poses a risk to human health (considering the intended use and consumer).

Generally, control measures essential for food safety are those that are specifically designed to eliminate or reduce the hazard to an acceptable level (e.g. cooking, metal detection).

The operator should use a systematic approach to hazard analysis and CCP determination for each process covered by the RMP. This must be documented, and any decisions made must be justified using information such as historical company records, technical publications, codes of practice or information provided by **MAF**.

CCP determination can be facilitated by the use of a decision tree (e.g. Codex decision tree) or a table that provides a series of questions to guide the user through the decision-making process. The table used in the HACCP models is a combined hazard analysis and CCP determination table. A template of this hazard analysis and CCP determination table is shown in Table 1.

When a CCP is identified, the remaining HACCP principles must be applied. When there is no CCP identified, the other principles related to CCPs (i.e. critical limits, monitoring and corrective action) are not required, however, verification, documentation and record-keeping still need to be applied **for GMP**.

Table 1: Hazard analysis and CCP determination template

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider the hazard at the next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.

To clarify the use of Table 1, the meaning of each column is explained. The operator should go through the series of questions for each step in the process. The hazard analysis must show any hazard that is uncontrolled at the end of the process. The HACCP models in sections 5 to 12 show how this table can be used for different types of processed meats.

Column 1 - Process step

Each process step should be written in column 1 in the order shown in the process flow diagram.

Column 2 - Inputs

All inputs at the particular step should be indicated in column 2. This should align with the process flow diagram.

Column 3 - Hazard identification

The hazards reasonably likely to occur at each process step should be identified considering:

- hazards introduced by inputs at that step
- hazards introduced or transferred as a consequence of applying the process step itself (e.g. metal from mincers)
- hazards carried over in the product from the previous step; and
- adverse impact of process step on existing hazards (e.g. growth of microorganisms).

Generally, hazards which could be transferred from personnel and other environmental sources (e.g. pests, waste, water) should not be included in this hazard identification because they are expected to be adequately controlled by existing GMP programmes or supporting systems.

Column 4 - Justification

A brief justification for the hazard identified in the previous column should be given in column 4. Justification may be based on company experience and records, scientific literature, surveys, industry reports, codes of practice, generic HACCP plans and other guidance documents provided by **MAF**.

Column 5 - Question 1: Identification of control measures

Question 1 requires the operator to identify any control measure for the identified hazard(s). Procedures for the control measure(s) must be documented in a supporting system of the FSP or RMP. The reference document title or number of the particular supporting system should also be cited.

Any hazard that is not completely eliminated at a step should be considered at the next step to ensure that the impact of succeeding steps on the existing hazard is considered during the analysis. In particular, bacterial pathogens should be carried over to succeeding steps since there is potential for their growth.

Hazards that are unlikely to be adversely affected by succeeding steps in the process (i.e. will not grow or increase), such as chemical residues and parasites, do not need to be carried over to each succeeding step in the hazard analysis table to reduce repetition. However, the hazard must be reintroduced at the step where it is controlled or, if the hazard is considered to be uncontrolled, it must be shown at the last step of the process.

If a control measure for an identified hazard does not exist in the process or is inadequate, the operator should consider process redesign, the implementation of new control measures or leaving the hazard as uncontrolled (if appropriate).

Column 6 - Question 2: CCP determination

The operator should decide whether or not the step is a CCP by determining if control at that step is essential, by itself or in combination with other steps, to achieve any regulatory or operator-defined limit.

4.7 Establish Critical Limits

Critical limit means a criterion which separates acceptability from unacceptability at a critical control point. The operator must define and justify critical limit(s) for each CCP. In some cases, more than one critical limit may be needed at a particular step. Parameters often used include temperature, time, moisture level, pH, and water activity.

Critical limits must be measurable and should be linked to the achievement of a regulatory limit or operator-defined limit. They should be appropriate to the specific operation and product. They should be parameters that can be monitored in real time to ensure ongoing effectiveness of the particular process step to achieve a specified level of control.

The operator should document:

- the parameters that are to be checked
- the limit for each parameter; and
- the justification for each limit.

4.8 Establish CCP Monitoring

Monitoring is the scheduled measurement of a critical limit(s) at a CCP. The operator must document monitoring procedures for each critical limit. Most monitoring procedures involve methods that give immediate results so that loss of control at the CCP can be detected quickly and appropriate corrective action can be taken to regain control.

Monitoring procedures should include the following information:

- person responsible for monitoring
- monitoring method
- monitoring frequency and sampling regime; and
- records to be kept.

The monitoring frequency selected must ensure adequate and consistent control. Monitoring may be continuous or be based on a statistical sampling plan. Other factors to consider for determining monitoring frequency include: the nature of the product, the likelihood of failing the limits, the cost of monitoring, the consequence of failure (including risk to human health), the corrective actions expected (especially with respect to product disposition), and other relevant matters.

4.9 Establish CCP Corrective Action

The operator must document corrective action procedures to be implemented when a critical limit is not met. Corrective action procedures should include the following information:

- person responsible for taking corrective action
- procedures for restoration of control
- procedures for control and disposition of non-conforming product, including checking of product back to the last acceptable result, where possible
- action to prevent the problem from happening again
- escalating response if preventative action fails; and
- records to be kept.

4.10 Establish Verification Procedures

The operator must establish and document operator verification procedures to ensure that the HACCP system is working effectively. The frequency of verification should be sufficient to confirm that the HACCP system is consistently working correctly.

Whenever possible, verification should be carried out by someone other than the person who is responsible for performing the monitoring and corrective actions.

Examples of verification activities include:

- review of the HACCP system and its records
- review of deviations and product dispositions; and
- confirmation that CCPs are kept under control.

The verification procedures should include the following information:

- person responsible for operator verification
- frequency or schedule for operator verification activities
- verification methods and procedures
- follow-up action to be taken if non-compliance occurs; and

- records to be kept.

4.11 Establish Documentation and Records

The operator must document all matters relating to the application of HACCP to the operation. Documentation and record keeping should be appropriate to the nature of the size of the operation and sufficient to assist the business to verify that the HACCP controls are in place and being maintained.

Examples of records that are expected to be generated when implementing HACCP are:

- CCP monitoring observations
- deviations to critical limits and associated corrective actions
- results of verification procedures; and
- modifications to the HACCP application.

4.12 Confirming the HACCP Application

The operator should check the HACCP application after completing the initial hazard analysis and CCP determination. The following questions should be considered:

- Are the limits defined by the operator appropriate and achievable, or are new ones needed?
- Are the identified CCPs essential to complying with the regulatory limit(s) or operator-defined limit(s)?
- Are the critical limits appropriate and achievable? Can the critical limits be monitored effectively?
- Are all the identified hazards adequately controlled by GMP and/or a CCP(s), or by controls outside the HACCP plan (e.g. regulated control scheme)? If not, does the process need to be modified or are additional control measures needed?
- Are there any uncontrolled hazards? If so, is it required by legislation to be controlled to a specified level? Does the operator need to consider redesigning the process/product? Does the operator need to inform the further processor, retailer or consumer about the uncontrolled hazard so that food safety can be assured prior to consumption of the

product (e.g. by providing feedback to suppliers; or cooking instructions, or product specifications to customers / consumers).

5 HACCP Application for the Manufacture of Fresh Sausages

Amendment **1**

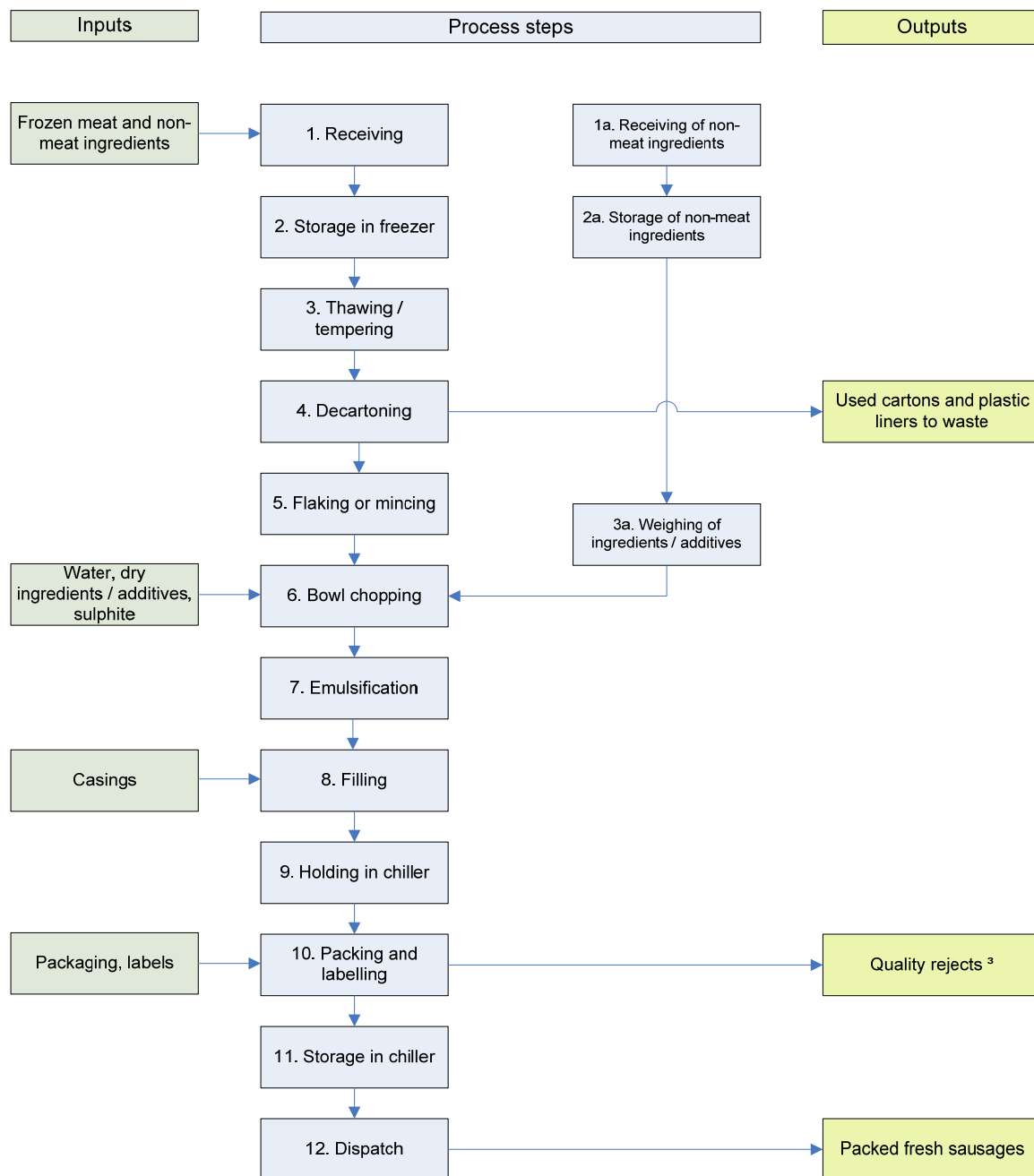
February 2012**2**

Table 5.1: Product description and intended use¹

Product name	Chilled fresh sausages (e.g. breakfast sausage, fresh pork or beef sausage)
Intended consumer	General public
Intended use	Cooked before consumption
Regulatory limits	Microbiological limits – none
	Sulphur dioxide/sodium and potassium sulphites ≤ 500 mg/kg
Operator-defined limits	None
Packaging and labelling	<i>Give company and regulatory specifications</i>
Handling, storage requirements and shelf life	<i>Give company and regulatory specifications</i>

¹ Company specifications for each product or product group should be documented as part of the FSP or RMP.

Fig. 5.1: Product description and intended use²



² Some companies may have a metal detection step to eliminate metal hazards in the product. For such cases, the operator should establish an operator-defined limit for metal considering the capability of the metal detector (i.e. type and size of metal which it can detect).

³ The operator should indicate the disposition (e.g. to waste) or use (e.g. rework, staff sales) of any rejects from the process.

Table 5.2: Identification of hazards from inputs

Inputs	Description/specification ⁴	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Frozen NZ meat – various species (e.g. pork, beef, sheepmeat, chicken)	Produced under a registered RMP Meets company specifications (e.g. arrival temperature)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants) ⁵	Bone in boneless products Plastic from carton liner
Imported frozen meat	Meets relevant regulatory requirements (e.g. Import Health Standards, Biosecurity requirements)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants)	Bone in boneless products Plastic from carton liner
Water	Potable	None	None	None
Sulphite	Food grade	None	Sulphite – hazard to asthmatics	None

⁴ Agreed specifications and procedures for inputs must be documented in the FSP or RMP.

⁵ Sporadic chemical residues at some level will always occur. However, results from the National Residue Monitoring Programme indicate that residue levels are generally in compliance with national requirements. The level of this hazard will not increase during processing, therefore, it will not be considered further in the hazard analysis.

Inputs	Description/specification ⁴	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Salt, sugar, other additives	Food grade	None	None	None
Cereals (e.g. flour, breadcrumbs)	Company specification	Bacterial pathogens (e.g. <i>Salmonella</i> spp., <i>Clostridium</i> spp., <i>Bacillus cereus</i>) Mould spores ⁶	Allergens (e.g. wheat) ⁷	None
Herbs, spices	Dried. Decontaminated Complies with the Food Standards Code (e.g. micro limit for pepper, paprika)	Bacterial spores (e.g. <i>Clostridium</i> spp., <i>Bacillus cereus</i>)	None	None
Natural casings	Properly salted with no signs of spoilage	Bacterial spores (e.g. <i>Clostridium</i> spp., <i>Bacillus</i> spp.)	None	None

⁶ Cereals may contain pathogenic mould spores (e.g. *Aspergillus* spp., *Penicillium* spp.). They are not of concern in high moisture meat products with short shelf-life such as fresh sausages. Bacteria usually outgrow them in products with water activity above 0.93 under normal chilled storage conditions. Mould spores will not be considered further in the hazard analysis.

⁷ Operators are expected to have a documented Allergen Management Plan for managing any risks to human health posed by the presence of allergens in their products. The Plan should be based on a systematic identification and analysis of all potential sources of allergens at each step of the process, and the development of controls for these sources. The presence of allergens in the product from intended ingredients should be managed by complying with the labelling requirements of the Food Standards Code, including relevant mandatory warning and advisory statements and declarations specified in Standard 1.2.3. The Allergen Management Plan must also establish controls for the unintended exposure of the product to allergens (i.e. due to inadvertent presence in raw materials and processing aids, incorrect formulation, changes to product scheduling, rework, insufficient or ineffective cleaning/sanitation procedures, etc). Since the identification of allergens from inputs and from the process, and the establishment of controls are expected to be adequately covered when developing the Allergen Management Plan and other related supporting systems (e.g. cleaning), allergens will not be considered any further in the hazard analysis. Refer to Part 2, section 14 of the Processed Meats COP for guidance on the Allergen Management Plan.

Inputs	Description/specification ⁴	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Artificial casings	Supplier & company specifications	None	None	None
Packaging materials	Suitable as food contact material Plastics comply with HC Specification 30(1)	None	None	None

Table 5.3: Hazard analysis and CCP determination for the manufacture of fresh sausages

This hazard analysis is based on the expectation that manufacturers have GMP programmes in place which comply with Parts 2 and 3 of this COP.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
Storage and batching of non-meat ingredients					
1a. Receiving of non-meat ingredients	Seasoning, other dry ingredients and additives (e.g. sulphite)	B – Bacterial pathogens	Refer to Table 5.2	No	
2a. Storage of non-meat ingredients	Seasoning, other dry ingredients and additives (e.g. sulphite)	B – Bacterial pathogens	Micro carried over from previous step	No	
3a. Weighing of ingredients / additives	Seasoning, other dry ingredients and additives	B – Bacterial pathogens	Micro carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
	Sulphite	C - Excessive sulphite	Weighing of incorrect amount may result in unacceptable levels in the final product	Yes –correct weighing procedures Refer to GMP Doc. xx ⁸	Yes – CCP1
Main process					
1. Receiving	Frozen meat	B – Bacterial pathogens	Refer to Table 5.2	No	
		P – Bone in boneless cuts	Refer to Table 5.2	No	
		P – Plastic	Refer to Table 5.2 Polyentrapment is a common occurrence in frozen meat	No	
2. Storage in freezer	Frozen meat	B – Bacterial pathogens	Micro carried over from previous step	No	

⁸ GMP and operating procedures should be documented in supporting systems. The relevant supporting system should be cited in this table.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – Bone in boneless cuts	Hazard carried over from previous step	No	
		P – Plastic	Hazard carried over from previous step	No	
3. Thawing/ tempering	Frozen meat	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if thawing time & temperature are not properly controlled	Yes –proper temperature/time control will minimise micro growth Refer to GMP Doc. xx	No
		P- Bone in boneless cuts	Hazard carried over from previous step	No	
		P - Plastic	Hazard carried over from previous step	No	
4. Decartoning	Thawed or tempered meat	B – Bacterial pathogens	Micro carried over from previous step	No	
		P – Bone in boneless cuts	Hazard carried over from previous step	No	
		P – Plastic	Hazard carried over from previous step	Yes – careful removal of plastic liner will minimise tearing of plastic; and further thawing or cutting of areas with entrapped plastic will remove the hazard Refer to GMP Doc. xx	No

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
5. Flaking/ mincing	Thawed or tempered meat	B – Bacterial pathogens	Micro carried over from previous step	No	
		P – Bone in boneless cuts	Hazard carried over from previous step	Yes – use of a bone elimination device in the mincer will minimise bone in the mince	No
		P – Metal	Contamination with metal fragments from the machine can occur	Yes – daily check of equipment parts and regular change of blades will minimise metal contamination Refer to GMP Doc. xx	No
6. Bowl chopping	Flaked/minced meat	B – Bacterial pathogens	Micro carried over from previous step	No	
	Non-meat ingredients (e.g. starches, herbs, spices)	B – Bacterial pathogens	Refer to Table 5.2	No	
	Potable water	None			
	Sulphite	C – Sulphite	The presence of sulphite can cause adverse reactions in some asthmatics	No – controlled at weighing step 3a	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – Metal	Contamination with metal fragments from the bowl chopper can occur	Yes – daily check of equipment parts and regular change of blades will minimise metal contamination Refer to GMP Doc. xx	No
7. Emulsification	Chopped meat	B – Bacterial pathogens	Micro carried over from previous step	No	
8. Filling	Meat emulsion	B – Bacterial pathogens	Micro carried over from previous step	No	
	Natural casings	B – Bacterial spores	Refer to Table 5.2	No	
9. Holding in chiller	Raw sausages	B – Bacterial pathogens and spores	Micro carried over from previous step Micro growth can occur if temperature is not controlled properly	Yes – holding at $\leq 5^{\circ}\text{C}$ will minimise micro growth Refer to GMP Doc. xx	No
10. Packing and labelling	Raw sausages	B – Bacterial pathogens and spores	Micro carried over from previous step	No	
	Plastic liner, cartons, label	None			

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
11. Storage in chiller	Packed raw sausages	B – Bacterial pathogens and spores	Micro carried over from previous step Micro growth can occur if temperature is not properly controlled.	Yes – storage at $\leq 5^{\circ}\text{C}$ will minimise micro growth Refer to GMP Doc. xx	No
12. Dispatch	Packed raw sausages	B – Bacterial pathogens and spores	Micro carried over from previous step Micro growth can occur if temperature is not controlled properly	Yes – proper temperature control will minimise micro growth Refer to GMP Doc. xx	No

Table 5.4: CCP summary for the manufacture of fresh sausages⁹

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures/tools	Corrective actions	Verification procedures	Records
1	Weighing of sulphite	Excess sulphite	Predetermined amount per batch size that will result in sulphite < 500 mg/kg in final product	Supervisor to check preparation checklist at xx frequency Visual check of weighing operation	Hold any affected products, test for sulphite, and determine disposition Review procedures and correct, as necessary Retrain worker and increase monitoring	Product testing Internal audit External audit (e.g. regulator, client) HACCP review	Weighing checklist Sulphite test results Corrective action report Internal audit report External audit report HACCP review record

⁹ Procedures for monitoring, corrective actions and verification must be documented in the FSP or RMP.

6 HACCP Application for the Manufacture of Cooked Comminuted Meat Products

Amendment **1**

February 201**2**

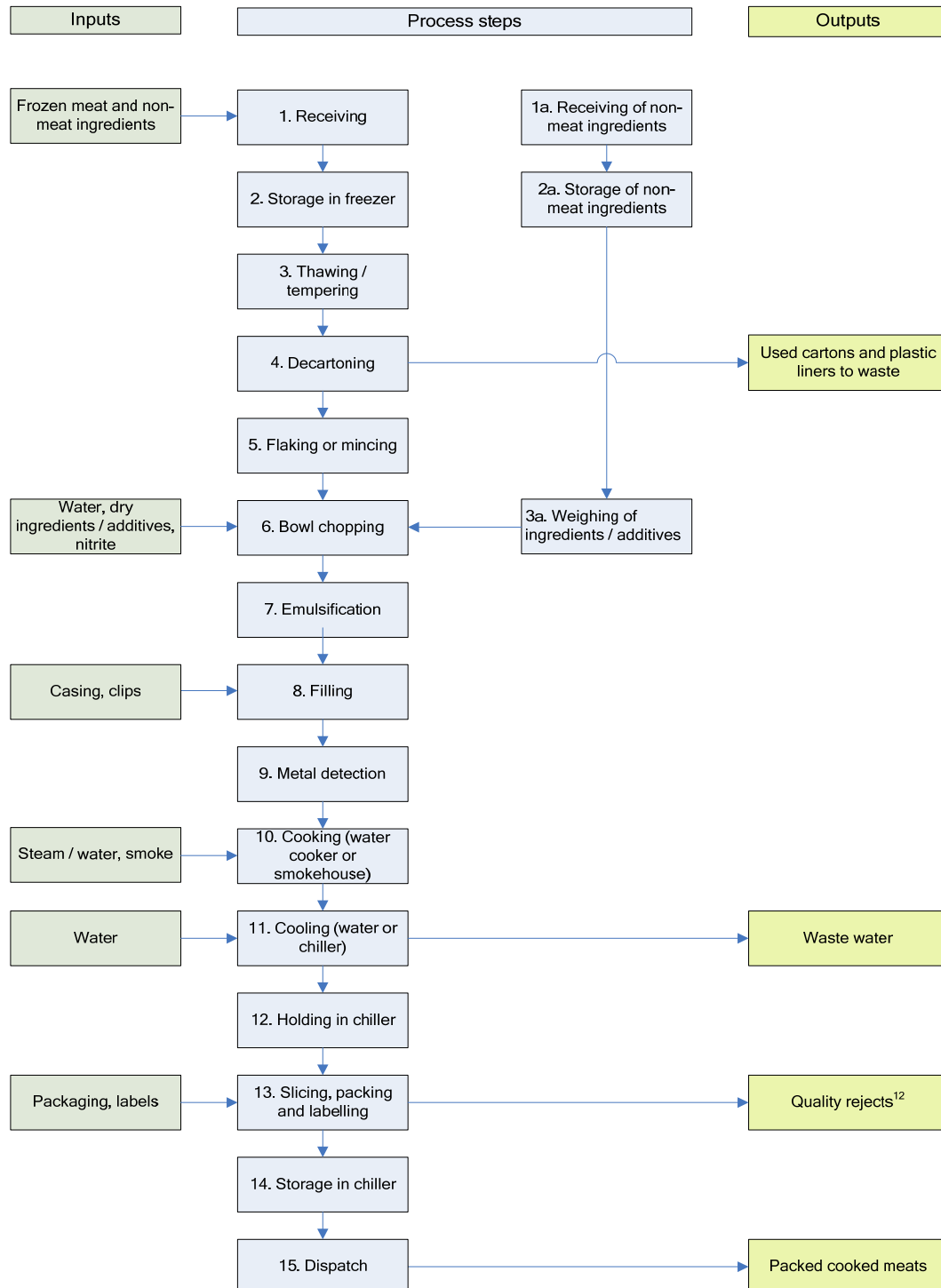
Table 6.1: Product description and intended use¹⁰

Product name	Cooked comminuted meats (e.g. luncheon, chorizo, black pudding, bologna, other cooked sausages)
Intended consumer	General public
Intended use	Ready-to-eat
Regulatory limits	Microbiological limits (Food Standards Code 1.6.1) Coagulase - positive <i>staphylococci</i> /g: n = 5 c = 1 m = 10 ² M = 10 ³ <i>Listeria monocytogenes</i> /25g: n = 5 c = 0 m = 0 <i>Salmonella</i> /25g: n = 5 c = 0 m = 0
	Nitrite ≤ 125 mg/kg (Food Standards Code)
Operator-defined limits ¹¹	Cooking schedule that will achieve a 6D reduction of <i>Listeria monocytogenes</i> (e.g. 70°C for 2 min)
	Limit for metal - type and size of metal that the metal detector is capable of detecting, (e.g. no metal objects ≥ 3 mm ferrous & 4 mm stainless steel)
Packaging and labelling	<i>Give company and regulatory specifications</i>
Handling, storage requirements and shelf life	<i>Give company and regulatory specifications</i>

¹⁰ Company specifications for each product or product group should be documented as part of the FSP or RMP.

¹¹ The operator must provide evidence that any operator-defined limit is appropriate to the product, process, and intended use and consumer. Part 3 of this COP provides guidance on acceptable limits.

Fig. 6.1: Process for the manufacture of cooked comminuted meat products



¹² The operator should indicate the disposition (e.g. to waste) or use (e.g. rework, staff sales) of any rejects from the process.

Table 6.2: Identification of hazards from inputs

Inputs ¹³	Description/ specification ¹⁴	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Frozen NZ meat – various species (e.g. pork, beef, sheepmeat, chicken)	Produced under a registered RMP Meets company specifications (e.g. arrival temperature)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants) ¹⁵	Bone in boneless products Plastic from carton liner
Imported frozen meat	Meets relevant regulatory requirements (e.g. Import Health Standards, Biosecurity requirements)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants)	Bone in boneless products Plastic from carton liner
Water	Potable	None	None	None
Nitrite	Food grade	None	Nitrite	None

¹³ Any rework materials used must be included in this table. The identified hazards will depend on the reason why the particular material or product was considered for rework.

¹⁴ Agreed specifications and procedures for inputs must be documented in the FSP or RMP.

¹⁵ Sporadic chemical residues at some level will always occur. However, results from the National Residue Monitoring Programme indicate that residue levels are generally in compliance with national requirements. The level of this hazard will not increase during processing, therefore, it will not be considered further in the hazard analysis.

Inputs ¹³	Description/ specification ¹⁴	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Salt, sugar, other additives	Food grade	None	None	None
Wood smoke	Generated from clean, dry untreated wood	None	Polycyclic aromatic hydrocarbons (PAH)	None
Cereals (e.g. flour)	Company specification	Bacterial pathogens (e.g. <i>Salmonella</i> , <i>Clostridium</i> spp., <i>Bacillus cereus</i>) Mould spores ¹⁶	Allergens (e.g. wheat) ¹⁷	None
Herbs, spices	Dried. Decontaminated Complies with the Food Standards Code (e.g. micro limit for pepper, paprika)	Bacterial spores (e.g. <i>Clostridium</i> spp., <i>Bacillus cereus</i>)	None	None

¹⁶ Cereals may contain pathogenic mould spores (e.g. *Aspergillus* spp., *Penicillium* spp.). They are not of concern in high moisture meat products with short shelf life such as cooked sausages. Bacteria usually outgrow them in products with water activity above 0.93 under normal chilled storage conditions. Mould spores will not be considered further in the hazard analysis.

¹⁷ Operators are expected to have a documented Allergen Management Plan for managing any risks to human health posed by the presence of allergens in their products. The Plan should be based on a systematic identification and analysis of all potential sources of allergens at each step of the process, and the development of controls for these sources. The presence of allergens in the product from intended ingredients should be managed by complying with the labelling requirements of the Food Standards Code, including relevant mandatory warning and advisory statements and declarations specified in Standard 1.2.3. The Allergen Management Plan must also establish controls for the unintended exposure of the product to allergens (i.e. due to inadvertent presence in raw materials and processing aids, incorrect formulation, changes to product scheduling, rework, insufficient or ineffective cleaning/sanitation procedures, etc). Since the identification of allergens from inputs and from the process, and the establishment of controls are expected to be adequately covered when developing the Allergen Management Plan and other related supporting systems (e.g. cleaning), allergens will not be considered any further in the hazard analysis. Refer to Part 2, section 14 of the Processed Meats COP for guidance on the Allergen Management Plan.

Inputs ¹³	Description/ specification ¹⁴	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Artificial casings	Supplier & company specifications	None	None	None
Packaging materials	Suitable as food contact materials Plastics comply with HC Specification 30(1)	None	None	None

Table 6.3: Hazard analysis and CCP determination for the manufacture of cooked comminuted meat products

This hazard analysis is based on the expectation that manufacturers have GMP programmes in place which comply with Parts 2 and 3 of this COP.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
Storage and batching of non-meat ingredients					
1a. Receiving of non-meat ingredients	Seasoning, other dry ingredients and additives (e.g. nitrite)	B - Bacterial pathogens	Refer to Table 6.2		
2a. Storage of non-meat ingredients	Seasoning, other dry ingredients and additives (e.g. nitrite)	B - Bacterial pathogens	Micro carried over from previous step		
3a. Weighing of non-meat ingredients /	Seasoning, other dry ingredients and additives	B - Bacterial pathogens	Micro carried over from previous step		

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
additives	Sodium nitrite	C - Excessive nitrite, if using pure nitrite and weighing is done by the processor	Weighing of incorrect amount may result in unacceptable levels in the final product	Yes –correct weighing procedures Refer to GMP Doc. xx ¹⁸	Yes – CCP1
		None, if premix is used			
Main process					
1. Receiving	Frozen meat	B – Bacterial pathogens	Refer to Table 6.2	No	
		P – Bone in boneless cuts	Refer to Table 6.2	No	
		P – Plastic	Refer to Table 6.2 Polyentrapment is a common occurrence in frozen meat	No	

¹⁸ GMP and operating procedures should be documented in supporting systems. The relevant supporting system should be cited in this table.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
2. Storage in freezer	Frozen meat	B – Bacterial pathogens	Micro carried over from previous step	No	
		P – Bone in boneless cuts	Hazard carried over from previous step	No	
		P – Plastic	Hazard carried over from previous step	No	
3. Thawing / tempering	Frozen meat	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if thawing time & temperature are not properly controlled	Yes –proper temperature/time control will minimise micro growth Refer to GMP Doc. xx	No
		P- Bone in boneless cuts	Hazard carried over from previous step	No	
		P - Plastic	Hazard carried over from previous step	No	
4. Decartoning	Thawed or tempered meat	B – Bacterial pathogens	Micro carried over from previous step	No	
		P – Bone in boneless cuts	Hazard carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – Plastic	Hazard carried over from previous step	Yes – careful removal of plastic liner will minimise tearing of plastic; and further thawing or cutting of areas with entrapped plastic will remove the hazard Refer to GMP Doc. xx	No
5. Flaking or mincing	Thawed or tempered meat	B – Bacterial pathogens	Micro carried over from previous step.	No	
		P – Bone in boneless cuts	Hazard carried over from previous step	Yes – use of a bone elimination device in the mincer will minimise bone in the mince	No
		P – Metal	Contamination with metal fragments from the machine can occur	Yes – daily check of equipment parts and regular change of blades will minimise metal contamination Refer to GMP Doc. xx	No
6. Bowl chopping	Flaked/minced meat	B – Bacterial pathogens	Micro carried over from previous step	No	
	Dry ingredients (e.g. starches, herbs, spices)	B – Bacterial pathogens	Refer to Table 6.2	No	
	Potable water	None			

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
	Sodium nitrite	C - Nitrite	Excess nitrite causes toxic reaction in consumers	No - controlled at weighing step 3a	
		P – Metal	Contamination with metal fragments from the bowl chopper can occur	Yes – daily check of equipment parts and regular change of blades will minimise metal contamination Refer to GMP Doc. xx	No
7. Emulsification	Chopped meat	B – Bacterial pathogens	Micro carried over from previous step	No	
8. Filling	Meat emulsion	B – Bacterial pathogens	Micro carried over from previous steps	No	
		P - Metal	Hazard carried over from the previous steps	No	
	Artificial casings	None			
	Metal clips	P – Metal clips	Metal clips have been found in processed meat products	Yes – procedures for preventing metal clips getting into the product Refer to GMP Doc. xx	No
9. Metal detection (for clipped sausages, this step is done before clipping)	Raw sausages	B – Bacterial pathogens	Micro carried over from previous step	No	
		P - Metal	Hazard carried over from previous step	Yes – metal detector will eliminate metal contaminants	Yes – CCP2

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
				Refer to GMP Doc. xx	
10. Cooking (water cooker or smoke house)	Raw sausages	B – Bacterial pathogens	Micro carried over from previous step	Yes – cooking schedule that will deliver a 6D reduction of <i>L. monocytogenes</i> (e.g. product core temp of $\geq 70^{\circ}\text{C}$ for 2 min) will eliminate vegetative pathogens Refer to GMP Doc. xx	Yes – CCP3
	Smoke	C – PAH	Refer to Table 6.2	Yes ¹⁹ – measures to minimise the formation of chemical hazards from wood smoke Refer to GMP Doc. xx	No
11. Cooling (water or chiller)	Cooked sausages	B – Bacterial spores	Micro carried over from previous step	Yes – proper cooling procedures will minimise the growth of <i>C. perfringens</i> Refer to GMP Doc. xx	No ²⁰

¹⁹ Operators should take measures to minimise the formation of chemical hazards from wood smoke, such as polycyclic aromatic hydrocarbons (PAH), during the smoking process. Refer to Part 3, section 8.2.5 for guidance on minimising PAH formation.

²⁰ Cooling of cooked sausages was not considered a CCP because the cooling requirements can easily be achieved due to the smaller diameter of the sausages compared to whole muscle products (e.g. ham leg) for which the cooling requirements were developed for.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
			Bacterial spores (e.g. <i>C. perfringens</i>) that survive heating may sporulate and grow if the product is not cooled properly		
	Cooling water	None			
12. Holding in chiller	Cooked sausages	B – Bacterial spores	Micro carried over from previous step Micro growth can occur if temperature is not controlled properly	Yes – holding at $\leq 5^{\circ}\text{C}$ will minimise micro growth Refer to GMP Doc. xx	No
13. Slicing, packing and labelling	Cooked sausages	B – Bacterial spores	Micro carried over from previous step	No	
		B – <i>Listeria monocytogenes</i>	Contamination may occur from food contact surfaces and the environment	Yes – effective separation between raw and RTE, and cleaning and sanitation will minimise contamination Refer to GMP Doc. xx	No
	Plastic liner, cartons, label	None			

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
14. Storage in chiller	Packed cooked sausages	B – Bacterial spores	Micro carried over from previous step Micro growth can occur if there is refrigeration failure	Yes – storage at $\leq 5^{\circ}\text{C}$ will minimise micro growth Refer to GMP Doc. xx	
15. Dispatch	Packed cooked sausages	B – Bacterial spores ²¹	Micro carried over from previous step Micro growth can occur if temperature is not controlled properly	Yes – proper temperature control will minimise micro growth Refer to GMP Doc. xx	No

²¹ Bacterial spores that survive the cooking process (e.g. *C. perfringens*) will not grow at refrigerated temperatures. They are unlikely to pose as a health hazard in properly handled and refrigerated cooked cured meat products.

Table 6.4: CCP summary for the manufacture of cooked comminuted meat products²²

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures/tools	Corrective actions	Verification procedures	Records
1	Weighing of nitrite	Excess nitrite	Predetermined amount per batch size that will result in nitrite \leq 125 ppm in final product	Supervisor to check preparation checklist at xx frequency Visual check of weighing operation	Hold any affected products, test for nitrite, and determine disposition Review procedures and correct, as necessary Retrain worker and increase monitoring	Product testing Internal audit External audit (e.g. regulator, client) HACCP review	Weighing checklist Nitrite test results Corrective action report Internal audit report External audit report HACCP review record
2	Metal detection	Metal pieces	Type and size of metal which the machine is capable of detecting (e.g. no metal objects \geq 3 mm ferrous & 4 mm stainless steel)	Daily check of metal detector against test pieces Physical check of any rejects	Check rejected material for metal Remove metal and repass material through the metal detector; or dump rejected material Investigate source of metal and take appropriate action to prevent recurrence. Correct setting of metal detector, if necessary	Calibration of metal detector Internal audit External audit (e.g. regulator, client) HACCP review	Daily monitoring record Calibration records Corrective action report. Internal audit report External audit report HACCP review record Customer complaints records

²² Procedures for monitoring, corrective actions and verification must be documented in the FSP or RMP.

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures/tools	Corrective actions	Verification procedures	Records
3	Cooking	Bacterial pathogens	Internal product temp of 70°C for 2 min (For biosecurity reasons, products containing imported products are usually cooked to a core temp of 70°C for 11 min)	Continuous product temperature recording for batches cooked in the smokehouse For batches cooked in water cooker, check of product temperature after cooking	Extend cooking process. Recook any undercooked products or rework into other products (e.g. sausages) Review process and procedures and correct deficiencies Retrain worker and increase monitoring	Product micro testing Internal and External audits HACCP review	Daily CCP monitoring records Micro test results Corrective action report Audit reports HACCP review record

7 HACCP Application for the Manufacture of Bacon

Amendment **1**

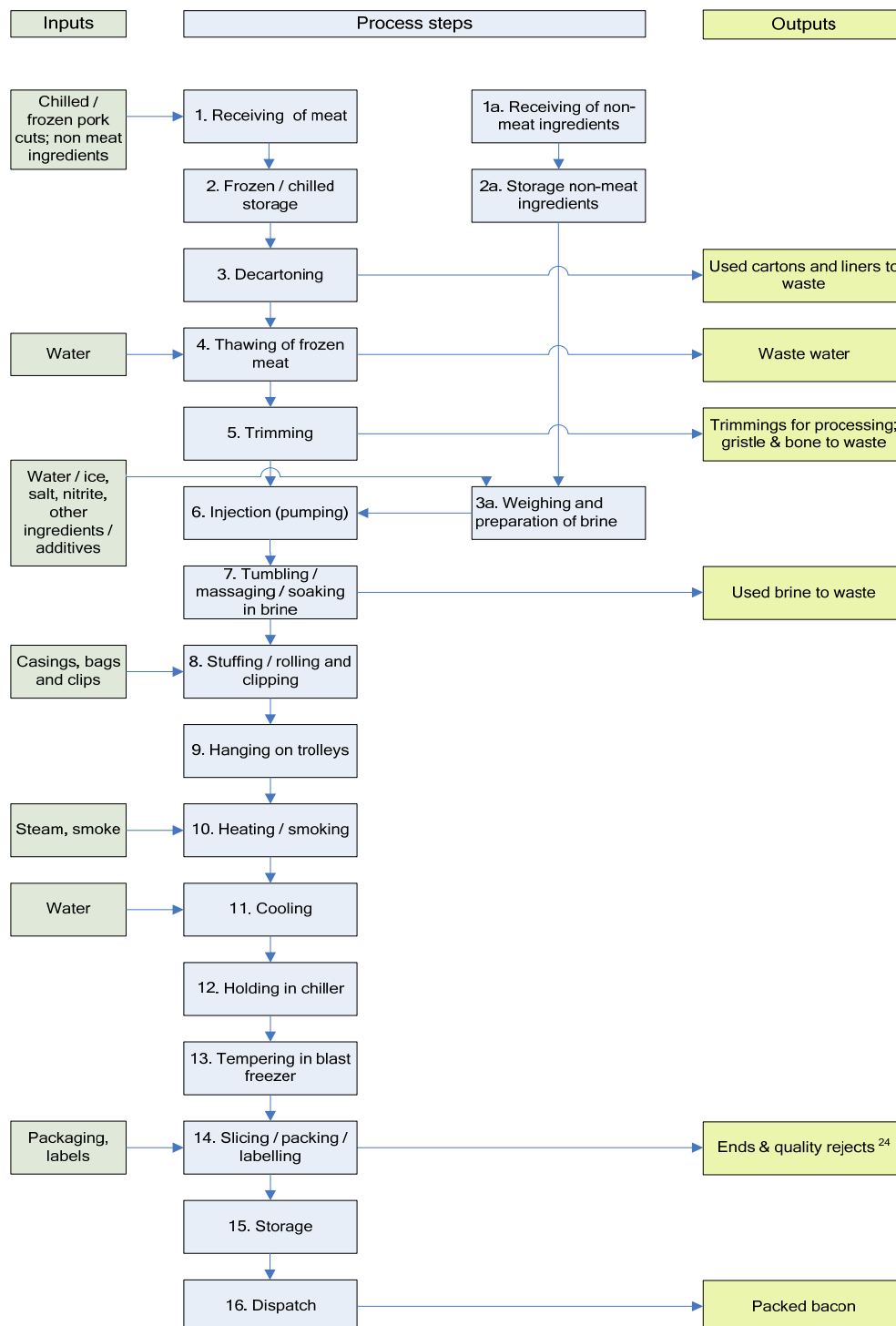
February 2012**2**

Table 7.1: Product description and intended use²³

Product name	Bacon (e.g. middle bacon, rolled bacon)
Intended consumer	General public
Intended use	Cooked
Regulatory limits	Microbiological limits – none
	Nitrite ≤ 125 mg/kg (Food Standards Code)
Operator-defined limit	None
Packaging and labelling	<i>Give company and regulatory specifications</i>
Handling, storage requirements and shelf life	<i>Give company and regulatory specifications</i>

²³ Company specifications for each product or product group should be documented as part of the FSP or RMP

Fig. 7.1: Process for the manufacture of bacon



²⁴ The operator should indicate the disposition (e.g. to waste) or use (e.g. rework, staff sales) of any rejects from the process.

Table 7.2: Identification of hazards from inputs

Inputs	Description/specification ²⁵	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Chilled or frozen NZ pork	Produced under a registered RMP Meets company specifications (e.g. delivery temperature)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants) ²⁶	Bone in boneless products Plastic from carton liners
Imported frozen pork	Meets relevant regulatory requirements (e.g. Biosecurity requirements)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants)	Bone in boneless products Plastic from carton liners
Water and ice	Potable	None	None	None
Sodium nitrite	Food grade	None	Nitrite	None
Wood smoke	Generated from clean, dry untreated wood	None	Polycyclic aromatic hydrocarbons (PAH)	None

²⁵ Agreed specifications and procedures for inputs must be documented in the FSP or RMP

²⁶ Sporadic chemical residues at some level will always occur. However, results from the National Residue Monitoring Programme indicate that residue levels are generally in compliance with national requirements. The level of this hazard will not increase during processing, therefore, it will not be considered further in the hazard analysis.

Inputs	Description/specification ²⁵	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Other non-meat ingredients & additives (e.g. salt, sugar, erythorbate, phosphate)	Food grade	None	None	None
Packaging materials (e.g. plastic bags, casings)	Suitable as food contact material Plastics comply with HC Specification 30(1)	None	None	None

Table 7.3: Hazard analysis and CCP determination for the manufacture of bacon

This hazard analysis is based on the expectation that manufacturers have GMP programmes (supporting systems) in place that comply with Parts 2 and 3 of this COP.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
Preparation of Brine					
1a. Receiving of non-meat ingredients	Non-meat ingredients & additives	None			
2a. Storage of non-meat ingredients	Non-meat ingredients & additives	None			
3a. Weighing and preparation of brine	Non-meat ingredients & additives	None			
	Sodium nitrite	C - Excessive nitrite, if pure nitrite is used and weighing is done by the processor	Weighing of incorrect amount may result in unacceptable levels in the curing solution and consequently in the final product	Yes –correct weighing procedures Refer to GMP Doc. xx ²⁷	Yes – CCP1

²⁷ GMP and operating procedures should be documented in supporting systems. The relevant supporting system should be cited in this table.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		None, if premix is used			
	Water/ice	None			
Main process					
1. Receiving of meat	Pork cuts	B – Bacterial pathogens	Refer to Table 7.2 Micro growth may occur in chilled meat at > 7°C	Yes – checking of chilled meat temperature Refer to GMP Doc. xx	No
		P – Bone in boneless cuts	Refer to Table 7.2	No	
		P – Plastic	Refer to Table 7.2 Polyentrapment is a common occurrence in frozen meat	No	
2. Frozen / chilled storage	Pork cuts	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if meat is held at > 7°C or refrigeration failure occurs	Yes – proper temperature control will minimise micro growth Refer to GMP Doc. xx	No
		P – Plastic	Hazard carried over from previous step	No	
3. Decartoning	Pork cuts	B – Bacterial pathogens	Micro carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – Plastic	Hazard carried over from previous step	No	
4. Thawing	Pork cuts	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if thawing time & temperature are not properly controlled	Yes –proper temperature/time control will minimise micro growth Refer to GMP Doc. xx	No
		P - Plastic	Hazard carried over from previous step	Yes – adequate thawing will ensure that most of the plastic is removed from meat blocks Refer to GMP Doc. xx	No
5. Trimming	Pork cuts	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if temperature is not properly controlled	Yes –hygienic techniques will minimise contamination; and time/temperature control will minimise micro growth Refer to GMP Doc. xx	No
		P - Plastic	Hazard carried over from previous step	Yes – inspection & removal of any remaining plastic Refer to GMP Doc. xx	No
6. Injection (pumping)	Pork cuts	B – Bacterial pathogens	Micro carried over from previous step	No	
	Brine	C – Nitrite	Excess nitrite causes toxic reaction in consumers	No – controlled at weighing of nitrite and brine preparation	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
			Insufficient nitrite in brines that are held for too long may allow growth of <i>C. botulinum</i>	Yes – proper control of brine temperature and dumping of unused brine at the end of production day, or checking for nitrite content and adjusting before use Refer to GMP Doc. xx	No
		B – Bacterial pathogens from highly contaminated brines	Poor temperature control and excessive recycling can result to brines with high micro load	Yes - procedures for controlling brine quality (e.g. temperature, storage, recycling) Refer to GMP Doc. xx	No
7. Tumbling / massaging / soaking in brine	Injected pork cuts	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if temperature is not properly controlled	Yes – proper temperature control will minimise micro growth Refer to GMP Doc. xx	No
8. Stuffing/ rolling (for rolled bacon) and clipping	Cured pork cuts	B – Bacterial pathogens	Micro carried over from previous step	No	
	Casings, nets	None			
	Metal clips	P – Metal clips	Metal clips have been found in processed meat products	Yes – procedures for preventing metal clips getting into the product Refer to GMP Doc. xx	No
9. Hanging on trolleys	Cured pork cuts	B – Bacterial pathogens	Micro carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
10. Heating / smoking	Cured pork cuts	B – Bacterial pathogens	Micro carried over from previous step	Yes – heating and smoking will reduce micro in the product substantially, but this is not a cooking step Refer to GMP Doc. xx	No
	Smoke	C – PAH	Refer to Table 7.2	Yes ²⁸ – measures to minimise the formation of chemical hazards from wood smoke Refer to GMP Doc. xx	No
11. Cooling	Bacon	B – Bacterial pathogens	Micro carried over from previous step Bacterial spores (e.g. <i>C. perfringens</i>) that survive heating may sporulate and grow if the product is not cooled properly	Yes – proper cooling procedures will minimise the growth of <i>C. perfringens</i> Refer to GMP Doc. xx	No
	Cooling water	None			
12. Holding in chiller	Bacon	B – Bacterial pathogens	Micro carried over from previous step	Yes – holding at ≤ 5°C will minimise micro growth Refer to GMP Doc. xx	No

²⁸ Operators should take measures to minimise the formation of chemical hazards from wood smoke, such as polycyclic aromatic hydrocarbons (PAH), during the smoking process. Refer to Part 3, section 8.2.5 for guidance on minimising PAH formation.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
13. Tempering in blast freezer	Bacon	B – Bacterial pathogens	Micro carried over from previous step	No	
14. Slicing / packing / labelling	Bacon	B – Bacterial pathogens	Micro carried over from previous step	No	
		B – <i>Listeria monocytogenes</i>	The product can be recontaminated with <i>L. monocytogenes</i> during slicing and packing	Yes- hygienic practices will minimise micro contamination Refer to GMP Doc. xx	No
	Packaging materials	None			
15. Storage	Packed bacon	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if there is refrigeration failure	Yes –proper temperature control will minimise micro growth Refer to GMP Doc. xx	No
16. Dispatch	Packed bacon	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if temperature is not controlled properly	Yes – proper temperature control will minimise micro growth Refer to GMP Doc. xx	No

Table 7.4: CCP summary for the manufacture of bacon²⁹

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures/tools (Consider Who, What, When and How)	Corrective actions	Verification procedures	Records
1	Weighing and brine preparation	Excess nitrite	Predetermined amount per batch size that will result in nitrite ≤ 125 ppm in final product	Supervisor to check preparation checklist at xx frequency Visual check of weighing operation	Reject and dump any brine mix that is made up incorrectly Hold any affected products, test for nitrite, and determine disposition Review procedures and correct, as necessary Retrain worker and increase monitoring	Product testing Internal audit External audit (e.g. regulator, client) HACCP review	Weighing checklist Nitrite test results Corrective action report Internal audit report External audit report HACCP review record

²⁹ Procedures for monitoring, corrective actions and verification must be documented in the FSP or RMP

8 HACCP Application for the Manufacture of Cooked Cured Meat Products

Amendment 1

February 2012

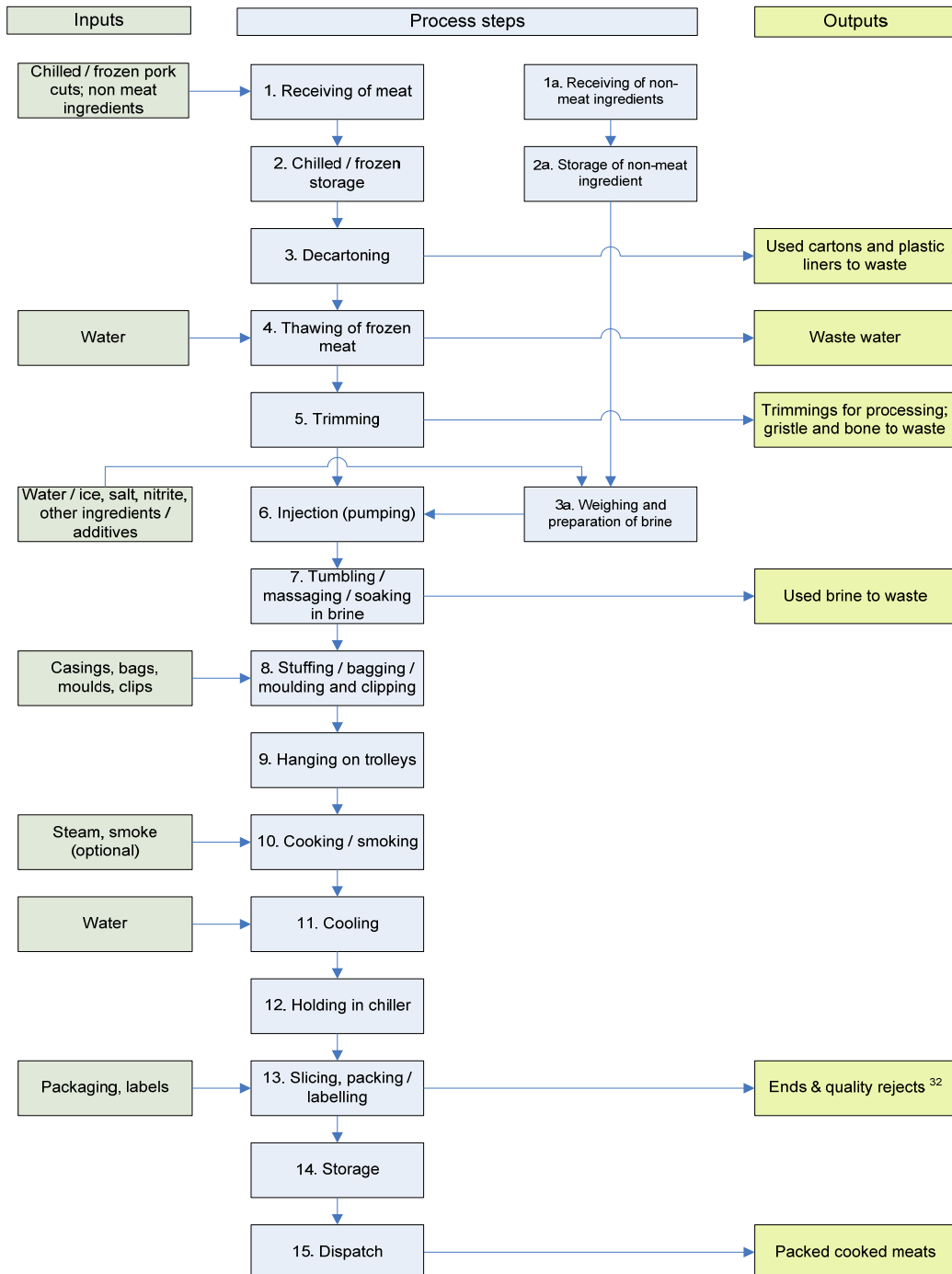
Table 8.1: Product description and intended use³⁰

Product name(s)	Cooked cured meat products – various types (e.g. bone-in cooked hams, sectioned and formed hams, corned meats, pastrami)
Intended consumer	General public
Intended use	Ready-to-eat or cooked
Regulatory limits	Microbiological limits (Food Standards Code) Coagulase - positive <i>staphylococci</i> /g: n = 5 c = 1 m = 10 ² M = 10 ³ <i>Listeria monocytogenes</i> /25g: n = 5 c = 0 m = 0 <i>Salmonella</i> /25g: n = 5 c = 0 m = 0
	Nitrite ≤ 125 mg/kg (Food Standards Code)
Operator-defined limits³¹	Cooking schedule that will achieve a 6-D reduction of <i>Listeria monocytogenes</i> (e.g. 70°C for 2 min)
	Specified cooling rate (e.g. 52 to 12°C within 7.5 hours and 12 to 5°C within 24 hours of completion of cooking)
Packaging and labelling	Give company and regulatory specifications
Handling and storage requirements	Give company and regulatory specifications

³⁰ Company specifications for each product or product group should be documented as part of the FSP or RMP.

³¹ The operator must provide evidence that any operator-defined limit is appropriate to the product, process, and intended use and consumer. Part 3 of this COP provides guidance on acceptable limits.

Fig. 8.1: Process for the manufacture of cooked cured meats



³² The operator should indicate the disposition (e.g. to waste) or use (e.g. rework, staff sales) of any rejects from the process.

Table 8.2: Identification of hazards from inputs

Inputs	Description/specification ³³	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Chilled/frozen NZ meat – various species (e.g. pork, beef)	Produced under a registered RMP Meets company specifications (e.g. delivery temperature)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants) ³⁴	Bone in boneless products Plastic from carton liners
Imported frozen pork	Meets relevant regulatory requirements (e.g. Biosecurity requirements)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants)	Bone in boneless products Plastic from carton liners
Water and ice	Potable	None	None	None
Sodium nitrite	Food grade	None	Nitrite	None
Wood smoke	Generated from clean, dry untreated wood	None	Polycyclic aromatic hydrocarbons (PAH)	None

³³ Agreed specifications and procedures for inputs must be documented in the FSP or RMP.

³⁴ Sporadic chemical residues at some level will always occur. However, results from the National Residue Monitoring Programme indicate that residue levels are generally in compliance with national requirements. The level of this hazard will not increase during processing, therefore, it will not be considered further in the hazard analysis.

Inputs	Description/specification ³³	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Other dry ingredients & additives (e.g. salt, sugar, erythorbate, phosphate)	Food grade	None	None	None
Packaging materials(e.g. plastic bags, casings)	Suitable as food contact material Plastics comply with HC Specification 30(1)	None	None	None

Table 8.3: Hazard analysis and CCP determination for the manufacture of cooked cured meat products

This hazard analysis is based on the expectation that manufacturers have GMP programmes (supporting systems) in place which comply with Parts 2 and 3 of this COP.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
Preparation of Brine					
1a. Receiving of non-meat ingredients	Non-meat ingredients & additives	None	Refer to Table 8.2		
2a. Storage of non-meat ingredients	Non-meat ingredients & additives	None	Micro carried over from previous step		
3a. Weighing & preparation of brine	Sodium nitrite	C - Excessive nitrite, if using pure nitrite and weighing is done by the processor	Weighing of incorrect amount may result in unacceptable levels in the curing solution and consequently in the final product	Yes –correct weighing procedures Refer to GMP Doc. xx ³⁵	Yes – CCP1
		None, if premix is used			

³⁵ GMP and operating procedures should be documented in supporting systems. The relevant supporting system should be cited in this table.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
	Non-meat ingredients and additives	None			
	Water/ice	None			
Main process					
1. Receiving of meat	Meat cuts	B – Bacterial pathogens	Refer to Table 8.2 Micro growth may occur in chilled meat at > 7°C	Yes – checking of chilled meat temperature. Refer to GMP Doc. xx	No
		P – Bone in boneless cuts	Refer to Table 8.2	No	
		P – Plastic	Refer to Table 8.2 Polyentrapment is a common occurrence in frozen meat	No	
2. Chilled / frozen storage	Meat cuts	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if meat is held at > 7°C or refrigeration failure occurs	Yes – proper temperature control will minimise micro growth Refer to GMP Doc. xx	No
		P – Bone in boneless cuts	Hazard carried over from previous step	No	
		P – Plastic	Hazard carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
3. Decartoning	Meat cuts	B – Bacterial pathogens	Micro carried over from previous step	No	
		P – Bone in boneless cuts	Hazard carried over from previous step	No	
		P – Plastic	Hazard carried over from previous step	No	
4. Thawing of frozen meat	Meat cuts	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if thawing time & temperature are not properly controlled	Yes –proper temperature/time control will minimise micro growth Refer to GMP Doc. xx	No
		P- Bone in boneless cuts	Hazard carried over from previous step	No	
		P - Plastic	Hazard carried over from previous step	Yes – adequate thawing will ensure that most of the plastic is removed from meat blocks. Refer to GMP Doc. xx	No
5. Trimming	Meat cuts	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if temperature is not properly controlled	Yes –hygienic techniques will minimise contamination; and time/ temperature control will minimise micro growth Refer to GMP Doc. xx	No

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – Bone in boneless cuts	Hazard carried over from previous step	No	
		P - Plastic	Hazard carried over from previous step	Yes – inspection & removal of any remaining plastic Refer to GMP Doc. xx	No
6. Injection (pumping)	Meat cuts	B – Bacterial pathogens	Micro carried over from previous step	No	
	Brine	C – Nitrite	Excess nitrite causes toxic reaction in consumers	No – controlled at weighing of nitrite and brine preparation	
			Insufficient nitrite in brines that are held for too long may allow growth of <i>C. botulinum</i>	Yes – proper control of brine temperature and dumping of unused brine at the end of production day, or checking for nitrite content and adjusting brine before use Refer to GMP Doc. xx	No
		B – Bacterial pathogens from highly contaminated brines	Poor temperature control and excessive recycling can result to brines with high micro load	Yes - procedures for controlling brine quality (e.g. temperature, storage, recycling) Refer to GMP Doc. xx	No

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
7. Tumbling / massaging / soaking in brine	Injected meat	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if temperature is not properly controlled	Yes – proper temperature control will minimise micro growth Refer to GMP Doc. xx	No
8. Stuffing / bagging / moulding and clipping	Cured meat	B – Bacterial pathogens	Micro carried over from previous step	No	
	Casings, nets, moulds	None			
	Metal clips	P – Metal clips	Metal clips have been found in processed meat products	Yes – procedures for preventing metal clips getting into the product Refer to GMP Doc. xx	No
9. Hanging on trolleys	Cured pork cuts	B – Bacterial pathogens	Micro carried over from previous step	No	
10. Cooking / smoking	Cured meat	B – Bacterial pathogens	Micro carried over from previous step	Yes – cooking using validated time/temperature schedule that will deliver a 6D reduction of <i>Listeria monocytogenes</i> will destroy vegetative pathogens Refer to GMP Doc. xx	Yes – CCP2

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
	Smoke	C – PAH	Refer to Table 8.2	Yes ³⁶ – measures to minimise the formation of chemical hazards from wood smoke Refer to GMP Doc. xx	No
11. Cooling	Cooked meat	B – Bacterial spores (e.g. <i>C. perfringens</i>)	Bacterial spores that survive cooking may sporulate and grow when cooling takes too long	Yes – correct cooling time/temperature based on validated cooling rate will minimise the growth of <i>C. perfringens</i> Refer to GMP Doc. xx	Yes – CCP3
	Cooling water	None			
12. Holding in chiller	Cooked meat	B – Bacterial spores	Micro carried over from previous step	Yes – holding at ≤ 5°C will minimise micro growth Refer to GMP Doc. xx	No
13. Slicing, packing / labelling	Cooked meat	B – Bacterial spores	Micro carried over from previous step	No	

³⁶ Operators should take measures to minimise the formation of chemical hazards from wood smoke, such as polycyclic aromatic hydrocarbons (PAH), during the smoking process. Refer to Part 3, section 8.2.5 for guidance on minimising PAH formation.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		B – <i>Listeria monocytogenes</i>	Product can be recontaminated with <i>L. monocytogenes</i> during slicing and packing	Yes- hygienic practices will minimise micro contamination Refer to GMP Doc. xx	No
	Packaging materials	None			
14. Storage	Packed cooked meat	B – Bacterial spores	Micro carried over from previous step Micro growth can occur if there is refrigeration failure	Yes – storage at $\leq 5^{\circ}\text{C}$ will minimise micro growth Refer to GMP Doc. xx	No
15. Dispatch	Packed cooked meat	B – Bacterial spores ³⁷	Micro carried over from previous step Micro growth can occur if temperature is not controlled properly	Yes – proper temperature control will minimise micro growth Refer to GMP Doc. xx	No

³⁷ Bacterial spores that survive the cooking process (e.g. *C. perfringens*) will not grow at refrigerated temperatures. They are unlikely to pose as a health hazard in properly handled and refrigerated cooked cured meat products.

Table 8.4: CCP summary for the manufacture of cooked cured meat products ³⁸

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures/tools (Consider Who, What, When and How)	Corrective actions	Verification procedures	Records
1	Brine preparation	Excess nitrite	Predetermined amount per batch size that will result in nitrite ≤ 125 ppm in final product	Supervisor to check preparation checklist at xx frequency Visual check of weighing operation	Reject and dump any brine mix that is made up incorrectly Hold any affected products, test for nitrite, and determine disposition Review procedures and correct, as necessary Retrain worker and increase monitoring.	Product testing Internal audit External audit (e.g. regulator, client) HACCP review	Weighing checklist Nitrite test results Corrective action report Internal audit report External audit report HACCP review record
2	Cooking	Bacterial pathogens	Cooking parameters that will achieve a 6D process for <i>L. monocytogenes</i> (e.g. cooking to internal product temp of 70°C for 2 min); and/or	Continuous product temperature recording for each batch, or worker to measure internal temperature of slowest heating product for every batch; and/or	Extend cooking process Recook undercooked products Review process and procedures	Product micro testing Thermometer calibration Internal audit External audit (e.g. regulator, client)	Validation record Micro test results Daily CCP monitoring worksheet Time/temperature charts

³⁸ Procedures for monitoring, corrective actions and verification must be documented in the FSP or RMP.

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures/tools (Consider Who, What, When and How)	Corrective actions	Verification procedures	Records
			Validated cooker operating parameters	Worker to monitor validated cooker operating parameters (e.g. air temperature, cooking time, etc)	and correct deficiencies Retrain worker and increase monitoring	HACCP review	Corrective action report Internal audit report External audit report HACCP review record
3	Cooling	<i>Clostridium perfringens</i>	Cooling time and temperature that will achieve specified cooling rate (e.g. 52 to 12°C within 7.5 hours and 12 to 5°C within 24 hours of completion of cooking)	Continuous product temperature reading for each batch, or worker to periodically measure internal temperature of slowest cooling product for every batch; and/or Worker to monitor validated cooling parameters (e.g. cooling time, cooling water temperature, room temperature)	Hold any affected products, review process, test product, and determine disposition (e.g. recook, reject) Review process and procedures and correct, as necessary Retrain worker and increase monitoring	Temperature measurements Internal audit External audit (e.g. regulator, client) HACCP review	Validation record Daily CCP monitoring worksheet Corrective action report Internal audit report External audit report HACCP review record

9 HACCP Application for the Manufacture of UCFM Products

Amendment 1

February 2012

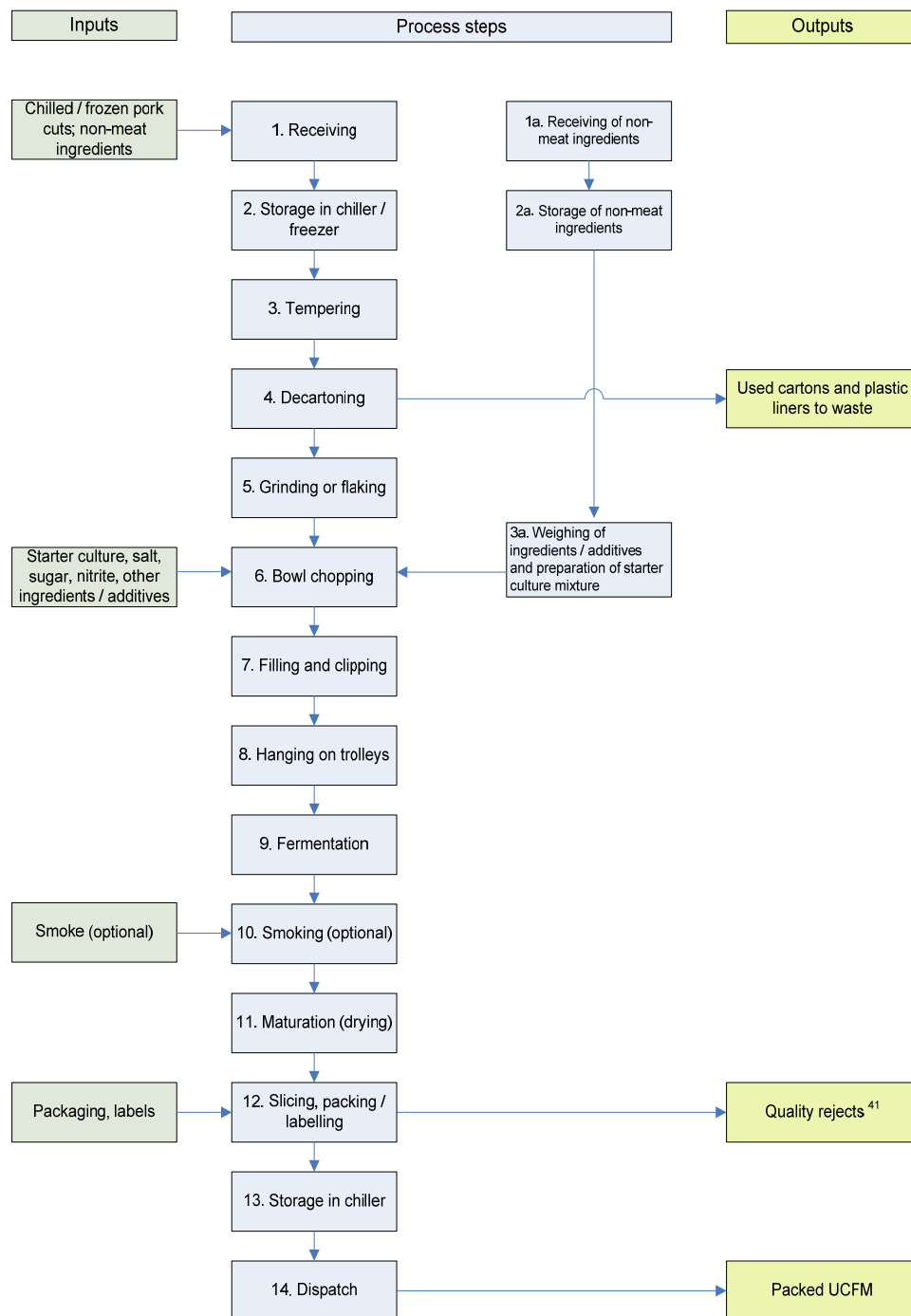
Table 9.1: Product description and intended use³⁹

Product name	Uncooked comminuted fermented meat products (e.g. salami, pepperoni)
Intended consumer	General public
Intended use	Ready-to-eat
Regulatory limits	Microbiological limits (Food Standards Code 1.6.1) Coagulase - positive <i>staphylococci</i> /g: n = 5 c = 1 m = 10 ³ M = 10 ⁴ <i>E. coli</i> /g: n = 5 c = 1 m = 3.6 M = 9.2 <i>Salmonella</i> /25g: n = 5 c = 0 m = 0
	Nitrite ≤ 500 mg/kg (Food Standards Code)
Operator-defined limits ⁴⁰	Specified pH and water activity (e.g. pH < 5.2 and aw < 0.95) for final product
Packaging and labelling	Give company and regulatory specifications
Handling, storage requirements and shelf life	Give company and regulatory specifications

³⁹ Company specifications for each product or product group should be documented as part of the FSP or RMP.

⁴⁰ The operator must provide evidence that any operator-defined limit is appropriate to the product, process, and intended use and consumer. The Guidelines for the Production of UCFM Products provides guidance on acceptable limits.

Fig. 9.1: Process for the manufacture of UCFM products



⁴¹ The operator should indicate the disposition (e.g. to waste) or use (e.g. rework, staff sales) of any rejects from the process.

Table 9.2: Identification of hazards from inputs

Inputs ⁴²	Description / specification ⁴³	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Chilled/frozen NZ meat – various species (e.g. pork, beef, venison)	Produced under a registered RMP Meets company specifications (e.g. delivery temperature)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants) ⁴⁴	Bone in boneless products Plastic from carton liner
Imported frozen meat	Meets relevant regulatory requirements (e.g. Import Health Standard, Biosecurity requirements)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants)	Bone in boneless products Plastic from carton liner
Water	Potable	None	None	None
Starter culture	Specifically intended for use in UCFM	None	None	None
Nitrite	Food grade	None	Nitrite	None
Salt, sugar, other additives	Food grade	None	None	None

⁴² Any rework materials used must be included in this table.

⁴³ Agreed specifications and procedures for inputs must be documented in the FSP or RMP.

⁴⁴ Sporadic chemical residues at some level will always occur. However, results from the National Residue Monitoring Programme indicate that residue levels are generally in compliance with national requirements. The level of this hazard will not increase during processing, therefore, it will not be considered further in the hazard analysis.

Inputs ⁴²	Description / specification ⁴³	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Wood smoke	Generated from clean, dry untreated wood	None	Polycyclic aromatic hydrocarbons (PAH)	None
Spices	Dried. Decontaminated (e.g. steam treated) Complies with the Food Standards Code (e.g. micro limit for pepper, paprika)	Bacterial spores (e.g. <i>Bacillus cereus</i> spp., <i>Clostridium</i> spp.)	None	None
Artificial casings	Supplier & company specifications	None	None	None
Packaging materials	Suitable as food contact material Plastics comply with HC Specification 30(1)	None	None	None

Table 9.3: Hazard analysis and CCP determination for the manufacture of UCFM products

This hazard analysis is based on the expectation that manufacturers comply with the requirements of the [UCFM Standard and Guide](#), and that they have GMP programmes (supporting systems) in place which comply with Parts 2 and 3 of this COP.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
Storage and batching of non-meat ingredients					
1a. Receiving of non-meat ingredients	Starter culture, other ingredients and additives (e.g. nitrite)	None			
2a. Storage of non-meat ingredients	Starter culture, other ingredients and additives (e.g. nitrite)	None			
3a. Weighing of ingredients, additives and preparation of starter culture mixture	Other ingredients and additives (e.g. nitrite)	None			

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
	Sodium nitrite	C - Excessive nitrite, if using pure nitrite and weighing is done by the processor	Weighing of incorrect amount may result in unacceptable levels in the final product	Yes –correct weighing procedures Refer to GMP Doc. xx ⁴⁵	Yes – CCP1
		None, if premix is used			
Main process					
1.Receiving	Chilled/frozen meat	B – Bacterial pathogens	Refer to Table 9.2	No	
		P – Bone in boneless cuts	Refer to Table 9.2	No	
		P – Plastic	Refer to Table 9.2 Polyentrapment is a common occurrence in frozen meat	No	
2. Storage in chiller or freezer	Chilled/frozen meat	B – Bacterial pathogens	Micro carried over from previous step	No	
		P – Bone in boneless cuts	Hazard carried over from previous step	No	

⁴⁵ GMP and operating procedures should be documented in supporting systems. The relevant supporting system should be cited in this table.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – Plastic	Hazard carried over from previous step	No	
3. Tempering	Frozen meat	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if tempering time & temperature are not properly controlled	Yes –proper temperature/time control will minimise micro growth Refer to GMP Doc. xx	No
		P- Bone in boneless cuts	Hazard carried over from previous step	No	
		P - Plastic	Hazard carried over from previous step	No	
4. Decartoning	Tempered meat	B – Bacterial pathogens	Micro carried over from previous step	No	
		P – Bone in boneless cuts	Hazard carried over from previous step	No	
		P – Plastic	Hazard carried over from previous step	Yes – careful removal of plastic liner will minimise tearing of plastic; and further thawing or cutting of areas with entrapped plastic will remove the hazard Refer to GMP Doc. xx	No

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
5.Grinding or flaking	Tempered meat	B – Bacterial pathogens	Micro carried over from previous step	No	
		P – Bone in boneless cuts	Hazard carried over from previous step	Yes – use of a bone elimination device in the grinder will minimise bone in the mince	No
		P – Metal	Contamination with metal fragments from the machine can occur	Yes – daily check of equipment parts and regular change of blades will minimise metal contamination Refer to GMP Doc. xx	No
6. Bowl chopping	Ground or flaked meat	B – Bacterial pathogens	Micro carried over from previous step	No	
	Starter culture	None			
	Sodium nitrite	C - Nitrite	Excess nitrite causes toxic reaction in consumers	No - controlled at weighing step 3a	
	Salt, sugar	None			
	Spices	B – Bacterial spores	Refer to Table 9.2		
	Potable water	None			

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – Metal	Contamination with metal fragments from the bowl chopper can occur	Yes – daily check of equipment parts and regular change of blades will minimise metal contamination Refer to GMP Doc. xx	No
7. Filling and clipping	Batter	B – Bacterial pathogens	Micro carried over from previous steps	No	
		P - Metal	Hazard carried over from the previous steps	No	
	Casings	None			
	Metal clips	P – Metal clips	Metal clips have been found in processed meat products	Yes – procedures for preventing metal clips getting into the product Refer to GMP Doc. xx	No
8. Hanging on trolleys	Raw sausage	B – Bacterial pathogens	Micro carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
9. Fermentation	Raw sausage	B – Bacterial pathogens	Micro carried over from previous step Slow or incomplete fermentation may allow growth of pathogens (e.g. <i>S. Aureus</i>)	Yes – compliance to validated fermentation time and temperature, and pH drop within validated period (e.g. pH < 5.2 within 24 hours) will prevent the growth of pathogens Refer to GMP Doc. xx	Yes – CCP2
10. Smoking (optional)	Fermented sausage	B – Bacterial pathogens	Micro carried over from previous step	No	
	Smoke	C – PAH	Refer to Table 9.2	Yes ⁴⁶ – measures to minimise the formation of chemical hazards from wood smoke Refer to GMP Doc. xx	No
11. Maturation (drying)	Smoked, fermented sausage	B – Bacterial pathogens	Micro carried over from previous step Incomplete maturing may allow survival of pathogens	Yes – compliance to validated maturation time and temperature, and end product pH and a_w will inactivate <i>E. coli</i> and other bacterial pathogens	Yes – CCP3

⁴⁶ Operators should take measures to minimise the formation of chemical hazards from wood smoke, such as polycyclic aromatic hydrocarbons (PAH), during the smoking process. Refer to Part 3, section 8.2.5 for guidance on minimising PAH formation.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
12. Slicing, packing and labelling	Dried, fermented sausage	B – Bacterial spores	Micro carried over from previous step	No	
		B – <i>Listeria monocytogenes</i>	Contamination may occur from food contact surfaces and the environment	Yes – effective separation between raw and RTE, and cleaning and sanitation will minimise contamination Refer to GMP Doc. xx	No
	Plastic liner, cartons, label	None			
13. Storage in chiller	Packed fermented sausages	B – Bacterial spores	Micro carried over from previous step	No	
14. Dispatch	Packed fermented sausages	B – Bacterial spores ⁴⁷	Micro carried over from previous step	No	

⁴⁷ Bacterial spores will survive fermentation and drying but the conditions in the fermented sausage (e.g. low water activity and pH) will inhibit their growth.

Table 9.4: CCP summary for the manufacture of UCFM products⁴⁸

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures/tools	Corrective actions	Verification procedures	Records
1	Weighing of nitrite	Excess nitrite	Predetermined amount per batch size that will result in nitrite \leq 500 mg/kg in final product	Supervisor to check preparation checklist at xx frequency Visual check of weighing operation	Hold any affected products, test for nitrite, and determine disposition Review procedures and correct, as necessary Retrain worker and increase monitoring	Product testing Internal audit External audit (e.g. regulator, client) HACCP review	Weighing checklist Nitrite test results Corrective action report Internal audit report External audit report HACCP review record
2	Fermentation	Bacterial pathogens	Validated fermentation time and temperature, and pH drop within validated period (e.g. pH < 5.2 within 24 hours)	Periodic monitoring of fermentation room temperature for every batch of UCFM Periodic checking of pH by suitably skilled person	Cook non-compliant products, or dump Non-compliant products must not be reworked A suitably skilled person to review process and procedures, and correct deficiencies	Calibration of thermometer and pH meter Internal audit External audit HACCP review	Fermentation room temperature records pH records Corrective action report Audit reports HACCP review record

⁴⁸ Procedures for monitoring, corrective actions and verification must be documented in the FSP or RMP.

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures/tools	Corrective actions	Verification procedures	Records
					Consider need for revalidation of the process Retrain worker and increase monitoring		
3	Maturation (drying)	Bacterial pathogens	Validated maturation time and temperature, and validated end product pH and a_w (e.g. pH < 5.2 and a_w < 0.95)	Periodic monitoring of maturation room temperature for every batch of UCFM Checking of pH and a_w of end product by a suitably skilled person, or determination of weight loss of sausages instead of a_w (weight loss must be correlated to a_w)	If required pH and a_w (or weight loss) not met, extend maturation period; or consider product as not shelf stable (i.e. must be refrigerated during storage); or cook product Non-compliant products must not be reworked A suitably skilled person to review process and procedures, and correct deficiencies Consider need for revalidation of the process Retrain worker and increase monitoring	Micro testing of final product to verify compliance against the micro criteria for UCFM Calibration of thermometers and pH meter Correlating weight loss against product a_w Internal audit External audit HACCP review	Micro test results Maturation room temperature records pH records Weight loss or a_w records (including data for correlating the two parameters) Corrective action report Audit reports HACCP review record

10 HACCP Application for the Manufacture of Dry-cured Ham

Amendment **1**

February 2012**2**

Table 10.1: Product description and intended use ⁴⁹

Product name	Dry-cured ham
Intended consumer	General public
Intended use	Ready-to-eat
Regulatory limits	Nitrite ≤ 500 mg/kg (Food Standards Code)
Operator-defined limits ⁵⁰	Microbiological limits appropriate for the product and its intended use, e.g. Coagulase -positive <i>staphylococci</i> ≤ 100 /g <i>E.coli</i> ≤ 10 /g <i>Salmonella</i> = 0 in 25g
	Finished product $a_w < 0.90$
Packaging and labelling	<i>Give company and regulatory specifications</i>
Handling, storage requirements and shelf life	<i>Give company and regulatory specifications</i>

⁴⁹ Company specifications for each product or product group should be documented as part of the FSP or RMP.

⁵⁰ The operator must provide evidence that any operator-defined limit is appropriate to the product, process, and intended use and consumer. Part 3 of this COP provides guidance on acceptable limits.

Fig. 10.1: Process for the manufacture of dry-cured ham

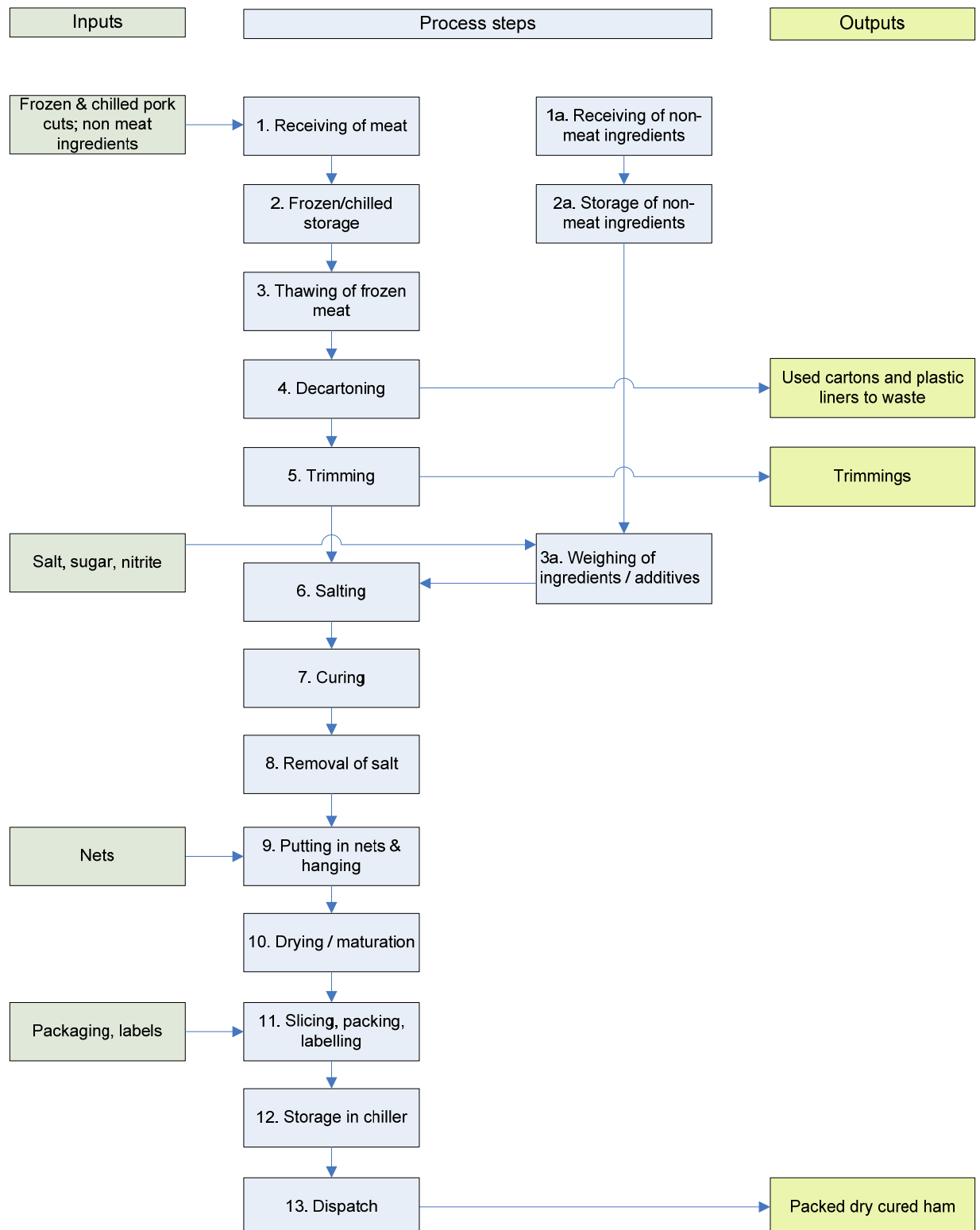


Table 10.2: Identification of hazards from inputs

Inputs	Description / specification ⁵¹	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Chilled/frozen NZ pork venison)	Produced under a registered RMP Meets company specifications (e.g. delivery temperature)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants) ⁵²	Bone in boneless products Plastic from carton liner
Imported frozen pork	Meets relevant regulatory requirements (e.g. Import Health Standard, Biosecurity requirements)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants)	Bone in boneless products Plastic from carton liner
Water	Potable	None	None	None
Nitrite	Food grade	None	Nitrite	None
Salt, sugar	Food grade	None	None	None
Packaging materials	Suitable as food contact material Plastics comply with HC Specification 30(1)	None	None	None

⁵¹ Agreed specifications and procedures for inputs must be documented in the FSP or RMP.

⁵² Sporadic chemical residues at some level will always occur. However, results from the National Residue Monitoring Programme indicate that residue levels are generally in compliance with national requirements. The level of this hazard will not increase during processing, therefore, it will not be considered further in the hazard analysis.

Table 10.3: Hazard analysis and CCP Determination for the manufacture of dry-cured ham

This hazard analysis is based on the expectation that manufacturers have GMP programmes are in place which comply with Parts 2 and 3 of this COP.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
Preparation of cure mix					
1a. Receiving of non-meat ingredients	Salt, sugar, nitrite, or premix	None			
2a. Storage of non-meat ingredients	Salt, sugar, nitrite, or premix	None			
3a. Weighing of ingredients / additives	Salt, sugar, nitrite, or premix	None			

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
	Sodium nitrite	C - Excessive nitrite, if using pure nitrite and weighing is done by the processor	Weighing of incorrect amount may result in unacceptable levels in the final product	Yes –correct weighing procedures Refer to GMP Doc. xx ⁵³	Yes – CCP1
		None, if premix is used			
Main process					
1.Receiving of meat	Chilled/frozen meat	B – Bacterial pathogens	Refer to Table 10.2	No	
		P – Bone in boneless cuts	Refer to Table 10.2	No	
		P – Plastic	Refer to Table 10.2 Polyentrapment is a common occurrence in frozen meat	No	
2. Frozen / chilled storage	Chilled / frozen meat	B – Bacterial pathogens	Micro carried over from previous step	No	

⁵³ GMP and operating procedures should be documented in supporting systems. The relevant supporting system should be cited in this table.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – Bone in boneless cuts	Hazard carried over from previous step	No	
		P – Plastic	Hazard carried over from previous step	No	
3. Thawing of frozen meat	Frozen meat	B – Bacterial pathogens	Micro carried over from previous step Micro growth can occur if tempering time & temperature are not properly controlled	Yes –proper temperature/time control will minimise micro growth Refer to GMP Doc. xx	No
		P- Bone in boneless cuts	Hazard carried over from previous step	No	
		P - Plastic	Hazard carried over from previous step	No	
4. Decartoning	Thawed meat	B – Bacterial pathogens	Micro carried over from previous step	No	
		P – Bone in boneless cuts	Hazard carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – Plastic	Hazard carried over from previous step	Yes – careful removal of plastic liner will minimise tearing of plastic; and further thawing or cutting of areas with entrapped plastic will remove the hazard Refer to GMP Doc. xx	No
5. Trimming	Thawed or chilled meat	B – Bacterial pathogens	Micro carried over from previous step	No	
		P – Bone in boneless cuts	Hazard carried over from previous step	Yes – removal of bone during trimming Refer to GMP Doc. xx	No
6. Salting	Thawed or chilled meat	B – Bacterial pathogens	Micro carried over from previous steps <i>S. aureus</i> can grow if salt is not evenly distributed or is added at too low a level	Yes – complete coverage of meat surface with correct amount of cure mix, and time and temp control during curing (2-7°C) will inhibit pathogen growth, and inactivate some bacterial pathogens Refer to GMP Doc. xx	Yes – CCP2
	Cure mix	None			
7. Curing	Salted meat	B – Bacterial pathogens	Micro carried over from previous step	Refer to GMP Doc. xx	
8. Removal of salt	Cured meat	B – Bacterial pathogens	Micro carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
9. Putting in nets & hanging	Cured meat	B – Bacterial pathogens	Micro carried over from previous step	No	
	Nets	None			
10. Drying/ maturation	Cured meat	B – Bacterial pathogens	Micro carried over from previous step Incomplete drying may allow survival of some pathogens and result in an unstable product	Yes – compliance to validated drying time and temperature, and end product a_w will inactivate bacterial pathogens Refer to GMP Doc. xx	Yes – CCP3
11. Slicing, packing and labelling	Dry-cured meat	B – Bacterial spores	Micro carried over from previous step	No	
		B – <i>Listeria monocytogenes</i>	Contamination may occur from product contact surfaces and the environment	Yes – effective separation between raw and RTE, and cleaning and sanitation will minimise contamination Refer to GMP Doc. xx	No
	Plastic liner, cartons, label	None			

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
12. Storage in chiller	Packed dry-cured ham	B – Bacterial spores	Micro carried over from previous step	No	
13. Dispatch	Packed dry-cured ham	B – Bacterial spores ⁵⁴	Micro carried over from previous step	No	

⁵⁴ Bacterial spores will survive curing and drying but they will not grow in dry-cured meats due to the low water activity.

Table 10.4: CCP summary for the manufacture of dry-cured ham⁵⁵

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures/tools	Corrective actions	Verification procedures	Records
1	Weighing of nitrite	Excess nitrite	Predetermined amount per batch size that will result in nitrite \leq 500 mg/kg in final product	Supervisor to check preparation checklist at xx frequency Visual check of weighing operation	Hold any affected products, test for nitrite, and determine disposition Review procedures and correct, as necessary Retrain worker and increase monitoring	Product testing Internal audit External audit (e.g. regulator, client) HACCP review	Weighing checklist Nitrite test results Corrective action report Internal audit report External audit report HACCP review record
2	Salting & curing	Bacterial pathogens	Complete coverage of meat surface with correct amount of cure mix Curing temp (e.g. 2-7°C)	Visual check of salting process Periodic monitoring of curing room temperature for every batch of product	Add more cure mix A suitably skilled person to review process and procedures, and correct deficiencies Consider need for revalidation of the process	Calibration of thermometer Internal audit External audit HACCP review	Curing room temperature records Corrective action report Audit reports HACCP review record

⁵⁵ Procedures for monitoring, corrective actions and verification must be documented in the FSP or RMP.

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures/tools	Corrective actions	Verification procedures	Records
					Retrain worker and increase monitoring		
3	Drying/ maturation	Bacterial pathogens	Validated drying time and temperature, and end product aw \leq 0.90	Periodic monitoring of drying room temperature for every batch of product Checking of aw of end product by a suitably skilled person, or determination of weight loss of product instead of aw (weight loss must be correlated to aw)	If required aw (or weight loss) not met, extend drying period; or consider product as not shelf stable (i.e. must be refrigerated during storage) A suitably skilled person to review process and procedures, and correct deficiencies Consider need for revalidation of the process Retrain worker and increase monitoring.	Micro testing of final product to verify compliance against micro criteria Calibration of thermometers and aw meter Correlating weight loss against product aw Internal audit External audit HACCP review	Micro test results Drying room temperature records Weight loss or aw records (including data for correlating the two parameters) Corrective action report Audit reports HACCP review record

11 HACCP Application for the Manufacture of Beef Jerky

Amendment 1

February 2012

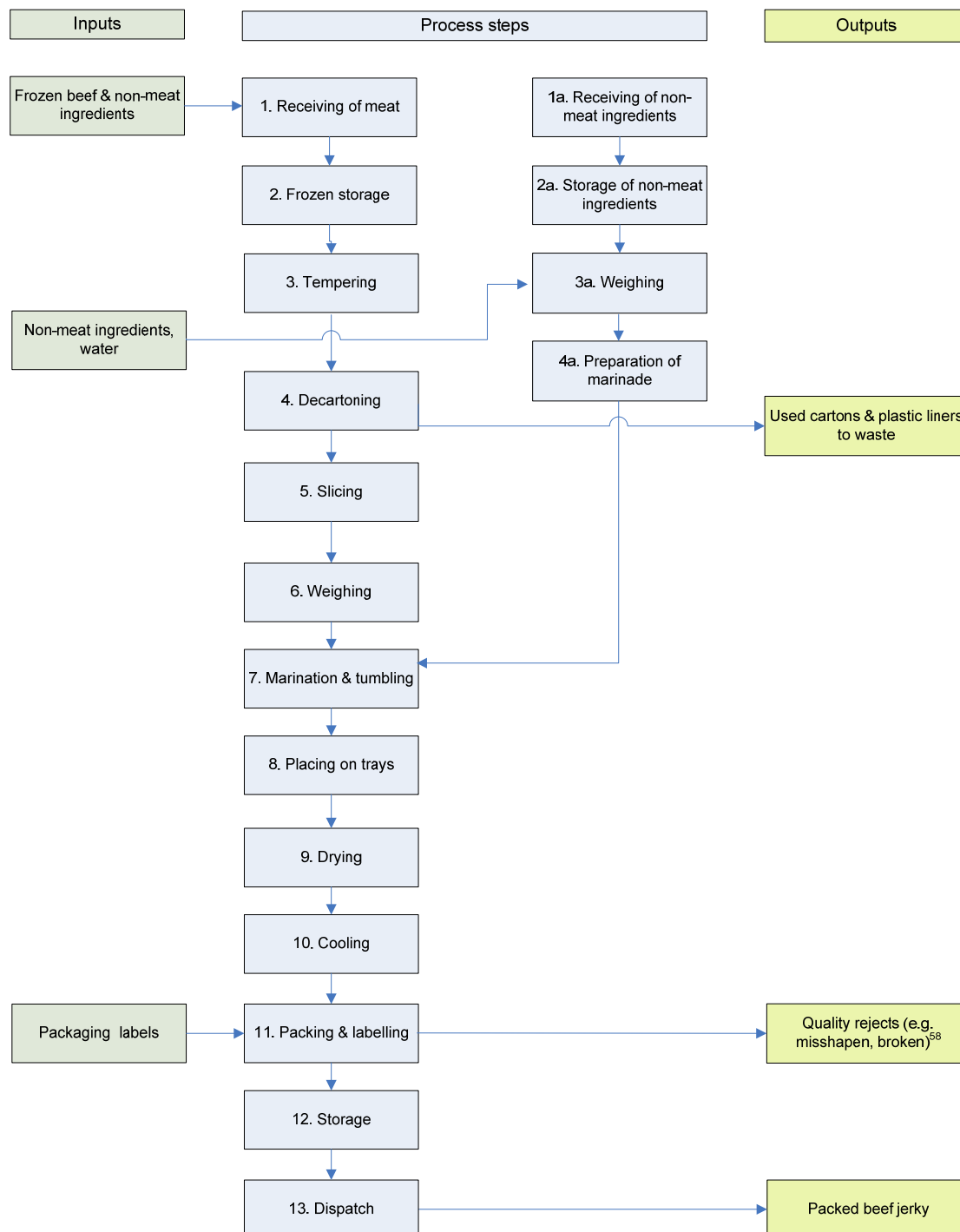
Table 11.1: Product description and intended use⁵⁶

Product name	Beef jerky
Intended consumer	General public
Intended use of product	Ready-to-eat
Regulatory limits	Nitrite \leq 125 mg/kg (Food Standards Code)
Operator-defined limits⁵⁷	Water activity limit (e.g. \leq 0.85)
	Microbiological limits <i>Give company specifications</i>
Packaging and labelling	<i>Give company and regulatory specifications</i>
Handling, storage requirements and shelf life	<i>Give company and regulatory specifications</i>

⁵⁶ Company specifications for each product or product group should be documented as part of the FSP or RMP.

⁵⁷ The operator must provide evidence that any operator-defined limit is appropriate to the product, process, and intended use and consumer. Part 3 of this COP provides guidance on acceptable limits.

Fig. 11.1: Process for the manufacture of beef jerky



⁵⁸ The operator should indicate the disposition or use of any rejects from the process.

Table 11.2: Identification of hazards from inputs

Inputs	Description/specification ⁵⁹	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Frozen NZ meat (boneless intact muscle cuts)	Produced under a registered RMP Meets company specifications (e.g. arrival temperature) ⁶⁰	Bacterial pathogens (e.g. <i>Salmonella</i> spp., <i>E. coli</i> 0157, <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants) ⁶¹	None
Water	Potable	None	None	None
Salt, sugar	Food grade	None	None	None
Spices	Dried, decontaminated spices; or spice extracts. Complies with the Food Standards Code (e.g. micro limit for pepper)	Dried, decontaminated spices - Bacterial spores (e.g. <i>Clostridium</i> spp., <i>Bacillus cereus</i>) Extracts - None	None	None

⁵⁹ Agreed specifications for inputs should be documented in the FSP or RMP.

⁶⁰ For jerky and other dried meats which do not undergo a microbiological kill step, such as heating, the safety of the process is greatly dependent on ensuring that only meat of good microbiological quality is used for the production of dried meats because there are limitations to the numbers of pathogenic bacteria that can be destroyed during drying.

⁶¹ Sporadic chemical residues at some level will always occur. However, results from the National Residue Monitoring Programme indicate that residue levels are generally in compliance with national requirements. The level of this hazard will not increase during processing, therefore, it will not be considered further in the hazard analysis.

Inputs	Description/specification ⁶²	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Soy sauce	Company specification	None	Allergens ⁶³	None
Additives (e.g. sodium nitrite)	Food grade Complies with the Food Standards Code	None	Nitrite	None
Packaging materials	Suitable for use as food contact materials Plastics comply with Human Consumption specification 30(1)	None	None	None

⁶² Agreed specifications for inputs should be documented in the FSP or RMP.

⁶³ Operators are expected to have a documented Allergen Management Plan for managing any risks to human health posed by the presence of allergens in their products. The Plan should be based on a systematic identification and analysis of all potential sources of allergens at each step of the process, and the development of controls for these sources. The presence of allergens in the product from intended ingredients should be managed by complying with the labelling requirements of the Food Standards Code, including relevant mandatory warning and advisory statements and declarations specified in Standard 1.2.3. The Allergen Management Plan must also establish controls for the unintended exposure of the product to allergens (i.e. due to inadvertent presence in raw materials and processing aids, incorrect formulation, changes to product scheduling, rework, insufficient or ineffective cleaning/sanitation procedures, etc). Since the identification of allergens from inputs and from the process, and the establishment of controls are expected to be adequately covered when developing the Allergen Management Plan and other related supporting systems (e.g. cleaning), allergens will not be considered any further in the hazard analysis. Refer to Part 2, section 14 of the Processed Meats COP for guidance on the Allergen Management Plan.

Table 11.3: Hazard analysis and CCP determination for the manufacture of beef jerky

This hazard analysis is based on the expectation that manufacturers have GMP programmes in place that comply with Parts 2 and 3 of this COP.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? ⁶⁴ If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
Storage and weighing of non-meat ingredients					
1a. Receiving of non-meat ingredients	Salt, spices, additives, other ingredients	B – bacterial spores from spices	Refer to Table 11.2	No	
2a. Storage of non-meat ingredients	Salt, spices, additives, other dry ingredients	B – bacterial spores	Micro carried over from previous step	No	

⁶⁴ Operators should comply with relevant process control requirements and procedures given in Part 3 of this COP. The control measures must be documented in the FSP or RMP.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? ⁶⁴ If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
3a. Weighing	Salt, spices, additives, other dry ingredients	B – bacterial spores	Micro carried over from previous step	No	
	Sodium nitrite	C – excessive nitrite, if using pure nitrite and weighing is done by the processor. None, if premix is used.	Weighing of incorrect amount may result in unacceptable levels in the final product.	Yes- correct weighing procedures. Refer GMP Doc. xx ⁶⁵	Yes – CCP1
4a. Preparation of marinade	Salt, spices, additives, other dry ingredients	B – bacterial spores	Micro carried over from previous step	No	
	Potable water	None			

⁶⁵ GMP and operating procedures should be documented in supporting systems. The relevant supporting system should be cited in this table.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? ⁶⁴ If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
Main process					
1. Receiving of meat	Frozen meat cuts (boneless intact muscle cuts)	B – bacterial pathogens	Refer to Table 11.2 Micro growth can occur in chilled meat at >7°C	Yes – checking of chilled meat temperature will minimise the potential for accepting meat which has been temperature abused during transport. Refer GMP Doc. xx	No
		C – chemical residues	Refer to Table 11.2	No	
2. Frozen storage	Meat cuts	B – bacterial pathogens	Micro carried over from previous step	No	
3. Tempering	Meat cuts	B – bacterial pathogens	Micro carried over from previous step. Micro growth can occur if tempering time & temperature are not properly controlled.	Yes – proper time/temperature control will minimise micro growth. Refer GMP Doc. xx	No
4. Decartoning	Meat cuts	B – bacterial pathogens	Micro carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? ⁶⁴ If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – plastic	Poly-entrapment is a common occurrence in frozen meat.	Yes – careful removal of plastic liner will minimise tearing of plastic; and further thawing or cutting of areas with entrapped plastic will remove the hazard. Refer GMP Doc. xx	No
5. Slicing	Meat cuts	B – bacterial pathogens	Micro carried over from previous step	No	
6. Weighing	Sliced meat	B – bacterial pathogens	Micro carried over from previous step	No	
7. Marination & tumbling	Sliced meat	B – bacterial pathogens	Micro carried over from previous step Micro growth may occur due to improper time/temp control	Yes – meat temp maintained at ≤ 7°C during marination & tumbling will minimise micro growth Refer GMP Doc. xx	No

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? ⁶⁴ If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
	Fresh marinade	B – bacterial spores	Refer to table 11.2	Yes – correct procedures for the preparation, storage and re-use of marinades ⁶⁶ Refer GMP Doc. xx	No
		C – nitrite	Excess nitrite can cause poisoning	No – controlled at weighing step 3a	
8. Placing on trays	Marinated meat	B – bacterial pathogens/spores	Micro carried over from previous step	No	
9. Drying	Marinated meat	B – bacterial pathogens/spores	Micro carried over from previous step	Yes - validated drying schedule ⁶⁷	Yes – CCP2

⁶⁶ The operator should indicate if marinades are re-used. Used marinades are likely to become contaminated with microorganisms from the raw meat. Procedures for the preparation, storage and re-use of marinades must be documented in the RMP or FSP. Refer to Part 3, section 6.4 of the Processed Meats COP.

⁶⁷ The validated drying process and any additional controls (when used) must render the product microbiologically safe for its purpose, and must achieve the required water activity. Refer to Part 3, section 6 of the Processed Meats COP for guidance on the validation of drying processes.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? ⁶⁴ If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
10. Cooling	Dried meat	B – bacterial spores ⁶⁸	Micro carried over from previous step	No	
11. Packing & labelling	Dried meat	B – bacterial spores	Micro carried over from previous step	No	
	Packaging materials	None			
12. Storage	Packed jerky	B – bacterial spores	Micro carried over from previous step	No	
13. Dispatch	Packed jerky	B – bacterial spores	Micro carried over from previous step	No	

⁶⁸ Bacterial spores (e.g. *Clostridium* spp.) can survive the drying process but they will not grow in beef jerky because of the low water activity of the product.

Table 11.4: CCP summary for the manufacture of beef jerky⁶⁹

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures	Corrective actions	Verification procedures	Records
1	Weighing of nitrite	Excess nitrite	Predetermined amount per batch size that will result in nitrite ≤ 125 mg/kg in the final product. (i.e. compliance with the regulatory limit)	Supervisor to check preparation checklist at xx frequency. Visual check of weighing operation.	Hold any affected products, test for nitrite, and determine disposition. Review procedures and correct, as necessary. Retrain worker and increase monitoring.	Product testing Internal audit External audits (e.g. regulator, client) HACCP review	Weighing checklist Nitrite test results Corrective actions reports Audit reports HACCP review records
2	Drying	Bacterial pathogens (e.g. <i>Salmonella</i> spp., <i>E. coli</i> 0157, <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Bacillus cereus</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Validated drying parameters that will achieve water activity ≤ 0.85 and eliminate vegetative pathogens Specified water activity or weight loss.	Monitoring of relevant drying parameters (e.g. time, temperature, humidity, air velocity) for each batch at xx frequency. Checks for water activity or weight loss for each batch at xx frequency.	Extend drying process until the required water activity or weight loss is achieved, or dump non-complying products. Investigate cause of non-compliance, and adjust drier settings, if necessary.	Product micro and water activity testing Calibration of measuring devices Internal audit External audits (e.g. regulator, client) HACCP review	Daily CCP monitoring records Product test results Corrective action reports Audit reports HACCP review records

⁶⁹ Procedures for monitoring, corrective actions and verification must be documented in the FSP or RMP.

12 HACCP Application for the Manufacture of Raw Meat Patties

Amendment 1

February 2012

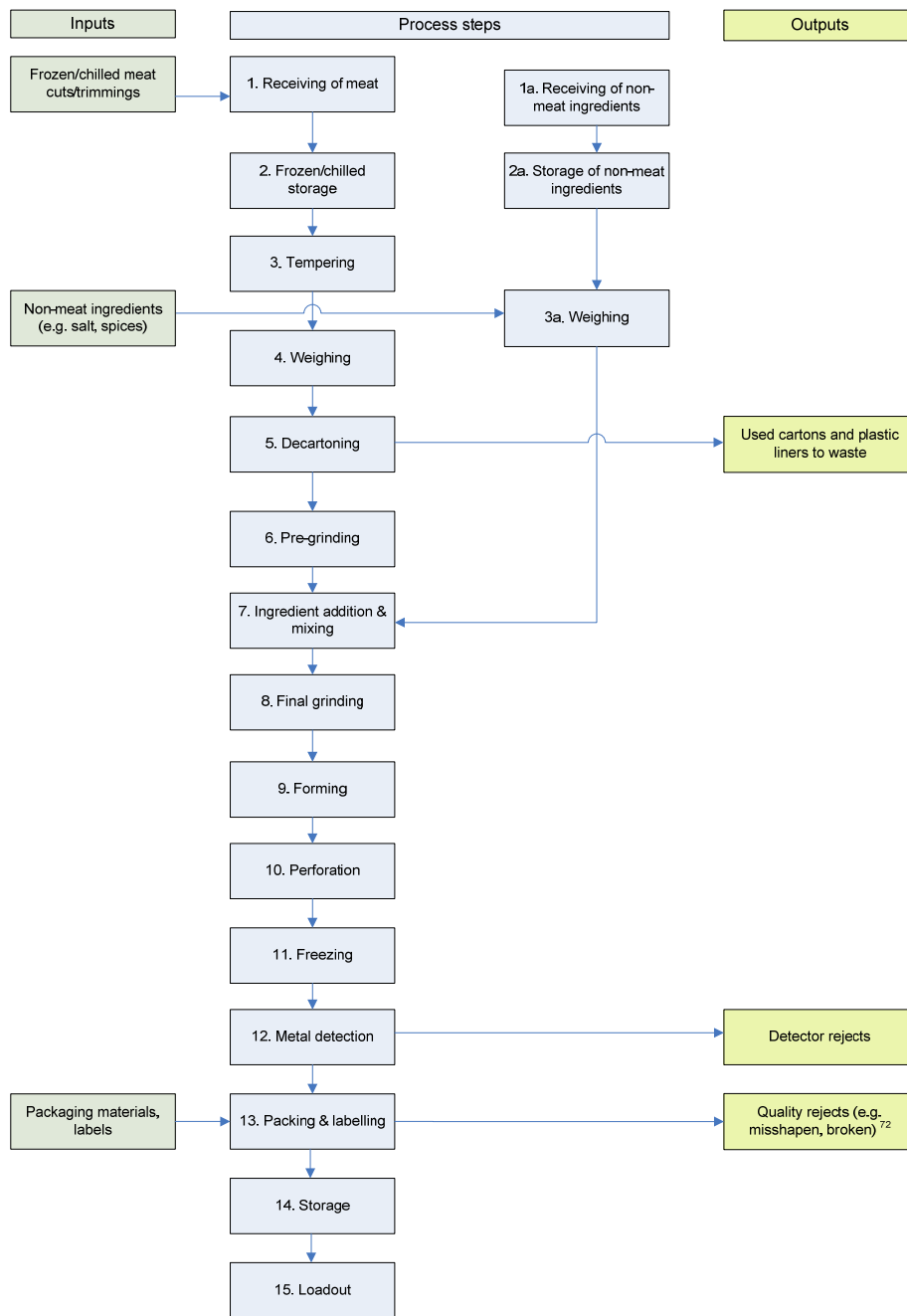
Table 12.1: Product description and intended use⁷⁰

Product name	Frozen raw meat patties
Intended consumer	General public
Intended use of product	To be fully cooked before consumption
Regulatory limits	None
Operator-defined limits⁷¹	Limit for metal: e.g. No metal objects ≥ 3 mm ferrous and 4 mm stainless steel in the final product
Packaging and labelling	Give company and regulatory specifications
Handling, storage requirements and shelf life	Give company and regulatory specifications

⁷⁰ Company specifications for each product or product group should be documented as part of the FSP or RMP.

⁷¹ The operator must provide evidence that any operator-defined limit is appropriate to the product, process, and intended use and consumer. Part 3 of this COP provides guidance on acceptable limits.

Fig. 12.1: Process for the manufacture of raw beef patties



⁷² The operator should indicate the disposition (e.g. to waste) or use (e.g. rework, staff sale) of any rejects from the process.

Table 12.2: Identification of hazards from inputs

Inputs	Description/specification ⁷³	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Frozen/chilled NZ meat boneless cuts, trimmings, fat	Produced under a registered RMP Meets company specifications (e.g. arrival temperature)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>E. coli</i> 0157, <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Listeria</i> <i>monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants ⁷⁴)	Bone in boneless product ⁷⁵ Plastic from carton liners Metal pieces
Imported frozen meat	Meets relevant regulatory requirements (e.g. Import Health Standard, Biosecurity requirements)	Pathogenic bacteria (e.g. <i>Salmonella</i> spp., <i>Campylobacter</i> spp., <i>Clostridium</i> spp., <i>Yersinia</i> <i>enterocolitica</i> , <i>E. coli</i> spp., <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)	Chemical residues (e.g. anthelmintics, antibiotics, environmental contaminants)	Bone in boneless products Plastic from carton liner
Water	Potable	None	None	None
Salt	Food grade	None	None	None
Spices, herbs	Dried and decontaminated Complies with the Food Standards Code (e.g. micro limit for pepper)	Bacterial spores (e.g. <i>Clostridium</i> spp., <i>Bacillus</i> <i>cereus</i>)	None	None

⁷³ Agreed specifications for inputs should be documented in the FSP or RMP.

⁷⁴ Sporadic chemical residues at some level will always occur. However, results from the National Residue Monitoring Programme indicate that residue levels are generally in compliance with national requirements. The level of this hazard will not increase during processing, therefore, it will not be considered further in the hazard analysis.

⁷⁵ Metal and bone pieces can occur in manufacturing meat. They can cause injury such as cuts in the mouth, broken teeth and intestinal perforation. The USDA FSIS in its 1995 Public Health Hazard Analysis Board on bone particles concluded that: bone particles < 1 cm are not a safety hazard; particles 1-2 cm are a low risk; particles > 2 cm have the potential to be a safety hazard and may cause injury.

Inputs	Description/specification ⁷³	Biological hazard (B)	Chemical hazard (C)	Physical hazard (P)
Cereal products (e.g. flour, breadcrumbs)	Company specification	Bacterial pathogens (e.g. <i>Salmonella</i> spp., <i>Clostridium</i> spp., <i>Bacillus cereus</i>) Mould spores (e.g. <i>Aspergillus</i> spp., <i>Penicillium</i> spp.)	Allergens (e.g. wheat) ⁷⁶	None
Soy protein	Company specification	None	Allergens ⁷⁶	
Additives	Food grade. Complies with the Food Standards Code	None	None	None
Packaging materials	Suitable for use as food contact materials. Plastics comply with Human Consumption specification 30(1)	None	None	None

⁷⁶ Operators are expected to have a documented Allergen Management Plan for managing any risks to human health posed by the presence of allergens in their products. The Plan should be based on a systematic identification and analysis of all potential sources of allergens at each step of the process, and the development of controls for these sources. The presence of allergens in the product from intended ingredients should be managed by complying with the labelling requirements of the Food Standards Code, including relevant mandatory warning and advisory statements and declarations specified in Standard 1.2.3. The Allergen Management Plan must also establish controls for the unintended exposure of the product to allergens (i.e. due to inadvertent presence in raw materials and processing aids, incorrect formulation, changes to product scheduling, rework, insufficient or ineffective cleaning/sanitation procedures, etc). Since the identification of allergens from inputs and from the process, and the establishment of controls are expected to be adequately covered when developing the Allergen Management Plan and other related supporting systems (e.g. cleaning), allergens will not be considered any further in the hazard analysis. Refer to Part 2, section 14 of the Processed Meats COP for guidance on the Allergen Management Plan.

Table 12.3: Hazard analysis and CCP determination for the manufacture of raw meat patties

This hazard analysis is based on the expectation that manufacturers have GMP programmes in place that comply with Parts 2 and 3 of this COP.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? ⁷⁷ If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
1. Storage and weighing of non-meat ingredients					
1a. Receiving of non-meat ingredients	Salt, spices, additives, other dry ingredients	B – bacterial pathogens, mould spores ⁷⁸	Refer to Table 12.2	No	
2a. Storage of non-meat ingredients	Salt, spices, additives, other dry ingredients	B – bacterial pathogens	Micro carried over from previous step	No	
3a. Weighing	Salt, spices, additives, other dry ingredients	B – bacterial pathogens	Micro carried over from previous step	No	

⁷⁷ Manufacturers should comply with relevant process control requirements and procedures given in Part 3 of this COP. The control measures must be documented in the FSP or RMP.

⁷⁸ Cereals may contain pathogenic mould spores (e.g. *Aspergillus* spp., *Penicillium* spp.). They are not a concern in high moisture meat products such as meat patties because bacteria usually outgrow them in products with water activity above 0.93 under normal chilled storage conditions. Thus, mould spores will not be considered further in this hazard analysis.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? ⁷⁹ If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
Main process					
1. Receiving meat	Frozen or chilled meat cuts/trimmings	B – bacterial pathogens	Refer to Table 12.2 Micro growth can occur in chilled meat at >7°C.	Yes – checking of chilled meat temperature will minimise the potential for accepting meat which has been temperature abused during transport. Refer GMP Doc. xx ⁷⁹	No
		P – bone	Refer to Table 12.2	No	
		P – metal	Refer to Table 12.2	No	
2. Frozen/chilled storage	Meat cuts/trimmings	B – bacterial pathogens	Micro carried over from previous step If refrigeration is ineffective, meat temp can increase to > 7°C and result in micro growth	Yes – effective refrigeration will control meat temperature and minimise micro growth. Refer GMP Doc. xx	No
		P – bone	Hazard carried over from previous step	No	

⁷⁹ GMP and operating procedures should be documented in supporting systems. The relevant supporting system should be cited in this table.

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – metal	Hazard carried over from previous step	No	
3. Tempering	Meat cuts / trimmings	B – bacterial pathogens	Micro carried over from previous step. Micro growth can occur if tempering time & temperature are not properly controlled.	Yes – proper time/temperature control will minimise micro growth. Refer GMP Doc. xx	No
		P – bone	Hazard carried over from the previous step	No	
		P – metal	Hazard carried over from the previous step	No	
4. Weighing	Meat cuts / trimmings	B – bacterial pathogens	Micro carried over from previous step	No	
		P – bone	Hazard carried over from previous step	No	
		P – metal	Hazard carried over from previous step	No	
5. Decartoning	Meat cuts / trimmings	B – bacterial pathogens	Micro carried over from previous step	No	
		P – bone	Hazard carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – metal	Hazard carried over from previous step	No	
		P – plastic	Poly-entrapment is a common occurrence in frozen meat.	Yes- careful removal of plastic liner will minimise tearing of plastic; and further thawing or cutting of areas with entrapped plastic will remove the hazard Refer GMP Doc. xx	No
6. Pre-grinding	Meat cuts/trimmings	B – bacterial pathogens	Micro carried over from previous step	No	
		P – bone	Hazard carried over from the previous step	Yes – use of a bone elimination device attached to the mincer will minimise bone in the mince. Refer GMP Doc. xx	No
		P – metal	Hazard carried over from the previous step	No	
			Metal fragments from the mincer can be introduced into the meat during mincing	Yes – daily check of equipment parts and regular changes of the blade will minimise metal contamination. Refer GMP Doc. xx	No
7. Ingredient addition & mixing	Minced meat	B – bacterial pathogens	Micro carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
		P – metal	Hazard carried over from previous step	No	
	Dry ingredients	B – bacterial pathogens	Refer to step 3a	No	
8. Final grinding	Meat mixture	B – bacterial pathogens	Micro carried over from previous step	No	
		P – metal	Hazard carried over from the previous step	No	
			Metal fragments from the mincer can be introduced into the meat during mincing	Yes – daily check of equipment parts and regular changes of the blade will minimise metal contamination. Refer GMP Doc. xx	No
9. Forming	Meat mixture	B – bacterial pathogens	Micro carried over from previous step	No	
		P – metal	Hazard carried over from previous step	No	
10. Perforation	Meat patties	B – bacterial pathogens	Micro carried over from previous step	No	
		P – metal	Hazard carried over from previous step	No	

Process step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? ⁷⁷ If yes, identify the control measure and then answer Q2. If no, consider hazard at next step.	Q2. Is the control measure at this step essential to achieve a regulatory limit or operator-defined limit? If yes, this step is a CCP. If no, this step is not a CCP.
11. Freezing	Meat patties	B – bacterial pathogens	Micro carried over from previous step	No	
		P – metal	Hazard carried over from previous step	No	
12. Metal detection	Frozen meat patties	B – bacterial pathogens	Micro carried over from previous step	No	
		P – metal	Hazard carried over from previous step	Yes – metal detector will reject patties with metal pieces.	Yes – CCP1
13. Packaging & labelling	Frozen beef patties	B – bacterial pathogens	Micro carried over from previous step	No	
	Packaging materials, labels	None			
14. Storage	Packed beef patties	B – bacterial pathogens	Micro carried over from previous step	No	No
15. Loadout	Packed beef patties	B – bacterial pathogens	Micro carried over from previous step	No	No

Table 12.4: CCP summary for the manufacture of raw meat patties⁸⁰

CCP No.	Process step	Hazard	Critical limits	Monitoring procedures	Corrective actions	Verification procedures	Records
1	Metal detection	Metal pieces	Type and size of metal that the machine is capable of detecting (e.g. no metal objects \geq 3 mm ferrous and 4 mm stainless steel in the final product)	Daily check of metal detector against test pieces Examination of all rejected patties	Break down and examine rejected patty for metal. Remove metal and repass patty through metal detector; or dump rejected patty. Investigate source of metal and take appropriate action to prevent recurrence. Correct setting of metal detector, if necessary.	Calibration of metal detector Internal audit External audits (e.g. regulator, client) Review of customer complaints HACCP review	Daily monitoring records Calibration records Corrective action reports Audit reports Records of customer complaints HACCP review records

⁸⁰ Procedures for monitoring, corrective actions and verification must be documented in the FSP or RMP.