Australian Meat Regulators Group

Standard 4.2.3 - Guidelines for the Management of *Listeria*

National Guideline Document developed by Meat Regulatory Agencies.

- *Biosecurity South Australia*
- *New South Wales Department of Primary Industries*
- *Northern Territory Department of Primary Industries and Fisheries*
- *PrimeSafe Victoria*
- *Safe Food Production Queensland*
- *Tasmanian Department of Primary Industries, Parks, Water and Environment*
- *Western Australia Health*
- *Food Standards Australia New Zealand*
- *Australian Department of Agriculture and Water Resources*

(To be read in conjunction with Australian Standard 4696:2007 and the *Australia New Zealand Food Standards Code*)

GLOSSARY

Applicable meat business	A producer of ready-to-eat meat, as identified in Standard 4.2.3 of the *Australia New Zealand Food Standards Code* (the Code), that manufactures packaged RTE meats for sale or purchases RTE meat products for slicing or portioning and packaging for further sale.
Authority	The State, Territory or Commonwealth agency or agencies having the legal authority to implement and enforce Standard 4.2.3 of the Code.
Batch	Up to 24 hours of continuous production of product or products from any specific line or a lesser period of continuous production between cleaning and sanitising procedures having been completed.
Package	Any environmental altering container or wrapper in which food is wholly enclosed prior to being displayed or stored for sale that extends the unpackaged shelf life of the food.
Ready-to-eat meat	Ready-to-eat meat: meat products intended to be consumed without further heating or cooking, and includes – (a) cooked or uncooked fermented meat; and (b) pâté; and (c) dried meat; and (d) slow cured meat; and (e) luncheon meat; and (f) cooked muscle meat including ham and roast beef; and (g) other ready-to-eat meat that is susceptible to the growth of pathogens or the production of toxins.
Validation	Obtaining evidence to confirm that the food safety management system is complete and effective and will deliver the expect food safety outcomes
Verification	The use of methods, procedures, and tests in addition to monitoring to determine the effectiveness of a food safety management system

Purpose

Under the Code's Standard 4.2.3 Primary Production and Processing Standard for Meat a producer of ready-to-eat meat must implement a food safety management system that identifies, evaluates, and controls hazards. These guidelines provide advice to businesses and authorities for promoting the consistent monitoring and management of listeria by businesses that manufacture packaged ready-to-eat meats as a means of verifying the effectiveness of process controls.

Scope

This document applies to applicable meat businesses, as defined above, and their activities relating to the manufacturing of RTE meats, including RTE meats in which the growth of Listeria will not occur (as defined in Standard 1.6.1 of the Code). Where there is doubt over whether a product is RTE (e.g. frozen or flash-fried product), products will not be considered RTE if the product label clearly indicates the need to cook the product prior to consumption and the cooking instructions have been validated by the applicable meat business.

Businesses that apply a post-cooking lethality treatment to product (e.g. in-pack pasteurisation) do not fall within the scope of this document but are still required to validate their process.

Responsibilities

Businesses whose operations fall within the scope of this document shall develop quality assurance procedures approved by the authority. These must address the following parameters.

Minimum operational requirements

Applicable meat businesses must review how their operations comply with Section 2 of the Meat & Livestock Australia (MLA) document, *Listeria monocytogenes in smallgoods: risks and controls*, and implement these requirements within their quality system. Authorities shall use this document as a basic reference tool to assess compliance with Standard 4.2.3 of the Code in order to verify the meat business' process control.

Minimum environmental sampling plan

Each applicable meat business shall implement an effective *Listeria* sampling plan that covers environmental testing and shall be able to justify its sampling methodology for detecting *Listeria spp*. in the processing environment. The objective of the sampling plan is to assess whether the RTE environment is adequately under control with respect to potential contamination of RTE product with *L. monocytogenes*. The business's food safety program must include the frequency of testing, identify the size and location of the sample sites, and detail corrective action procedures, including cleaning programs and handling of product following a positive test for *Listeria* indicator organisms on a food contact surface.

Applicable meat businesses shall sample sites within the operating environment that are most likely to reveal contamination by *Listeria spp.* if it is present. The choice of sites must be justified and documented in the food safety program. Table 1 lists sites where *Listeria spp.* is likely to establish and multiply. Zone 1 sites are those that are typically contaminated with *Listeria* while Zone 2 sites are those that can harbour *Listeria spp.* in a RTE processing environment. Samples shall be taken from Zone 1 and Zone 2 surfaces.

Table 1 Classification of environmental sampling sites as part of a *Listeria* sampling plan

Priority	Examples of sampling sites within the priority zones
Zone 1	Equipment that comes into contact with cooked product (e.g. slicers, dicers, hoppers), spiral freezers and conveyors for cooked product, tables and benches on which product is stored or portioned.
Zone 2	Floors, walls, ceilings, drain outlets, pools of water (e.g. on the floors of a manufacturing area or cold room), condensate from refrigeration evaporators (cold rooms), chiller doors, switches, floor joints/crevices

At a minimum, applicable meat businesses shall sample five environmental sites for *Listeria spp.* monthly. Testing shall include samples collected before operations commence and during operations, and shall cover all important work surfaces over time. Businesses shall maintain a consistently high level of hygiene and shall undertake sampling throughout the year regardless of whether the applicable business is producing packaged RTE product in a particular month.

If an applicable meat business undertakes in-house laboratory testing, for comparison purposes at least one lot of monthly environmental samples must be submitted annually to a NATA-accredited laboratory or equivalent for testing.

Product testing complemented by environmental testing to monitor and detect *Listeria* in the environment is more effective than product testing alone. Two factors determine the effectiveness of a *Listeria* control program — the design of the environmental testing plan (i.e. the capacity to find *Listeria* if present) and the response to a positive finding (i.e. what corrective action is implemented).

Authorities acknowledge a *Listeria*-free environment is difficult to maintain at every test. The microbiological sampling plan shall be designed to detect *Listeria* if it is present, and it would be unusual if *Listeria* was found in the environment occasionally. However, any detection of *Listeria* must be treated as an opportunity to improve the program, a strategy that will ultimately protect both consumers and the business.

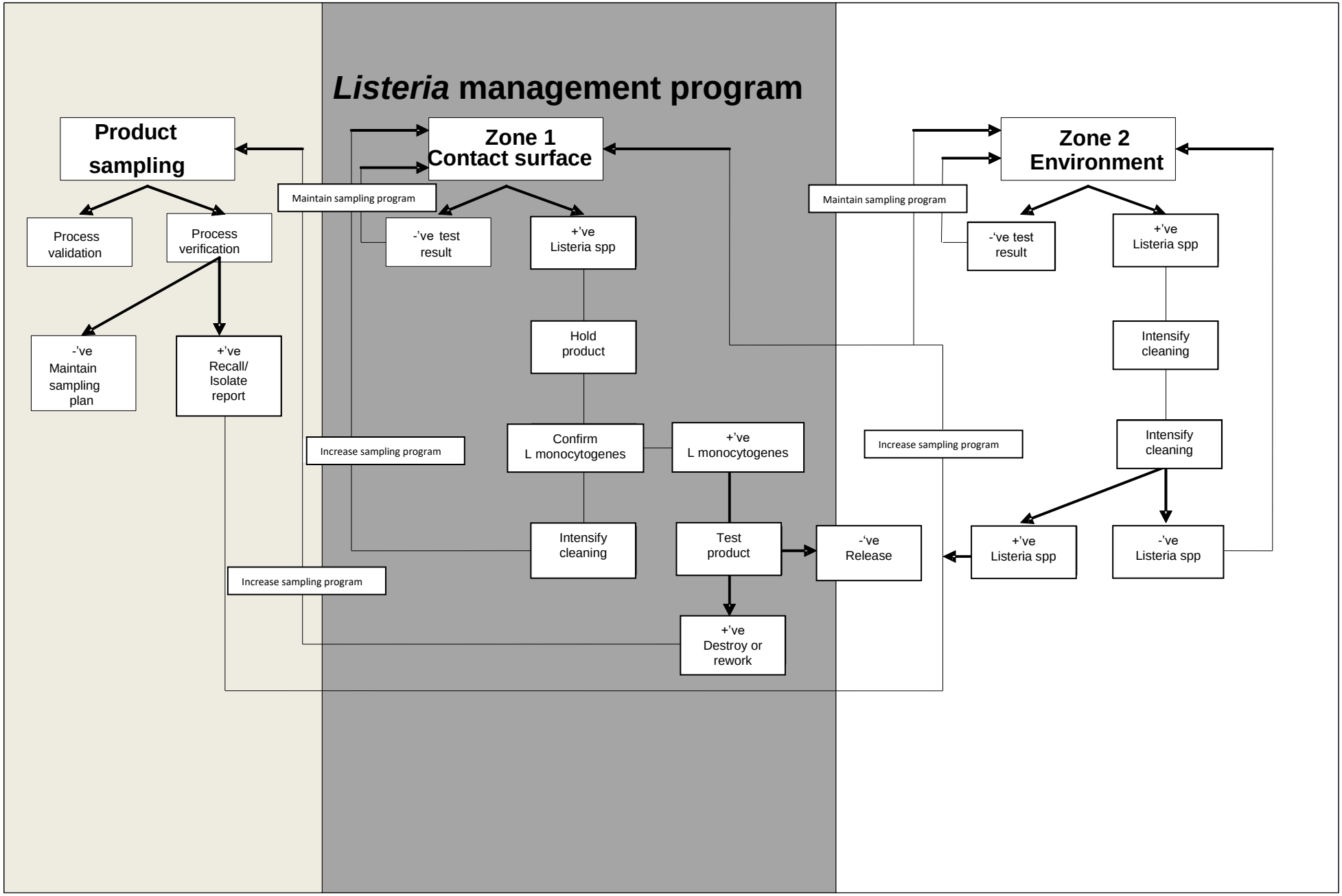
Action in the event of a positive environmental sample - Zones 1 and 2

If a positive environmental sample is found, the applicable meat business shall immediately investigate the potential cause of the problem and initiate corrective action in accordance with its food safety program. The suspect areas shall be immediately identified, cleaned and sanitised. Any implicated equipment and parts shall be dismantled and cleaned effectively, for example, by soaking in a concentrated sanitiser (e.g. Quat) at 800 or 1000 ppm. The business shall ensure RTE product is not contaminated and continue to review corrective action. This process allows the business to demonstrate adequate steps have been taken to minimise the risk of *Listeria* contamination of RTE product.

Whenever there is a positive environmental sample for *Listeria* from either a Zone 1 or Zone 2 surface, the business shall increase the frequency of environmental testing to weekly and continue to test until the environmental swabbing program has achieved three consecutive negative results from tests taken on separate operation days. The purpose of increasing the testing frequency is to monitor the effectiveness of the corrective action that has been undertaken by the meat business. Where negative results are not being obtained, the adequacy of the corrective action needs to be further reviewed and revised corrective action shall be implemented.

Additional action in the event of a positive environmental sample - Zone 1

To ensure end product has not been contaminated, where a food contact surface tests positive for *Listeria* that swab shall be typed in a laboratory to confirm the presence or otherwise of *L. monocytogenes*. All potentially contaminated RTE product shall be held pending the results of this test. If the presence of *L. monocytogenes* is confirmed, the applicable meat business shall follow Standard 1.6.1 of the Code and test and hold available product batches from the day of the first positive *L. monocytogenes* environmental contamination onwards. Product batches shall be tested for *L. monocytogenes* at the rate of five 25-gram samples per batch. Composite testing is permitted at the laboratory. The business shall continue to test each production batch until the environmental swabbing program has achieved three consecutive negative results as outlined above.


Listeria management program
Product sampling
Process validation
Process verification
-'ve Maintain sampling plan
+'ve Recall/ Isolate report
Zone 1 Contact surface
Maintain sampling program
-'ve test result
+'ve Listeria spp
Hold product
Confirm L monocytogenes
+'ve L monocytogenes
Increase sampling program
Intensify cleaning
Test product
-'ve Release
+'ve Destroy or rework
Increase sampling program
Zone 2 Environment
Maintain sampling program
-'ve test result
+'ve Listeria spp
Intensify cleaning
Increase sampling program
Intensify cleaning
+'ve Listeria spp
-'ve Listeria spp

Minimum product sampling plan

Applicable meat businesses shall conduct microbiological testing of finished product as a tool to verify good manufacturing practice (i.e. hygiene and sanitation processes) and the effectiveness of process controls. Results shall be recorded and used to improve food safety practices. The testing program shall be documented in the applicable meat business' food safety program, meet the expectations of the relevant Authority and include the frequency of testing, the product type and batches to be tested, and corrective action procedures (including handling of affected batches) should there be a positive test for *L. monocytogenes*. Any product recall shall comply with the provisions of the Code. The food safety program shall contain documented procedures for product recall. Product testing shall be conducted in a NATA-accredited laboratory or equivalent.

Applicable meat businesses shall sample RTE finished product for *L. monocytogenes* at an initial rate of at least one sample per fortnight for the first three months of initial production of RTE packaged product. Where no positive product test results are recorded during that time the applicable meat business can commence sampling at a rate of once every three months. Where various types of RTE finished product undergo the same process post-cooking only one sample of product needs to be submitted for analysis. However, where the business produces RTE finished product on various production lines or the process varies post-cook for different product types, a sample of each of product type shall be submitted.

Product sampling is required for all packaged RTE meat products where there is a claim for the shelf life to be greater than 5 days. For such products a use-by date must be included on the label. Applicable meat businesses are encouraged to implement a product sampling plan whereby batch testing of product is conducted on a regular basis. In addition, the relevant Authority may require that the sampling plan include compliance verification of processing controls with the Standard 1.6.1 of the Code:

(a) on a regular basis (quarterly),
(b) as part of a remedial (test and hold) action, and/or
(c) following a contamination incident and moving back to normal processing.

Standard 1.6.1 of the Code specifies a limit of 100 cfu/g at the end of the shelf life for an RTE meat in which the growth of *L. monocytogenes* will not occur. Criteria are given against which RTE meats are considered for not supporting the growth of *L. monocytogenes*. For those RTE products that do not support the growth of *L. monocytogenes* the use of product properties, listericidal processes, challenge studies and predictive modelling are encouraged, however these alone are not sufficient to validate that the product does not support the growth of *L. monocytogenes*.

Applicable meat businesses must validate that a meat product packaged with the intention of extending its shelf life greater than 5 days is compliant with the Code. Validation measures for RTE meats approved by Authorities as not supporting the growth of *L. monocytogenes* should include:

(a) all product properties listed in Standard 1.6.1 of the Code
(b) any challenge testing or product modelling
(c) *L. monocytogenes* enumeration for each product type at least:
    (i) immediately after packaging,
    (ii) the mid-point of expected shelf life, and
    (iii) the end point of the product shelf life.

The three product sampling points noted in (c) above must validate that *L. monocytogenes* will not increase by greater than 0.5 log cfu/g for at least the expected shelf life of the product. For compliance validation of processing controls with the requirements of Standard 1.6.1, a sample size of 5 x 25g independent samples within the same batch for each product type is required for at least each of the time points.

The relevant Authority will consider a proposal that contains the above information for approval of the product as not supporting the growth of *L. monocytogenes*.

Where insufficient, inadequate or no information exists to validate that that growth of LM will not occur, the meat is considered to support growth of *L. monocytogenes*, and therefore a limit of not detected applies.

Products approved as not supporting the growth of *L. monocytogenes* should be considered separately in the facility's *L. monocytogenes* product sampling program as they are not subject to recall at manufacture, distribution or retail unless they are shown to contain greater than 100 cfu/g.

If *L. monocytogenes* is detected in an RTE product the applicable meat business shall notify the authority within 24 hours of receiving the result and begin a clearance program to ensure product complies with the provisions of the Code. A clearance program of test and hold of each batch should be implemented until acceptable results are obtained for three consecutive batches of the affected type of product. Sampling of potentially affected product shall adhere to the sampling plan stipulated in Standard 1.6.1 of the Code, which requires product batches to be tested for *L. monocytogenes* at five 25-gram samples per batch. Composite testing of these product samples is permitted at the laboratory.

Where product has been contaminated with *L. monocytogenes* the authority would expect the applicable meat business to undertake a thorough review of its *Listeria* control program to determine the source of product contamination. Such a review may require a business to increase the frequency of its environmental testing program until the clearance program is completed. Following completion of the clearance program, the applicable meat business shall revert back to the fortnightly product sampling regime as described above, and if results are acceptable, progress to the three-monthly product testing frequency.

Appendix A

Assistance material for meat businesses

Purpose of testing

The purpose of environmental sampling is to assess whether the RTE environment is adequately under control with respect to potential contamination of RTE product with *L. monocytogenes*.

The purpose of microbiological testing of finished product is to assist in verifying good manufacturing practice (i.e. hygiene and sanitation processes) and the effectiveness of process controls.

Testing at NATA-accredited laboratories

Authorities require all **product** testing for the presence of pathogens (i.e. bacteria that may cause illness) to be conducted at a NATA-accredited laboratory or equivalent. Product and food contact surface samples must be tested using approved laboratory test methods. Businesses can obtain a list of NATA- accredited laboratories that conduct microbiological testing of meat and meat products at www.nata.com.au.

Equipment for environmental sampling

Environmental samples are required to be tested in accordance with the Association of Official Analytical Chemists (AOAC) methodology or equivalent.

Food contact surfaces are tested to check the effectiveness of clean-down and to assess whether *Listeria spp.* are present in post-cook areas and packing rooms. While several methods of sampling and testing are available, it is recommended a standard testing process be used to enable valid comparisons of results over time.

The aim in sampling contact surfaces is to extract as many bacteria as possible; hence it is important to use absorptive materials such as sponges or swabs, which are commercially available in sterile packs. The location of the sampling site determines which absorptive material should be used.

Sponge sampling

Use sponges to sample tables, floors, door handles, seals on chiller doors, conveyors, air conditioning units and drip trays, and any other flat surfaces. If the surface is dry the sponge can be moistened with sterile peptone water. If the surface is already wet, such as a drip tray or a conveyor, it is best to rehydrate the sponge using the moisture on the surface being tested. Sponges can also be used on slicers, dicers, packing machines and other processing equipment.

Sponges allow large areas to be sampled with up 5 m^2 of contact surface able to be sampled if both sides of the sponge are used. Sponges can be rubbed quite vigorously over surfaces to remove particles of dust and organic material containing bacteria.

Sponge samples can be used for up to five different surfaces to maximise the number of surfaces tested in order to minimise costs. However, where samples have been composited and a positive result is returned, each site will subsequently need to be tested individually to ascertain where the organism came from.

Swab sampling

Swabs are used for sampling inside plant and equipment, e.g. fins on cooling units, motor housings, bearings on conveyors and inside hollow rollers. Swabs are not as absorptive as sponges and get overloaded if used to sample more than 100 cm^2. Swabs should be used with caution so as not to

break them by rubbing too hard.

Rapid test kits

There are a number of test kits containing sponges and swabs available for in-house testing, but irrespective of which one is used, it is important to read and understand all the instructions pertaining to the testing procedure, storage and transport of samples. Rapid test kits are only useful as a screening method. Any positive *Listeria spp.* test results must be confirmed using the reference test method at a laboratory.

Only rapid microbiological kits that have been approved by independent bodies such as the AOAC shall be used. Businesses that do not use a laboratory must validate their test kits when testing commences and every twelve months thereafter by submitting comparative samples to a laboratory.

Most small to medium-size businesses would only need the following material to take environmental samples:

- sterile sponges (preferably pre-moistened)
- *Listeria spp.* swabs
- a medium such as a neutralising broth that contains agents to neutralise sanitiser (10 ml bottles should suffice).

The above items are available from distributors of microbiological testing equipment.

Procedure for *Listeria spp.* environmental sampling [1]

Environmental sampling

Environmental swabs can be taken from Zone 1 or Zone 2 areas within the plant and can be taken over any size area with any suitable implement as long as the implement is sterile and clean. Suitable swabbing implements include cotton buds, eye patches and gauze squares. The surface area swabbed will vary according to the size of the area to be examined.

The area to be swabbed should not contain any chemical residues that may inhibit or interfere with the growth of *Listeria spp*. If the presence of chemical residues is suspected, the sampling should either be aborted or the sample should be submitted along with a note outlining the suspected presence of residues.

Locations in the processing area most prone to contamination by *Listeria spp.* shall be identified and procedures subsequently implemented to control the occurrence and spread of *Listeria spp*.

Swabbing techniques

(a) Wherever possible swabs should be taken during full production or before equipment clean-up. Swabs must not be taken immediately after equipment has been cleaned as residues of detergents and sanitisers will reduce the viability of any *Listeria* present. If samples must be taken during non-production, wait for several hours after cleaning or sanitising.

(b) Use one jar of nutrient broth or 0.1% peptone per sampling. Open the broth jar and place lid, face up, on a **clean** bench.

(c) Remove the swab from its tube and lightly touch the end of the swab to the surface of the

[1] Reproduced from ADASC – 1999 – Australian Manual for Control of Listeria in the Dairy Industry

solution. Do not immerse the swab completely in the solution.

(d) Rub the swab slowly over/in the surface to be sampled. A surface area of up to 50 cm^2 can be swabbed.

(e) Return the swab to the transport medium container.

(f) Use one jar of broth per sampling. Once you have taken all swabs needed discard the broth. **DO NOT RE-USE.**

(g) All swabs should be held at 4 °C during transportation.

For gauze swabs follow this procedure:

(a) Sterile gauze can be used to swab large surface areas.

(b) Aseptically open the individually wrapped gauze pads. Open a vial of rinse solution and moisten a pad with 10 ml of solution.

(c) Holding the pad aseptically with sterile gloves, swab the surface by vigorous rubbing. An area of several square metres may be effectively swabbed.

(d) After sampling, aseptically place the swab into a sterile container for transport.

(e) All swabs should be held at 4 °C during transportation.

To swab correctly wipe the swab in a zigzag motion across the surface area. The zigzags should be close together to cover as much of the surface area as possible, as illustrated below. If using a cotton bud for a swab, the bud should be rotated as it is wiped across the area. Once the swab has been drawn over the surface area once, re-swab at a 90° angle to the original swab and place the cotton bud in the transport vessel.

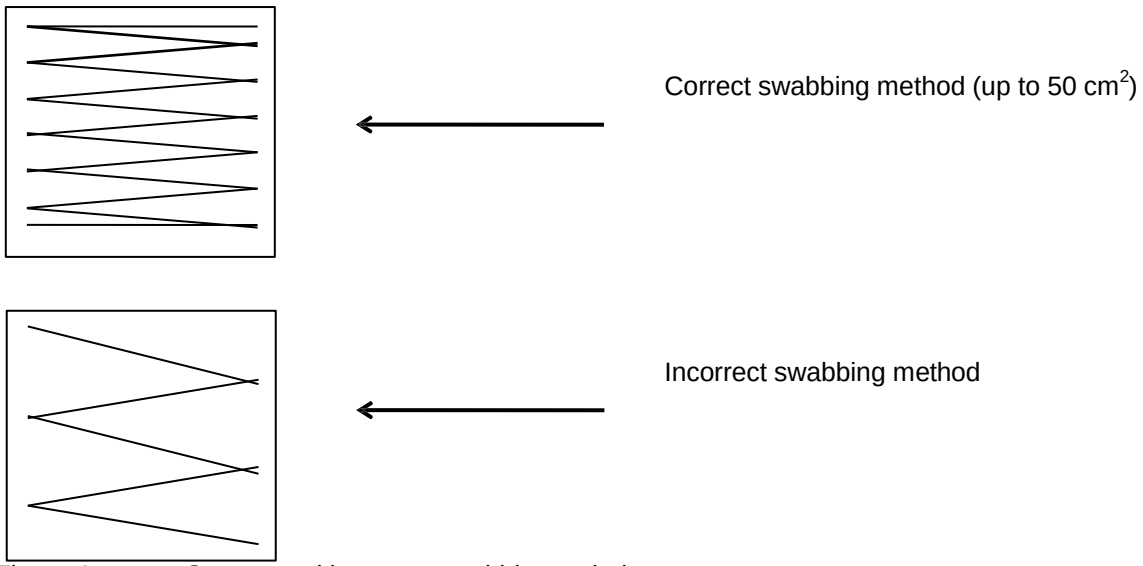


Figure 1: Correct and incorrect swabbing techniques.

Sampling methods for the microbiological analysis of cooked foods

- Samples shall be taken of finished product. Wherever possible, product sampled should be in the form that it is sold to the consumer (e.g. final packaged product should be sampled for product that is sold sliced and pre-packaged).

- An RTE product that has been cooked, chilled to below 5 °C (not frozen) and preferably vacuum packed shall be randomly selected.

- The package should not be opened or damaged and shall be delivered or sent by courier in a small esky or equivalent with ice or similar to ensure the product can be maintained at 5 °C or below to a NATA-accredited laboratory (or equivalent) for analysis **within 48 hours of manufacture or final packaging**.

- Complete a laboratory submission form detailing what type of analysis you require (e.g. *L. monocytogenes* testing) and include a batch number or lot identification for each individual product on the submission form, and on the product packaging. For complete traceability, this identification must also relate to batch information on the cooking monitoring sheet.

Records

- File all laboratory results with the monitoring documentation and keep these on the premises for audit purposes.