Processed Meats Code of Practice

Part 4: HACCP Application

Prelims

Amendment 1

February 2012

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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)

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1 Introduction

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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

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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

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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

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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

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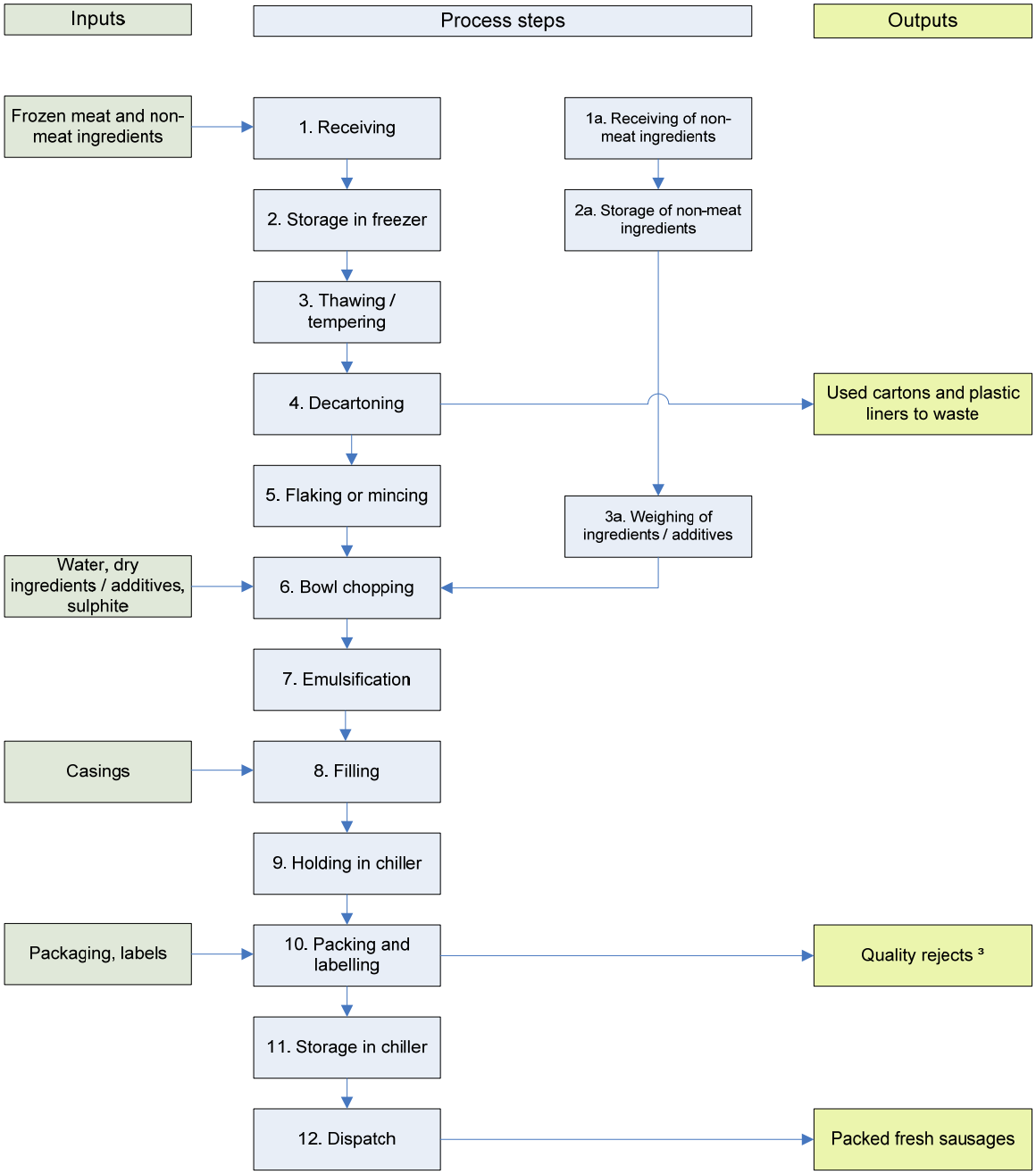
Table 5.1: Product description and intended use[1]

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	*Give company and regulatory specifications*
Handling, storage requirements and shelf life	*Give company and regulatory specifications*

[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 use[2]



[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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica*, *E. coli* spp., *Listeria monocytogenes,* *Staphylococcus aureus*)	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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica*, *E. coli* spp., *Listeria monocytogenes,* *Staphylococcus aureus*)	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. *Salmonella* spp, *Clostridium* spp., *Bacillus cereus*) 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. *Clostridium* spp., *Bacillus cereus*)	None	None
Natural casings	Properly salted with no signs of spoilage	Bacterial spores (e.g. *Clostridium* spp., *Bacillus* 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 ≤ 5°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 ≤ 5°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 sausages[9]

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 2012

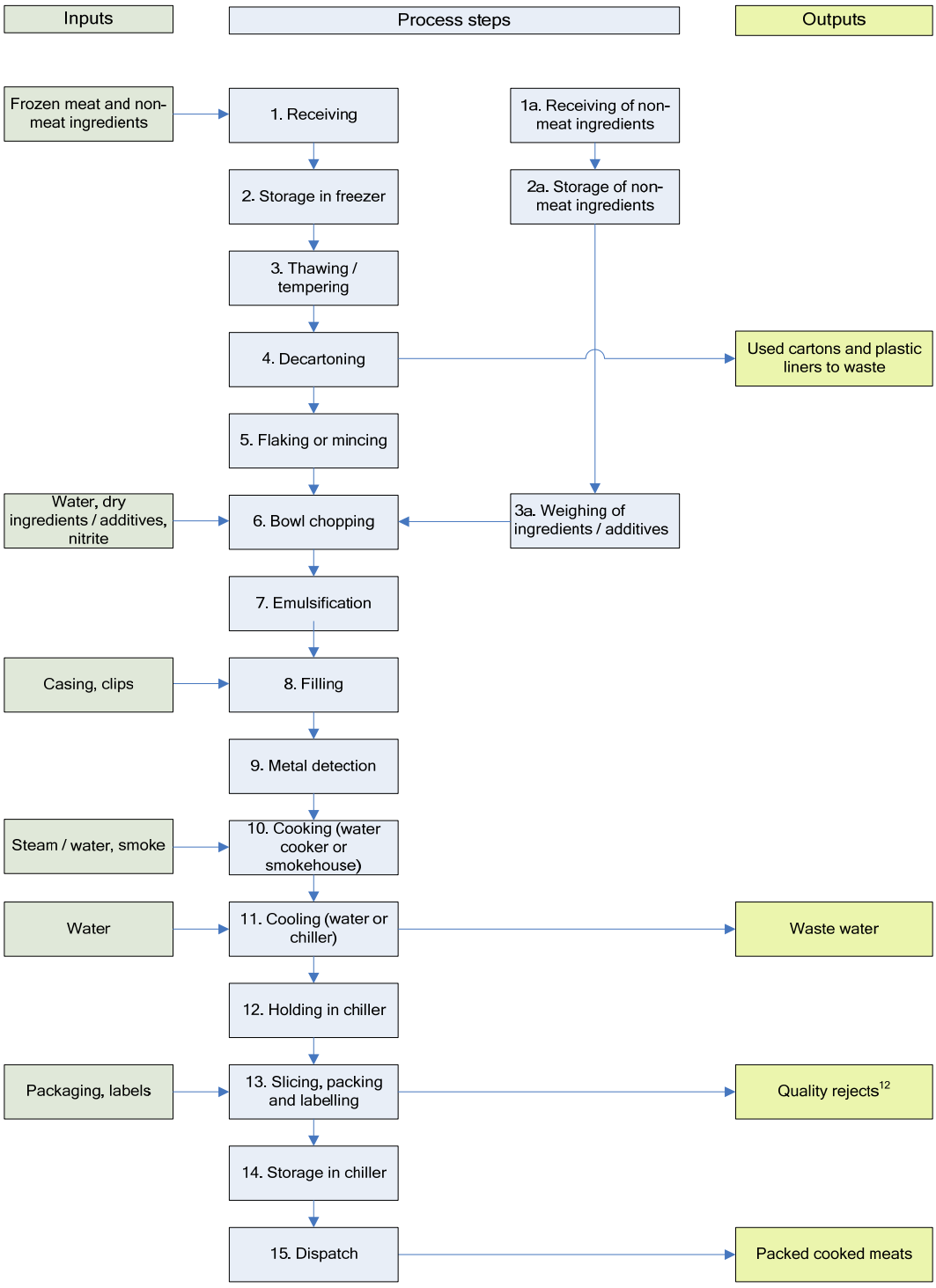
Table 6.1: Product description and intended use[10]

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 *staphylococci*/g: n = 5 c = 1 m = 10^2 M = 10^3 *Listeria monocytogenes*/25g: n = 5 c = 0 m = 0 *Salmonella* /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 *Listeria monocytogenes* (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	*Give company and regulatory specifications*
Handling, storage requirements and shelf life	*Give company and regulatory specifications*

[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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica, E. coli* spp., *Listeria monocytogenes*, *Staphylococcus aureus*)	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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica, E. coli* spp., *Listeria monocytogenes*, *Staphylococcus aureus*	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. *Salmonella, Clostridium spp., Bacillus cereus*) 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. *Clostridium* spp., *Bacillus cereus*)	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 *L. monocytogenes* (e.g. product core temp of ≥ 70°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 *C. perfingens* 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. *C. perfringens*) 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 ≤ 5°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 – *Listeria monocytogenes*	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 ≤ 5°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 products[22]

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 ≤ 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 ≥ 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

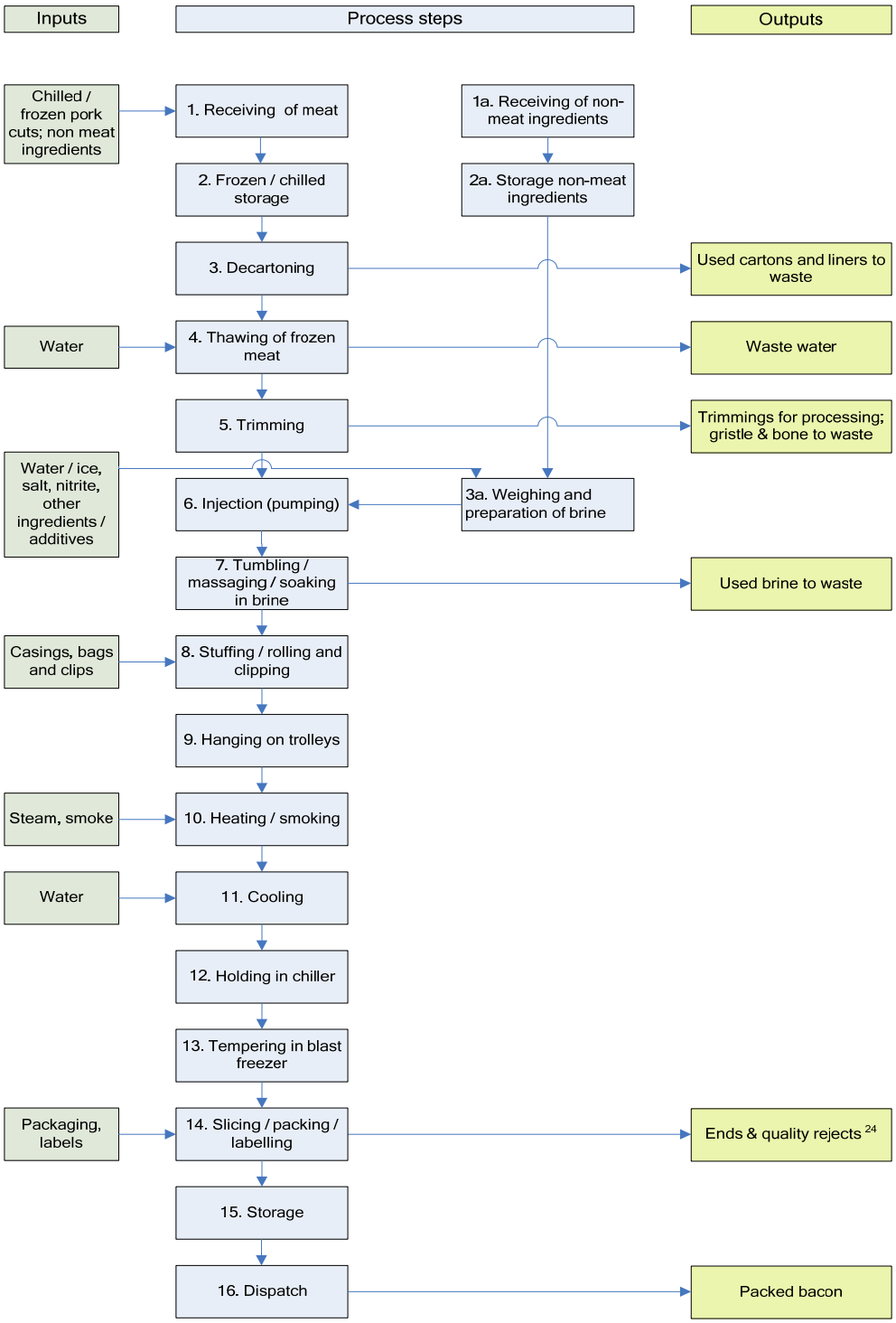
February 2012

Table 7.1: Product description and intended use[23]

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	*Give company and regulatory specifications*
Handling, storage requirements and shelf life	*Give company and regulatory specifications*

[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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica*, *E. coli* spp., *Listeria monocytogenes*, *Staphylococcus aureus*)	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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica*, *E. coli* spp., *Listeria monocytogenes*, *Staphylococcus aureus*)	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 *C. botulinum*	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. *C. perfringens*) that survive heating may sporulate and grow if the product is not cooled properly	Yes – proper cooling procedures will minimise the growth of *C. perfingens* 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 – *Listeria monocytogenes*	The product can be recontaminated with *L. monocytogenes* 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 bacon[29]

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

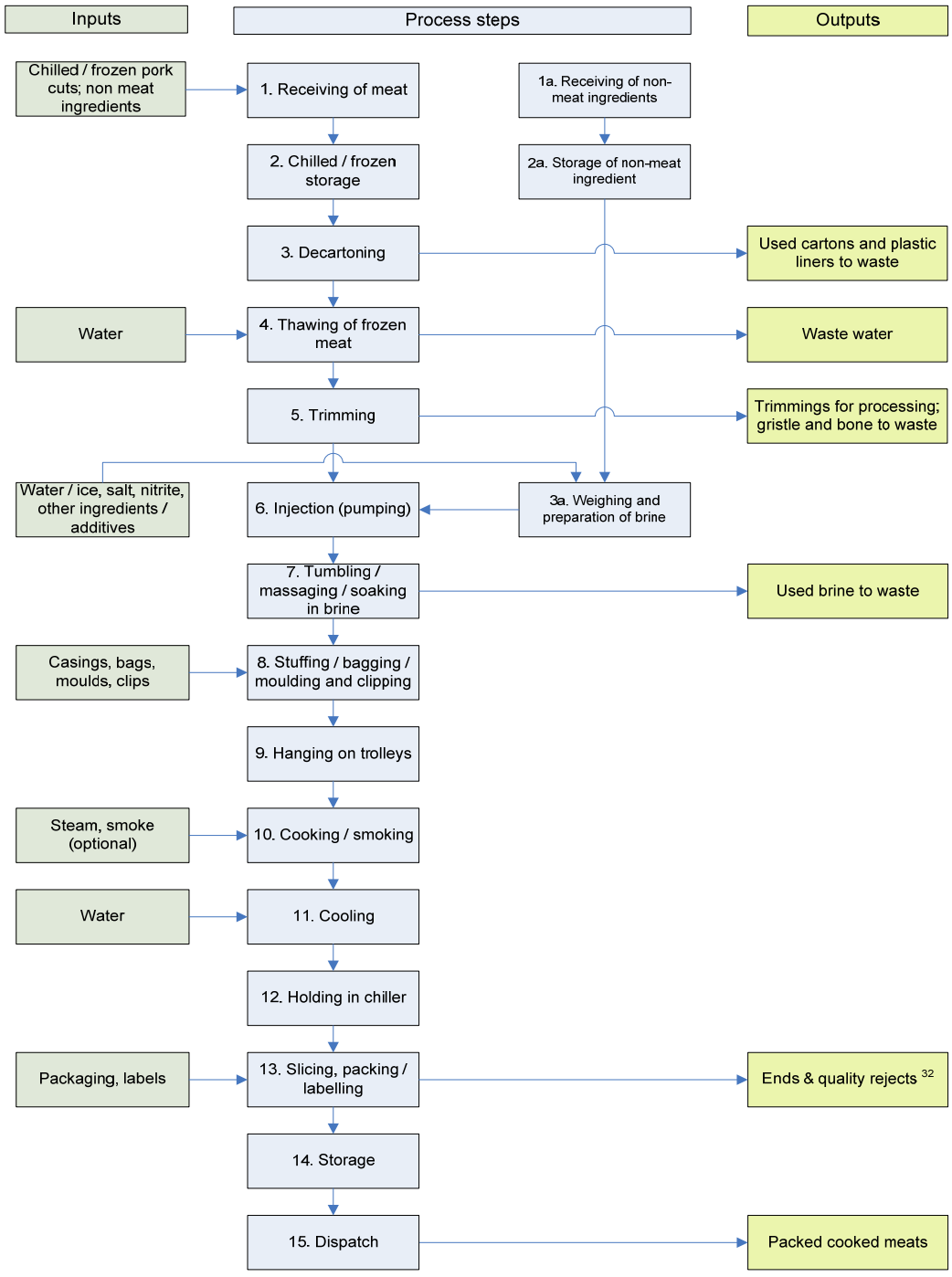
Table 8.1: Product description and intended use[30]

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 *staphylococci*/g: n = 5 c = 1 m = 10^2 M = 10^3 *Listeria monocytogenes*/25g: n = 5 c = 0 m = 0 *Salmonella* /25g: n = 5 c = 0 m = 0
	Nitrite ≤ 125 mg/kg (Food Standards Code)
Operator-defined limits[31]	Cooking schedule that will achieve a 6-D reduction of *Listeria monocytogenes* (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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica*, *E. coli* spp., *Listeria monocytogenes*, *Staphylococcus aureus*)	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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica*, *E. coli* spp., *Listeria monocytogenes*, *Staphylococcus aureus*)	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 *C. botulinum*	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 *Listeria monocytogenes* 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. *C. perfringens*)	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 *C. perfringens* 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 – *Listeria monocytogenes*	Product can be recontaminated with *L. monocytogenes* 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 ≤ 5°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 *L. monocytogenes* (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	*Clostridium perfringens*	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

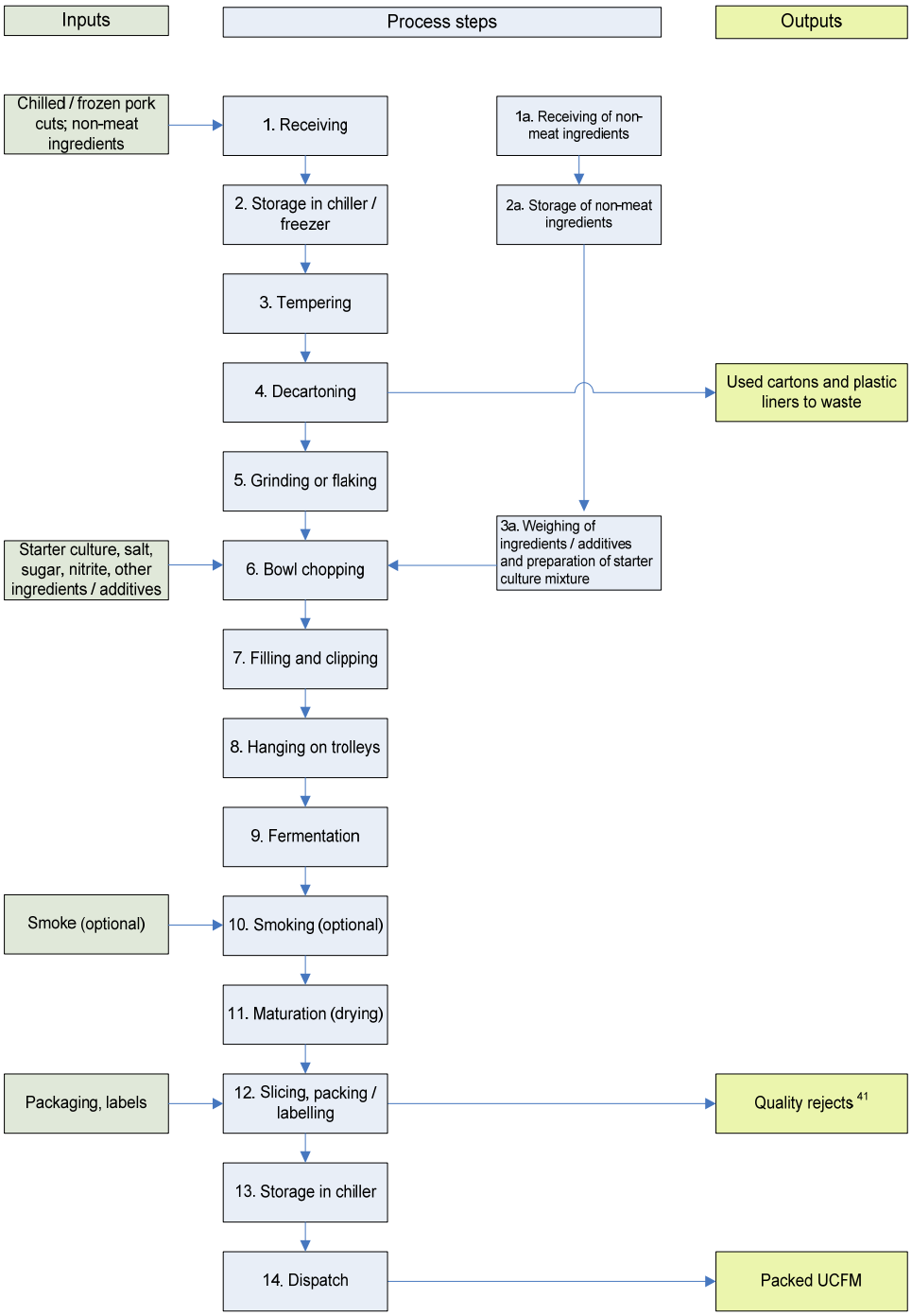
Table 9.1: Product description and intended use [39]

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 *staphylococci*/g: n = 5 c = 1 m = 10^3 M = 10^4 *E. coli/g*: n = 5 c = 1 m = 3.6 M = 9.2 *Salmonella* /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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica*, *E. coli* spp., *Listeria monocytogenes*, *Staphylococcus aureus*)	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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica*, *E. coli* spp., *Listeria monocytogenes*, *Staphylococcus aureus*)	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. *Bacillus cereus* spp., *Clostridium* 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. *S. Aureus*)	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 *E. coli* 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 – *Listeria monocytogenes*	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 products[48]

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 ≤ 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 aw (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

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 *staphylococci* ≤ 100/g *E.coli* ≤ 10/g *Salmonella* = 0 in 25g
	Finished product a_w < 0.90
Packaging and labelling	*Give company and regulatory specifications*
Handling, storage requirements and shelf life	*Give company and regulatory specifications*

[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

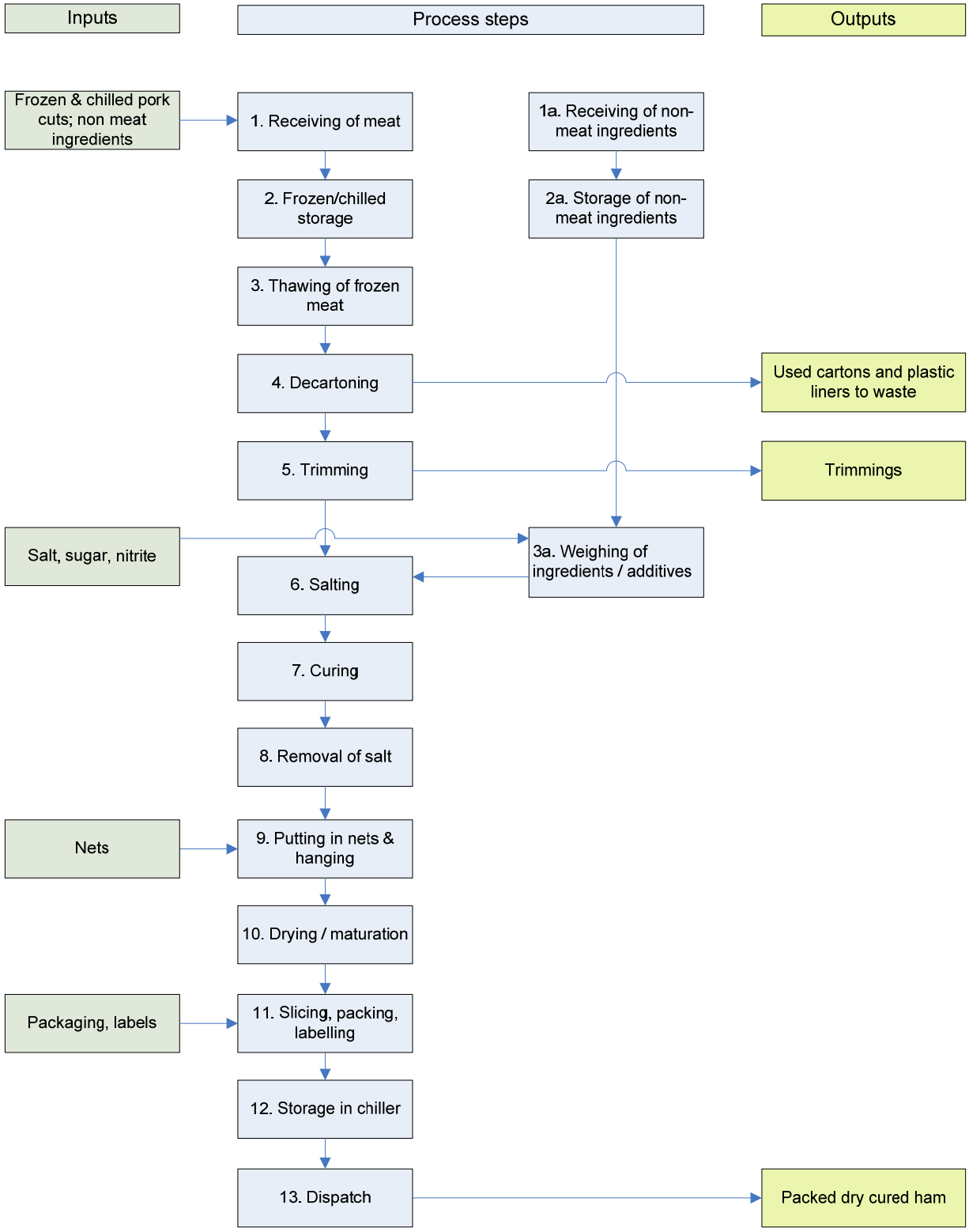


Table 10.2: Identification of hazards from inputs

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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica*, *E. coli* spp., *Listeria monocytogenes,* *Staphylococcus aureus*)	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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica*, *E. coli* spp., *Listeria monocytogenes,* *Staphylococcus aureus*)	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 *S. aureus* 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		
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 – *Listeria monocytogenes*	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 ham [55]

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 ≤ 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 ≤ 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

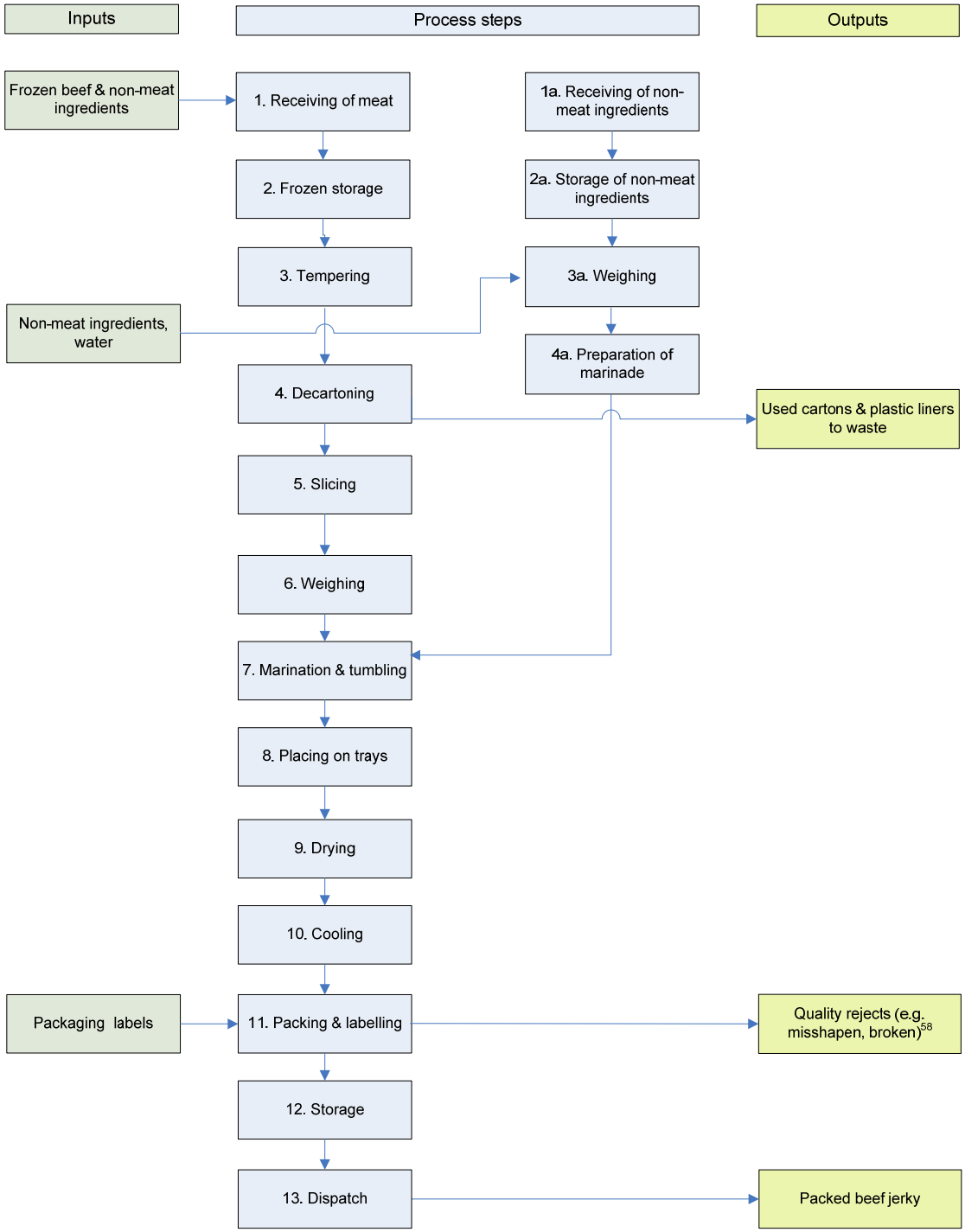
Table 11.1: Product description and intended use[56]

Product name	Beef jerky
Intended consumer	General public
Intended use of product	Ready-to-eat
Regulatory limits	Nitrite ≤ 125 mg/kg (Food Standards Code)
Operator-defined limits [57]	Water activity limit (e.g. ≤ 0.85)
	Microbiological limits *Give company specifications*
Packaging and labelling	*Give company and regulatory specifications*
Handling, storage requirements and shelf life	*Give company and regulatory specifications*

[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. *Salmonella* spp., *E. coli* 0157, *Campylobacter* spp., *Clostridium* spp., *Listeria monocytogenes*, *Staphylococcus aureus*)	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. *Clostridium* spp., *Bacillus cereus*) 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 labellling 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 are 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 jerky[69]

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. *Salmonella spp., E. coli 0157, Campylobacter spp., Clostridium* spp., *Bacillus cereus*, *Listeria monocytogenes, Staphylococcus aureus)*	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

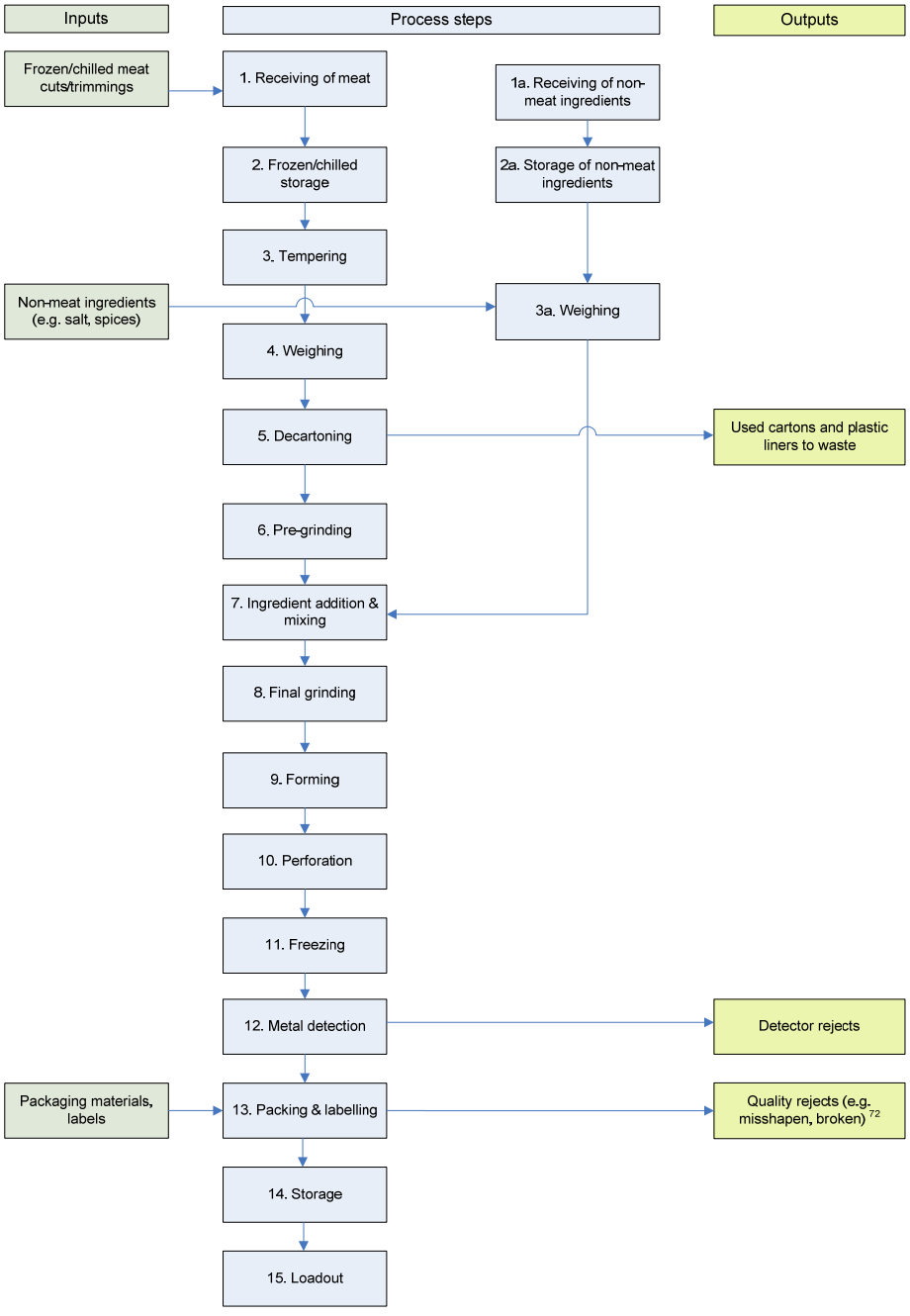
Table 12.1: Product description and intended use[70]

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 limits [71]	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. *Salmonella* spp., *E. coli 0157, Campylobacter* spp., *Clostridium* spp., *Listeria monocytogenes, Staphylococcus aureus*)	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. *Salmonella* spp., *Campylobacter* spp., *Clostridium* spp., *Yersinia enterolitica*, *E. coli* spp., *Listeria monocytogenes, Staphylococcus aureus*)	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. *Clostridium* spp., *Bacillus cereus*)	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. *Salmonella* spp., *Clostridium* spp., *Bacillus cereus*) Mould spores (e.g. *Aspergillus* spp., *Penicillium* 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 labellling 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? [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.
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? [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.
		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? [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.
		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? [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.
		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 patties[80]

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 ≥ 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.