MEAT HYGIENE ASSESSMENT

OBJECTIVE METHODS
FOR THE MONITORING
of
PROCESSES and PRODUCT

2nd Edition

ISBN

F

FOREWORD

In consultation with the meat processing industry, the systems contained within this publication have been developed by Dr Evan F Singleton, and the Officers of the Food Services Group. They were successfully trialed in many establishments during development.

Meat Hygiene Assessment (MHA) systems are integral to the implementation of HACCP-based QA programs to meet Primary Industries Ministerial Council and USDA requirements.

Since publication of the first edition in 1996, the system has been operating in all Australian export registered abattoirs resulting in significant improvement in process and product standards. The additions detailed in this edition will enhance the existing system and expand this now proven system to further sections of the meat processing and storing industry.

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PREFACE

This document on Meat Hygiene Assessment describes the application of two monitoring systems - the first relates to process controls in the production of the meat and the second to the physical condition of meat. Both systems utilise standardised methods to assure consistency in the outputs from monitoring and to provide an objective approach to assessing meat hygiene.

The two systems complement each other and are designed to operate conjointly with the product monitoring serving to verify the effectiveness of the process controls. Importantly, they will assist in the implementation of Hazard Analysis Critical Control Point (HACCP) plans and MSQA systems. The product monitoring system includes the monitoring and control of faeces, ingesta, urine, and milk contamination (zero tolerance) and gives guidance to what is expected of corrective and preventive action. Both systems are verified by company microbiology testing.

Process Monitoring

The process monitoring system assesses the efficiency of sanitation and hygiene programs, operations on the slaughter floor, in the offal room and the boning room and during refrigeration and storage of product, with a view to minimising microbiological contamination. It requires the routine examination of the procedures used in each task and at each process step in the production areas. In addition the system is applied to meat processing operations, livestock handling procedures and ratite processing establishments. Weightings are applied when operations are found marginal or unacceptable. This information is then condensed to a single value called a Conformity Index.

Procedures at each process step are described in work instructions. The work instructions include “best practice” techniques for tasks and sanitation. They also specify limits where applicable. These procedures collectively represent the control measures to minimise the risk from hazards, such as contamination, during processing. The process monitoring system measures compliance with procedures in work instructions against their limits.

The Conformity Index provides an overall picture of the process control and corrective action is specified when the Conformity Index falls below the target level.

Product Monitoring

The product monitoring system assesses the level of macro-contamination on carcases, offal and cartoned meat. Representative samples are routinely examined using a consistent methodology, including a defined classification for defects and their respective tolerances.

Weightings are applied to defects according to their public risk and severity. This information is then condensed to a single value called a Defect Rating.

The Defect Rating provides an overall picture of the hygienic condition of meat and verifies the adequacy of process controls associated with its production. Corrective action is specified when the Defect Rating falls below a target value or when zero tolerance detections are made.

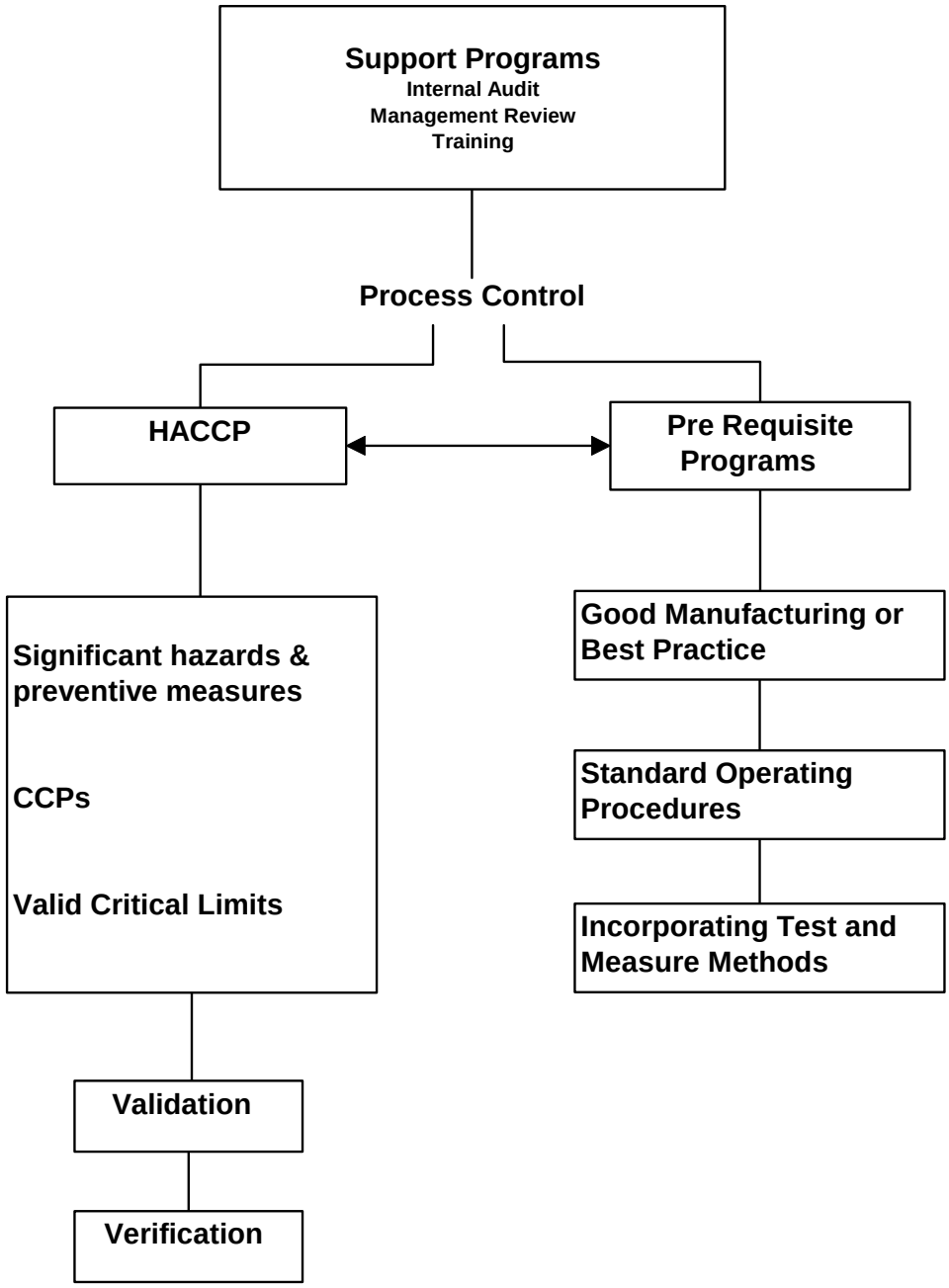
Trend Analysis

This document also introduces approaches to analysing trends in the Defect Rating and Conformity Index. The role of trend analysis in decision-making in relation to adjusting process controls is also outlined. Trend analysis should form a critical part of the verification and management review process. Measurement and analysis is the key to improvement.

OVERVIEW

- Meat Hygiene Assessment has been produced to assist industry in formulating systems that monitor the food production process with regard to its ability to produce wholesome product.

- The following diagram is an example of a basic construct of a processes food safety program. Meat Hygiene assessment has been primarily designed to be the monitoring, corrective action and verification guide for good manufacturing practice. It should be noted that it may also be an appropriate guide for the monitoring, corrective action and verification of parts of a HACCP plans where the Hazard Analysis dictates that it is appropriate.



- Meat Hygiene Assessment consists of two parts, Process and Product monitoring.
- Trained company monitors perform process and product monitoring.
  - The company monitors are observed in performing this function by AQIS on-plant monitors using check-the-checker procedures to verify the program.
  - AQIS verifies standards by conducting independent process and product evaluation on all relevant operations conducted on the establishment

Part 1 (Process Monitoring)

- Process monitoring evaluates the performance of operations in processing lines, processing areas and within activities.
- It provides a minimum sample size and frequency of monitoring, and employs pass / fail criteria as targets.

Part 2 (Product Monitoring)

- Product monitoring measures end point product defects and verifies the effectiveness of the sanitary process. Any detection of a zero tolerance defect automatically rates the lot represented by the sample as unacceptable and therefore must be subject to corrective and preventive action as outlined in the relevant work instruction.
  - The assessment of carcases is performed:
  - on the slaughter floor after final trim and prior to the final wash, and
  - when bagging quarters and carcases, during telescoping of carcases, at load out and load in of unwrapped meat, including entry into independent boning rooms,
  - in the boning room post pre-trim, the guidelines outlined in the process monitoring of boning operations should be adopted.
  - There are three areas where carcase defects are defined:
  - the first for application **before** the final wash, and
  - the second for application **after** the final wash (note: carcase washing is not mandatory),
  - the third for application after the pre-boning trim.
- Offal monitoring is conducted in the offal room.
  - Offal defects classifications are defined.
- The existing provisions in the Export Meat Orders (Emus) for boneless meat reinspection have been strengthened and renamed “Carton Meat Assessment”.
  - The scope of the arrangements includes all carton meat bulk and layer packs, boneless and bone-in.
  - The criteria for defects have been strengthened to encompass zero tolerance.

Figure: 1 Meat Hygiene Assessment

MEAT HYGIENE ASSESSMENT	
PROCESS MONITORING	**PRODUCT MONITORING**
Process	**Product**
Slaughter (all species)	**Carcase**
	(Slaughter Floor, Bagging, Telescoping, Load In/Out and Boning Rooms
Offal Handling (all species)	**Offal**
	(Slaughter Floor, Offal Room)
Boning Operations	**Carton Meat** (Boning Room)
Meat Processing Operations	
Chiller, Freezer, Storage, Load-in/out Operations	Receival of meat, Load-out of meat, Storage conditions and temperatures (room/product)
Livestock Handling and Sorting Program	
Ratite Meat Processing Operations	

ALTERNATE MONITORING SYSTEMS

- A system that delivers the same outcome as MHA may be approved within an MSQA.

  AQIS will still use MHA to conduct the independent process and product checks.

PART 1

PROCESS MONITORING

1

PROCESS MONITORING

1.1 AIMS

The objectives of the process monitoring component of this program for meat hygiene assessment are:

♦ To confirm that process standards of meat hygiene have been satisfied and that the operations have been conducted in accordance with good manufacturing practice resulting in minimal macro and micro-contamination of product.

To:

- Identify threshold levels for the triggering of remedial action when monitoring indicates that standards have not been met particularly with respect to zero tolerance control measures.
- Provide a mechanism which tracks trends in these outputs over time and reconciles process standards with the results of product monitoring.
- Use these trends to improve the process and to identify and manage repetitive deficiencies.

1.2 SCOPE

♦ Process monitoring applies to all export meat establishments in the following categories.

- abattoirs including integrated establishments.
- independent boning rooms.
- meat processing establishments.
- meat storage establishments.
- ratite establishments (see Part 3).

1.3 CONFORMANCE MONITORING

- Conformance monitoring has been developed as a method for **monitoring processes** and is based on a **standardised evaluation** of operations against **written work instructions**
  - On slaughter floors.

    Include post mortem (for MSEP plants)
  - In offal rooms.
  - In boning rooms.
  - In meat processing establishments.
  - In chillers, freezers, freezer stores and load out procedures.
  - In livestock handling and sorting programs.

    Include ante-mortem (for MSEP plants)
- The system complies with HACCP principles. In addition to food safety, the system monitors compliance with animal welfare and legislative requirements.
- The system monitors the effectiveness of the measures as documented in work instructions for the control of zero tolerance defects on carcases on the slaughter floor.
- Each operator task or operation shall be described in a clearly written **work instruction**.
  - These instructions should:
    - include “best practice” techniques for procedures and sanitation as control measures,
    - establish **limits** for consistent monitoring where applicable,
    - have immediate corrective action wherever possible (eg. trimming of Zero Tolerance defects or tagging the carcase to highlight the defect to trimmers). Urine and milk are difficult to detect after initial contamination and therefore should be trimmed off immediately.
    - include overseas country requirements as appropriate,
    - be readily available to both the worker and the monitor.
- Management shall prepare these work instructions when developing the HACCP program that will be verified through check the checker by the AQIS on-plant supervisor (OPS).
  - Area Technical Managers (ATMs) shall verify that work instructions deliver the required outcome.
  - Guidance in preparing work instructions can be obtained from the **AQIS "Guide for the Preparation of the MSQA System Second Edition"**.

Monitoring

The processes defined in section 1.3, shall be monitored by **company monitors, AQIS on-plant supervisors** (check-the-checker and independent process checks) and **AQIS reviewers/auditors** (verification).

- Monitors should work to a **plan** that provides a random overview.
- A **divided approach** is desirable in maintaining the overall randomness of monitoring.
    - Different areas in a process (see "Recording" page 7) can be checked at different times during the monitoring period.
    - The monitoring program should ensure that all classes of stock are included within the monitoring plan.

Monitoring Frequency

- The frequency with which the checks shall be conducted is governed by the nature of the individual process and by the establishment throughput.

Table: 1 Monitoring/Verification Frequencies

Process	Normal Monitoring Frequencies		
	Company Monitor (minimum)	**AQIS OPS (check the checker)**	**AQIS ATM (verification)**
Lamb, Sheep, Goat, Deer, Calf Slaughter	once/shift to 2000 twice above 2000	Twice/weekly/shift	As per ATM audit schedule
Cattle, Horse, Pig, Camel, Slaughter	once/shift to 500 twice above 500	Twice/weekly/shift	As per ATM audit schedule
Offal Handling (all species)	once/shift	Twice/weekly/shift	As per ATM audit schedule
Boning	once/line/shift	Twice/weekly/shift	As per ATM audit schedule
Meat Processing	once/shift	Twice/weekly/shift	As per ATM audit schedule
Chiller, Freezer Storage, Load Out	once/shift	Twice/weekly/shift	As per ATM audit schedule
Livestock Handling and Sorting	twice/week	Once/week	As per ATM audit schedule

Adjustment of Company Monitoring Frequency

There are **three levels** of monitoring frequency: **Normal, Intensified** and **Reduced**.

- When two consecutive monitorings of a process at the normal level rate unacceptable conformance score then the **increased** intensity shall be adopted as a corrective action on the whole process being monitored:
  - With the slaughter floor, offal room, boning room and chillers, freezers, freezer stores and load outs:
    - where the normal monitoring frequency is **once** per shift, it is increased **to twice** per shift,
    - where the normal frequency is **twice** per shift it is increased to **three** times per shift.
  - With company livestock handling and sorting the monitoring is increased to twice the normal frequency where practical.
  - This intensified rate is **maintained until at least five** consecutive lots from that shift are rated acceptable before reverting to the normal monitoring level.
- When five consecutive normal lots from that shifts are rated acceptable, the monitoring frequency can be **reduced** to half the normal frequency:
  - With operations on the slaughter floor, in the offal room, boning room meat processing establishments and chillers, freezers, freezer stores and load outs:
    - where the normal monitoring frequency is **twice** per shift, the reduced frequency is **once** per shift,
    - there must be at least one monitoring per shift even if the normal rate is already once per shift.
  - With livestock handling and sorting, reduce the monitoring to half the normal frequency.
  - When the process **once fails** to record an acceptable rating at the reduced frequency, the monitoring frequency shall revert to the normal frequency.
  - This is shown in the following table:

Table: 2 The adjustment of company monitoring frequency for slaughter floors, offal rooms, boning rooms, meat processing establishments and chillers, freezers, freezer stores and load outs.

<table>
<tr><th>INTENSIFIED</th><th colspan="2">NORMAL</th><th>REDUCED</th></tr>
<tr><td>⇐</td><td>2 consecutive unacceptable ratings</td><td>5 consecutive acceptable ratings</td><td>⇒ ½ normal frequency</td></tr>
<tr><td>twice per shift</td><td colspan="2">once per shift</td><td>once per shift</td></tr>
<tr><td>three times per shift</td><td colspan="2">twice per shift</td><td>once per shift</td></tr>
<tr><td>If maintained for 5 consecutive shifts with acceptable ratings</td><td>⇒</td><td>⇐</td><td>one unacceptable rating at reduced frequency</td></tr>
</table>

- Two successive unacceptable ratings of an individual operation triggers the intensified level of monitoring of that operation regardless of the overall Conformity Index for the process.
- Five successive acceptable ratings of an individual operation triggers the reduced level of monitoring frequency which shall revert to the normal level following the first subsequent unacceptable rating of that operation.
- **Regardless of the intensity of monitoring of the process, any Critical Control Points must not be monitored at a lower frequency than that described in the Hazard Audit Table.**

Recording

- **Specific process monitoring sheets** which provide the same information as shown in the examples (Appendices 1 - 7) must be customised by each establishment.
    - The monitoring sheets in the examples divide each of the processes into **5 areas**:
        - in each area a number of **operations** will be conducted,
        - areas should be selected for convenience of **conducting observations** of operations during monitoring or with regard to the frequency of monitoring required as is the case with livestock handling and sorting,
        - areas will be **works specific** dependent on the plant layout.
        - The CCP's will need to be nominated where they have been identified.
    - **As an example a monitoring sheet for Cattle Slaughter** would divide the process into **5 areas** each covering a number of operations.
        - the **operations** covered in **Area 1** for the process of cattle slaughter in this example could be Restraining, Stunning, Weasand tie, Shackling, Sticking, Rodding and Dehorning,
        - **area 2** might then include Legging, Rumping, Flaying, Bung Dropping and Hide Removal,
        - **areas 3, 4 and 5** could have the remainder of the operations apportioned to them.
    - The monitoring sheet has provision for each area to **record marginal and unacceptable** performance of operations observed in an area during the period of monitoring.
        - Each operation assessed as marginal or unacceptable is recorded in the appropriate box as one deficiency (see example Appendix 7).
- **Meat Processing requires** a relatively specialised program and operators should refer to the Export Meat Orders and the relevant standard for guidance. The example recording form (Appendix 6) is offered as a guide only and specific customisation will be required.

- Forms with a different layout from any of the examples in the appendix can be employed, provided they record all the same data and deliver an objective assessment.

Process Recording

- The operations are judged marginal or unacceptable on the basis of **food safety**, **animal welfare, and/or legislative compliance.**

- Where processes are **dynamic** the performance of each operation in each area shall be observed **10 times** in order to determine a rating.

- It is important to the concept to appreciate that the **overall performance** of operation is judged in scoring the operation as acceptable, marginal or unacceptable.

  - as such, 1 or more incorrect stunnings within the 10 performances observed, together only represent **one unacceptable score** for that operation.
  - Where the operations are too **slow** to reasonably observe 10 times, (ie a slow chain), the operations in each area shall be rated on **a scale of 1 to 10** to determine whether the operation is acceptable, marginal or unacceptable.
    - in doing this, each operation should be objectively observed for a **sufficient period of time** to form **a reliable opinion**.

- Where operations are **static,** that is the monitor cannot easily observe a number of operations but can observe the outcome. Examples of this could be, meat processing operations, chiller/freezer/storage/load out monitoring and monitoring of livestock handling and sorting. In these cases the monitor shall rate the outcome based on the following definitions.

Process Rating	Description
Acceptable	Food safety, wholesomeness or product integrity not affected.
Marginal	Has potential to affect food safety, wholesomeness or product integrity
Unacceptable	Reasonably likely to seriously affect food safety, wholesomeness, or product integrity

- **Boning Operations**

  - pre-boning trim assessment requires monitoring of the operator's technique (including adequate use of the facilities),
    - observe the operation 10 times for conformance with work instructions,
  - Observe all other boning room operations for conformance with work instructions either 10 times or on a scale of 1 to 10 as appropriate.

Process Rating

Each operation shall be described in detailed work instructions, which also detail the acceptable limits for each operation.

The following examples can be used for guidance. The symbols (♠,♣,♥,♦) are only used as one part of the examples to assist in the explanation of the concepts in this model.

♦ **Food Safety (♠/♣)**

- The number of incorrect performances in the 10 observations (or on a scale of 1 to 10) of any operation, which determines a marginal or unacceptable rating, may depend on the risk to food safety.
- This is determined by employing the principles of hazard analysis
  - as an example sticking is rated high risk to food safety whereas shackling is low risk.

Table: 3 Rating Performance of High and Low Food Safety Risk Operations

Incorrect Performances	Food Safety Risk	Rating
1 in 10	High (marked ♠)	unacceptable
1 in 10	Low (marked ♣)	marginal
2 in 10	Low (marked ♣)	unacceptable

♦ **Animal Welfare (♥)**

- The AQIS Operational Guidelines for The Welfare of Animals at Slaughter Houses and Abattoirs provides a guide to acceptable limits. It is required that companies produce a Standard Operating Procedure that covers the welfare of animals on their establishment.

♦ **Compliance with Legislation and Overseas Country Requirements (♦)**

- An example of legislative compliance is branding of carcases.
  - these are rated marginal or unacceptable according to the degree of non-compliance.
- Due weight should be given to the relative risk inherent in the operation being observed.
  - if legislative requirement is related to high food safety risk, it must score 10 out of 10 to be acceptable,
  - if the operation involves no great risk to food safety, a performance rated 8 out of 10 would rate as acceptable, 7 out of 10 marginal and ≤ 6 out of 10 unacceptable.

- where overseas country requirements are being monitored there must be full compliance so it must score 10 out of 10 to be acceptable. Any score less than this would be unacceptable.

Recording of Nonconforming Operations

- Non-conforming operations should be noted in the comments column on the monitoring sheet beside the relevant area for reference when instigating corrective action or reviewing the monitoring frequency.

- Corrective action taken must also be recorded. The recording must occur in real time as the corrective action is taken.

Conformity Index

- In each area's recording chart, a rating is calculated by weighting the marginal scores by a factor of 2, unacceptable scores by a factor of 4.

- The Conformity Index is calculated using the formula:

$$\textbf{Conformity Index} = \frac{50 - (\text{Total of Marginal and Unacceptable Ratings for Operations})}{50}$$

The Index is expressed as a percentage.

- Trends can be identified by progressively plotting the daily indices on a line graph.

Conformity Index Targets

The Conformity Index should be considered as a target in determining whether a process is acceptable, marginal or unacceptable.

- Trends in performance relative to these targets should receive more emphasis than absolutes in judging the standard of a process.

- Companies should develop and justify their own targets.

- Results of process monitoring should be reconciled with the results of product monitoring as part of the verification process.

Conformance Monitoring Targets

- If 2 unacceptable and 1 marginal operations in a complete process is the maximum which is considered acceptable, then the Conformity Index for an acceptable process should not fall below 80%.

    - Similarly 1 unacceptable and 3 marginal scores which also result in a Conformity Index of 80% are the maximum unacceptable and marginal

operations in an acceptable process. (i.e. the weighting for unacceptable operations is 4 while the weighting for marginal operations is 2).

- Any combination of unacceptable and marginal operations which results in a Conformity Index of less than 80% denotes a process which is less than acceptable.

- The marginal band between acceptable and unacceptable could be defined as any combination of unacceptable and marginal operations resulting in a Conformity Index between 70% and 79%.

    - As an example 3 unacceptable operations resulting in a Conformity Index of 76% would rate the process as marginal.

- A Conformity Index below 70% would then indicate an unacceptable process.

Companies should endeavour to increase their conformity target score as compliance improves.

- Table 4 categorises this example into Acceptable, Marginal and Unacceptable Conformity Indices (rounded for convenience).

Table: 4 Conformance Monitoring Targets

Conformity Index	Process Rating
≥ 80%	Acceptable
70 - 79%	Marginal
< 70%	Unacceptable

1.4 CORRECTIVE ACTION

The MHA program is designed to complement the HACCP plan. An essential part of an effective HACCP Plan is the action to correct any deviations from limits that may occur.

Each CCP must have it's individual corrective action procedures documented in the HACCP Plan.

Corrective action needs to address:

The identification and correction of the cause of the non-conformity.

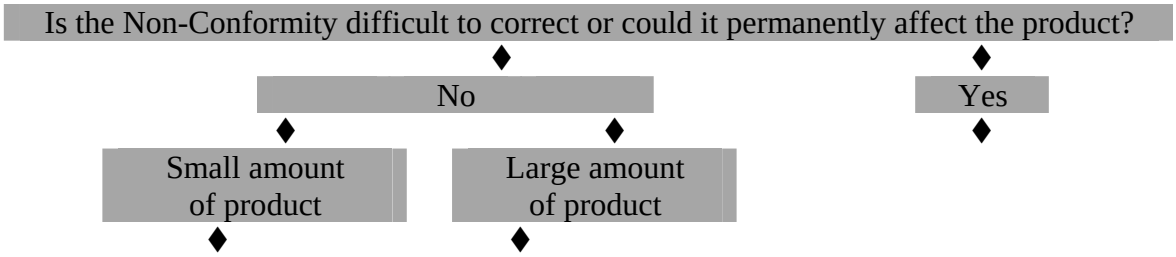
The treatment and disposition of affected product.

The records documenting the incident and the action taken.

- The people responsible for taking corrective action and for releasing affected product after corrective action has been taken also need to be clearly identified. The action taken needs to be documented and the record signed by those responsible for taking the action. These people must be thoroughly conversant with the process, product and HACCP Plan.

When non-conformities are detected, the level, type and extent of response will be dependent on a range of factors. Immediate corrective action procedures to rectify unacceptable monitoring results should be decided using the "Corrective Action Decision Tree".

Corrective Action Decision Tree



1 Take local action to control situation. 2. Retain/rework any affected product. **3. Record result and action taken.** 4. Consider switching the operation to intensified monitoring.	1.Control situation by: informing person(s) responsible ensuring further product is not being similarly affected if necessary stopping production until situation is controlled. 2. Retain all affected product for inspection and rework. **3. Record results and action taken.** 4. Follow-up rework and final outcome. 5. Inform AQIS. 6. Flag incident for further	1. Control situation by: informing person(s) responsible. stopping production until situation is controlled. immediately ensuring that further product is not being similarly affected. 2. Retain affected product. 3. Inform AQIS. 4. Liaise with AQIS to determine changes required for resumption of production and disposition of affected product.

	investigation and analysis. 7. Consider switching operation to intensified monitoring if a repeat incident.	**5. Record all actions.** 6. Verify the effectiveness of changes by additional monitoring. 7. Switch operations involved to intensified monitoring.

Immediate Corrective Action for individual operations

Deficiencies in the application of work instructions identified during routine monitoring must be corrected immediately.

Having instigated corrective action, verification shall always be conducted to ensure that this action has been successful. This verification should always be noted in the records.

- All corrective action and any necessary verifications should be recorded

Preventive Actions

Where there has been a serious breach of a standard sanitation operating procedure an evaluation of why the problem occurred must occur. This assists in identifying follow-up action required to improve the future reliability of operations.

An evaluation of past monitoring sheets should occur regularly (especially where serious problems or repetitive defects have occurred). This assists in identifying follow-up action required to improve the future reliability of operations.

A review of the work instructions should occur to assess their effectiveness in delivering the outcomes required.

Examples of follow up action include:

Training in weak areas of the company's system. Records would have to be kept to verify that corrective action was taken.

Improving worker understanding of their Work Instruction through general training in meat hygiene.

Ensuring that workers who rotate through jobs understand the Work Instruction relevant to each job.

Adjusting chain speeds to the job that is 'the weakest link' on the chain.

- Changing the work area or process in order that operators may more easily comply with required standards, i.e. proximity to equipment for sterilisation.

Seeking operator's opinions as to why some problems recur.

Recording follow-up action and cross-referencing the information back to the initial problem.

Implementing temporary solutions in order to overcome the immediate problem until the full cause has been identified and the problem rectified.

Reactions by QA monitors and company supervisors to problems should also be analysed to determine if these problems could be handled better in the future and if company policy needs to be amended.

Trends Leading to Corrective Action

- Trends in the conformity indices should be monitored and an analysis of these trends used in determining the overall rating of an establishment. (see Part 4).

  If monitoring indicates a downward trend, corrective action should be taken early before the process consistently records a conformity index below the acceptable target.

  Though minor fluctuations around the mean are to be expected, acute or prolonged unacceptable deviations should be considered when formulating an audit assessment of an establishment.

Conformity indices should be correlated with defect ratings when examining trends.

A1

Part 1: LIST OF APPENDICES

Appendix: 1 Slaughter Monitoring Sheet

Establishment.....Monitor.....Date.....Time.....

Check	**Scale**	**Recording**			**Comments**
Area 1	10		M	U	
♥ (Restraining)			(x2)	(x4)	
♥ (Stunning)		Scores			
♠ (Weasand Tie)		**Rating**			
♣ ♥ (Shackling)					
♠ (Sticking)					
♠ (Rodding)					
♣ (Dehorning)					
Area 2	10		M	U	
♠ (Legging/Rumping)			(x2)	(x4)	
♠ (Flaying)		Scores			
♠ (Udder Removal)		**Rating**			
♠ (Bung Dropping)					
♣ (Hide Removal)					
Area 3	10		M	U	
♠ (Head Removal/Skinning)			(x2)	(x4)	
♠ ♦(Correlation)		Scores			
♠ (Head Washing)		**Rating**			
♣ (Removal, Tongue/Meat)					
Area 4	10		M	U	
♠ (Belly Opening)			(x2)	(x4)	
♠ (Evisceration)		Scores			
♣ (Brisket Sawing)		**Rating**			
♣ (Pluck Removal)					
♦ (Inspection Procedures)					
Area 5	10		M	U	
♣ (Carcase Split)			(x2)	(x4)	
♣ (Trim, Neck/Side)		Scores			
♦ (Dentition/Aging/Branding)		**Rating**			
♣ (General room / personal hygiene)					
♦ (Program Requirements)					
♣ (Wash, Temp/Time)					

♦ Legislation ♥ Animal Welfare ♠ Food Safety High Risk ♣ Food Safety Low Risk

(M - marginal U - unacceptable)

$$\textbf{Conformity Index} = \frac{50 - (\text{Total of Marginal and Unacceptable Ratings on All Operations})}{50} \text{ (Expressed as a percentage)}$$

Overall Process Rating	**Acceptable**	**Marginal**	**Unacceptable**

Appendix: 2 Offal Handling and Packing Monitoring Sheet

Establishment.....Monitor.....Date.....Time.....

Check	**Scale**	**Recording**			**Comments**
Area 1	10		M	U	
♠ (Offal Table/Barrow)			(x2)	(x4)	
♦ (Other Country Requirements)		Scores			
♦ (Correct Disposition)		**Rating**			
♣ (Transfer to Offal Room)					
♠ (Handling of Inedible Product)					
Area 2	10		M	U	
♦ (Separation, Other Countries)			(x2)	(x4)	
♣ (Washing)		Scores			
♣ (Trimming)		**Rating**			
♦ (Rejecting))					
♣ (Sorting & Batching)					
♦ (Inspection Procedures)					
Area 3	10		M	U	
♠ (Tripe Handling)			(x2)	(x4)	
♠ (Runner Handling)		Scores			
		Rating			
Area 4	10		M	U	
♣ (Stacking)			(x2)	(x4)	
♠ (Chilling)		Scores			
♠ (Temperature Control)		**Rating**			
	10		M	U	
Area 5			(x2)	(x4)	
♣ (Packing)		Scores			
♦ (Product description)		**Rating**			
♣ (General room / personal hygiene)					

♦ Legislation ♥ Animal Welfare ♠ Food Safety High Risk ♣ Food Safety Low Risk

(M – marginal U - unacceptable)

Conformity = $\frac{50 - (\text{Total of Marginal and Unacceptable Ratings on All Operations})}{50}$ (Expressed as a percentage)

Index

Overall Process Rating	**Acceptable**	**Marginal**	**Unacceptable**

Appendix: 3 Boning Room Monitoring Sheet

Establishment.....Monitor.....Date.....Time.....

Check	**Scale**	**Recording**			**Comment**
Area 1	10		M (x2)	U (x4)	
*♠ (Pre-boning Trim)		Scores			
		Rating			
Area 2	10		M (x2)	U (x4)	
♠ (Hygiene, Room/Personnel)		Scores			
♠ (Meat Handling)		**Rating**			
♣ (Accumulation, Product Flow)					
♠ (Dropped Meat)					
♠ (Brisket Inspection)					
♣ (Vacuum Packaging)					
Area 3	10		M (x2)	U (x4)	
♠ (Wrapping Material)		Scores			
♠ (Carton Handling)		**Rating**			
♠ (Inedible Material)					
♠ (Carton Room)					
♠ (Carton Meat Assessment)					
Area 4	10		M (x2)	U (x4)	
♣ (Temperatures, Meat/Air)		Scores			
♠ (Time to Refrigeration)		**Rating**			
♠ (Mechanically De-boned Meat)					
♦ (Part Cartons)					
Area 5	10		M (x2)	U (x4)	
♦ (Product Description)		Scores			
♦ (Hot Boning Program)		**Rating**			
♦ (Cool Cutting Program)					
♦ (Mandatory Optional Categories)					
♦ (Other Country Requirements)					
♦ (Re-Lidding Procedures)					

*** Unacceptable rating automatically rates the whole process unacceptable**

♦ Legislation ♠ Food Safety High Risk ♣ Contamination Low Risk

(M – marginal U - unsatisfactory)

50 - (Total of Marginal and Unacceptable Ratings on All Critical Operations)

Conformity = ----------
-(Expressed as a percentage)
Index 50

Overall Process Rating	**Acceptable**	**Marginal**	**Unacceptable**

Appendix: 4 Chiller, Freezer, Freezer Store, Load Out Monitoring Sheet

Establishment.....Monitor.....Date.....Time.....

Check	**Scale**	**Recording**			**Comments**
Area 1	10		M (x2)	U (x4)	
♣ (Chiller Structures)		Scores			
♠ (Hygiene)		**Rating**			
♠ (Condensation/Drip)					
♠ (Temperature/Air Flow)					
♦ (Refrigeration log)					
♠ (Retain Cage/Room)					
♠ (Bagging Trimming Product)					
♣ (Quartering Procedures)					
♠ (Carcases, Loading/Separation)					
♠ (Offal Chilling)					
♠ (Product, Temperature/Time)					
♠ (Dropped Carcase Procedure)					
♦ (Product, Stamping/Identification)					
Area 2	10		M (x2)	U (x4)	
♣ (Blast Freezer Structure)		Scores			
♣ (Hygiene)		**Rating**			
♠ (Temperature Records)					
♠ (Product, Temperature/Time)					
Area 3	10		M (x2)	U (x4)	
♣ (Freezer Store Structure)		Scores			
♣ (Hygiene)		**Rating**			
♠ (Temperature Records)					
♠ (Product Temperature)					
♦ (Segregation of Product)					
Area 4	10		M (x2)	U (x4)	
♣ (Carton Damage/Re-cartoning)		Scores			
♦ (Additional Country Requirements)		**Rating**			
♠ (Meat Re-examination)					
Area 5	10		M (x2)	U (x4)	
♦ (Load Out Structures)		Scores			
♠ (Transport Hygiene)		**Rating**			
♦ (Product Temperature & Control)					

♦ Legislation ♠ food Safety High Risk ♣ Food Safety Low Risk
(M – marginal U - unsatisfactory)

Conformity = 50 - (Total of Marginal and Unacceptable Ratings on All Critical Operations)-(Expressed as a percentage)

Index		50	
Overall Process Rating	**Acceptable**	**Marginal**	**Unacceptable**

Appendix: 5 Livestock Handling and Sorting Monitoring Sheet

Establishment.....Monitor.....Date.....Time.....

Check	**Scale**		**Recording**		**Comments**
Area 1	10		M	U	
♥ (Preliminary Handling)			(x2)	(x4)	
♠ (Disposal, Cadavers/Condemns)		Scores			
♥ (Handling Sick & Injured)		**Rating**			
♥ Animal Care Statement					
Area 2	10		M	U	
♥ ♣ (Long Term Holding)			(x2)	(x4)	
♥ (Feeding)		Scores			
♥ (Watering)		**Rating**			
♠ (Sanitary Handling)					
Area 3	10		M	U	
♠ (Wet & dirty stock)			(x2)	(x4)	
♦ ♠ (Diseased stock)		Scores			
♠ (Suspects)		**Rating**			
♥ ♣ (Emergency Slaughter)					
♦ (Ante-Mortem Procedures)					
Area 4	10		M	U	
♦ (Documentation/Kill Sheets/NVD)			(x2)	(x4)	
♦ (Animal Identification, NLIS)		Scores			
♦ ♠ (Residue Status)		**Rating**			
♦ (Special permits)					
♦ ♠ (Ante Mortem Cards)					
Area 5	10		M	U	
♥ ♠ (Moving Stock to Slaughter)			(x2)	(x4)	
♥ (Working Animals)		Scores			
♥ (Pen Capacity)		**Rating**			
♥ (Pens to Knocking Box)					
♠ (Washing of Stock)					

♦ Legislation ♥ Animal Welfare ♠ Food Safety High Risk ♣ Food Safety Low Risk

(M – marginal U - unsatisfactory)

50 - (Total of Marginal and Unacceptable Ratings on All Critical Operations)

Conformity = ----------(Expressed as a percentage)

Index 50

Overall Process Rating	**Acceptable**	**Marginal**	**Unacceptable**

Appendix: 6 Meat Processing Monitoring Sheet

Establishment.....Monitor.....Date.....Time.....

Check	**Scale**	**Recording**			**Comments**
Area 1	10		M (x2)	U (x4)	
♠ (Non-Export Meat Program) ♠ (Thermal Process, Cannery) ♠ (Thermal Process, Smallgoods) ♠ (Frozen Cooked Meat)		Scores			
		Rating			
Area 2	10		M (x2)	U (x4)	
♠ (Preparation, Time) ♠ (Preparation, Temperature) ♣ (Product Filling) ♠ (Fermentation/Drying) ♣ (Batch Control) ♠ (Drying)		Scores			
		Rating			
Area 3	10		M (x2)	U (x4)	
♣ (Product Separation) ♦ Product Identification) ♣ (Product Flow) ♠ (Product Temperature) ♠ (Waste Handling)		Scores			
		Rating			
Area 4	10		M (x2)	U (x4)	
♦ ♠ (Bacteriological Testing) ♦ ♠ (pH) ♦ ♠ (Aw) ♦ ♠ (Nitrite)		Scores			
		Rating			
Area 5	10		M (x2)	U (x4)	
♠ (Storage of Raw Product) ♠ (Storage of Ingredients) ♠ (Storage of Vegetables) ♠ (Storage Temperatures) ♣ (General room / Personal hygiene)		Scores			
		Rating			

♦ Legislation ♥ Animal Welfare ♠ Food Safety High Risk ♣ Food Safety Low Risk

(M - marginal U - unacceptable)

50 - (Total of Marginal and Unacceptable Ratings on All Critical Operations)

Conformity = ----------(Expressed as a percentage)

Index 50

Overall Process Rating	**Acceptable**	**Marginal**	**Unacceptable**

Appendix: 7 Example, Cattle Slaughter Monitoring Sheet

Establishment *000* **Monitor** *John Smith* **Date** *30/9/98* **Time** *10.00 am*

Check	**Scale**	**Recording**			**Comments**
Area 1	10		M	U	*Stunning*
♥ (Restraining)			(x2)	(x4)	*unacceptable*
♥ (Stunning)		Scores		*1*	
♠ (Weasand Tie)		**Rating**		***4***	
♣ ♥ (Shackling)					
♠ (Sticking)					
♠ (Rodding)					
♣ (Dehorning)					
Area 2	10		M	U	*First Leg*
♠ (Legging/Rumping)			(x2)	(x4)	*marginal*
♠ (Flaying)		Scores	*1*	*1*	*Bunging*
♠ (Bung Dropping)		**Rating**	***2***	***4***	*Unacceptable*
♣ (Hide Removal)					
Area 3	10		M	U	
♠ (Head Removal/Skinning)			(x2)	(x4)	
♠ ♦(Correlation)		Scores			
♠ (Head Washing)		**Rating**			
♣ (Removal, Tongue/Meat)					
Area 4	10		M	U	
♠ (Belly Opening)			(x2)	(x4)	
♠ (Evisceration)		Scores			
♣ (Brisket Sawing)		**Rating**			
♣ (Pluck Removal)					
♦ (Inspection Procedures)					
Area 5	10		M	U	*Trim*
♣ (Carcase Split)			(x2)	(x4)	*marginal*
♣ (Trim, Neck/Side)		Scores	*1*		
♦ (Dentition/Aging/Branding)		**Rating**	***2***		
♦ (Program Requirements)					
♣ (Wash, Temp/Time)					
♣ (general room/personal hygiene)					

♦ Legislation ♥ Animal Welfare ♠ Food Safety High Risk ♣ Food Safety Low Risk

(M - marginal U - unacceptable)

Conformity Index = $\frac{50 - 12}{50}$ = 76% ***MARGINAL***

PART 2

PRODUCT MONITORING

2

PRODUCT MONITORING

2.1 AIMS

The objectives of the product monitoring component of this program for meat hygiene assessment are:

- To confirm that physical standards of meat hygiene have been satisfied including the control of Zero Tolerance defects.
- To verify that the process is being conducted in accordance with good manufacturing practice.
- To identify:

  Threshold levels for the triggering of remedial action when monitoring indicates that product standards have not been met.

  - A mechanism that tracks trends in these outputs over time and reconciles product standards with the results of process monitoring.

2.2 SCOPE

- Product monitoring applies to all export meat establishments in the following categories:

  - Abattoirs, including integrated establishments.
  - Boning rooms.
  - Meat processing establishments.
  - Ratite establishments (see Part 3)

2.3 ASSESSMENT OF QUARTERS, SIDES OR CARCASES

The **initial assessment** of product is performed on carcases / sides **after final trim but before the final wash** on the slaughter floor.

Additional assessments are made **after the final wash** during

- the bagging of carcases and quarters,
- during packing of telescoped carcases,
- at load out and load in of unwrapped product,
  including entry into independent boning rooms and meat processing establishments,

and post pre-boning trim, and
at Carton Meat Assessment.

Skin on carcases from a line employing a pre-evisceration wash are assessed after the final carcase trim but before the final carcase wash using the target defect ratings designed for after the wash (Table 13).

Sample Size

The **minimum number of samples** required for a statistical assessment of product is dependent on the number of items processed. (see Table 5). What constitutes a unit is described in Table 6.

Sample numbers at different production levels have been derived from the Australian Standard (AS 1199-1988, Sampling Procedures and Tables for Inspection by Attributes").

There are **3 levels** of sampling - **Normal, Intensified** and **Reduced** (see Table 5).

- When two consecutive average monitorings of product produced in a shift at the normal sampling level are rated unacceptable by score, the **intensified** level of sampling is adopted.

  When a single lot is rated as unacceptable due to a **zero tolerance** defect detection, the **intensified** level of sampling is adopted.

- The **intensified** level is maintained until at least five consecutive average monitorings of product produced in a shift achieve acceptable rating, before reverting to the normal sampling level.

- When at least five consecutive average monitorings of product produced in a shift at the normal sampling level are rated acceptable, monitoring can move to the **reduced** level of sampling.

- The **reduced** level of monitoring reverts to the normal level after the first unacceptable or second consecutive marginal average rating of product produced in a shift.

  When a **zero tolerance** defect detection is made the reduced rate changes to the intensified rate.

- NB. - **Regardless of the intensity of monitoring of the product, any operations nominated as Critical Control Points in the HACCP plan, that use MHA or parts of MHA as Critical Limits must not be monitored at a lower frequency than that described in the Hazard Audit Table.**

Table: 5 Sample Numbers

<table>
<tr><th>Total Number of Animals in a lot</th><th>Intensified Level (units)</th><th>Normal Level (units)</th><th>Reduced Level Units</th></tr>
<tr><td>1 - 25</td><td>8</td><td>5</td><td>5</td></tr>
<tr><td>26 - 50</td><td>13</td><td>8</td><td>5</td></tr>
<tr><td>51-90</td><td>20</td><td>13</td><td>8</td></tr>
<tr><td>91-280</td><td>32</td><td>20</td><td>13</td></tr>
<tr><td>281 - 500</td><td>50</td><td>32</td><td>20</td></tr>
<tr><td>> 500</td><td>80</td><td>50</td><td>32</td></tr>
<tr><td rowspan="4"></td><td>⇐</td><td>2 consecutive unacceptables by score | 5 consecutive acceptables</td><td>⇒</td></tr>
<tr><td>5 consecutive acceptables</td><td>⇒ ⇐</td><td>1 unacceptable by score, or 2 marginals</td></tr>
<tr><td>⇐</td><td>1 zero tolerance</td><td></td></tr>
<tr><td>⇐</td><td>⇐⇐⇐⇐⇐</td><td>1 zero tolerance</td></tr>
</table>

Table: 6 Unit Size

Horses, cattle, camels and splitters (split calves)	a side or fore and hind quarter combined
Pigs	a whole carcase or the two sides when split (eg choppers)
Lambs, sheep, goats, deer and veal	a whole carcase

Monitoring

Product assessment is a **uniform method** of monitoring that determines whether a predetermined quality level has been achieved.

The program assumes that a **carcase identification system** is available at an establishment to differentiate between lots.

- The selection of samples must be **random**.
- Production during a shift may be broken into a number of **lots** to facilitate a practical approach to managing corrective action.
- Where the lot concept is adopted as an option, lots should be determined in consultation between the Company and the AQIS OPS.
  - *"A production lot is the number of animals over which a monitoring sequence is conducted. It may represent the entire production for a shift or any part thereof,"*
  - when there is **significant variation** within lots (for example, short wool lambs and long wool sheep), monitoring should be spread across the entire lot. In these cases, increasing the number of lots monitored could also be considered,
  - lots can be adjusted daily to reflect changes in the category or type of slaughter stock,
  - in establishments where there is a **small throughput** for a particular species, the production lot will most likely be the entire kill during a shift.
  - It should be noted that it is the entire lot represented by the sample that is subject to any necessary corrective action. This should be kept in mind when defining lots.
- Independent boning rooms should treat loads from different abattoirs as separate lots.

Monitoring Frequency

♦ Monitoring is conducted at a minimum of once every lot spread over the entire lot.

Minimum Requirements - Assessment of Samples

♦ **Facilities** must be available and adequate to allow a thorough examination of all surfaces of the sampled carcases and to perform corrective action as necessary.

♦ **Lighting** at the assessment point must be **at least 600 lux**.

♦ Adequate **time** must be allocated to ensure a thorough examination of the carcase / side is performed, **accurate data is collected** and consistency is maintained.

This may mean that on fast moving chains small stock chains the only viable option is to hang the carcases on a dead rail.

Consideration should be given to using hoists, raised rails, hooks or other devices to help the monitor observe all the parts of the carcase as thoroughly as possible.

- Assessment must be performed in a **consistent manner**. The use of scanning lines (Appendix 8) is recommended.

Additional Comments - Assessment of Samples

- It is acceptable to assess **part carcases / sides** at random to achieve the required sample size, (for example: assess a run of beef hindquarters on the high stand and complete the monitoring from the low stand with a later run of forequarters, high speed chains may need to divide the carcase into even smaller sections) providing the Company supplies written advice to the AQIS OPS on the proposed approach.

- Where carcases or sides are divided into sections for assessment, all defects from the sections that make up one complete carcases or side must be added together to determine how the defect is scored for that carcase.

Criteria

The following defect criteria (Table 7) are included in the assessment but are not an exclusive list. Companies should develop their own comprehensive list by including any other foreign material encountered.

Table: 7 Criteria for Defects

Zone	Area Included	Common Defects
Hock	hock, shank, hook hole	hair, wool, scurf, hide, grease, rail dust, stains, toe-nails
Hindquarter Outside	tail area, back, flank	rust, grease, hair, wool, hide, bruises, scurf, faeces, pizzle butts, inoculation abscesses
Forequarter outside	plate, ribs, chuck, neck, outside brisket, fore shank	hair, wool, hide, grease, stains, nodules, bruises, grass seeds, scurf, ingesta
Forequarter inside	diaphragm, thorax, spine, neck, jugular groove, inner forearm, end of shank, brisket, pleura	hair, hide, grease, stains, clots, bruises, broken ribs, ingesta, pieces of trachea and lung
Hindquarter inside	inside round, aitch bone, pelvic canal, spine, cod fat, lumbar area, kidney, ovary, abdominal surfaces, pizzle, rectal mucosa, peritoneum	hair, wool, hide, grease, rust, faeces, hanging fragments, blood clots, remnants of organs, mature udder fragments, bruises

Categorisation of Carcase Defects

Defects are classified to reflect the effect of the defect on the appearance or wholesomeness of the product into minor, major or critical categories.

Table: 8 Carcase Defect Categories

Defect Category	Description
Minor	Affects appearance; not food safety
Major	Has potential to affect food safety, or wholesomeness
Critical	Reasonably likely to seriously affect food safety, or wholesomeness
Zero Tolerance	Contamination with faeces, ingesta, milk or urine

A **zero tolerance** detection on carcases selected for monitoring, automatically rates the lot represented by the sample as unacceptable. It also triggers immediate corrective action in the form of reprocessing of the affected lot, rectification of the process and increased monitoring, regardless of the overall conformity index for the process.

Classification of Carcase Defects

Table: 9 Classification of Carcase Defects

	Minor	Major	Critical	Zero Tolerance
Faeces, Milk, Ingesta, Urine				**Any Amount**[1]
Bruises / Blood Clots	2 - 5 cm (GD)	> 5 cm (GD)	2 or more majors	
Seed *2* (Not associated with inflammation)	5 - 10	11 - 20	> 20	
Rail Dust, Specks, Hide &Wool Dust	5 - 10 scattered specks	11 - 20 scattered specks	> 20 scattered specks	
Smears & Stains (inc bile, oil & grease)	≤1 cm diam	1 – 2 cm diam	> 2 cm diam	
Hair & Wool Strands *3*	5 – 10 strands	11 - 20 strands hair/wool	> 20 strands hair/wool	
Hair & Wool Clusters, & Hide, scurf, toenails *3*	1 cluster of hair Hide < 1 cm diam	2 - 3 clusters hair/wool Hide 1 - 5 cm diam	> 3 clusters hair/wool Hide > 5 cm diam	
Foreign Objects & Extraneous Tissue *4* includes parts of other organs & loose attached mucosa	1 incidence	2 incidence	3 incidence	
Pathology *5*			**Any incidence**	

1. Retained udder fragments are evidence of milk contamination.

   For a defect to be rated as a zero tolerance defect it must be clearly identifiable to the naked eye as faeces, ingesta, urine or milk.

2. Seed should be assessed after the seed trim where in place. (Infected seeds are pathology).

3. Short attached shaved bristles on pigs and skin on goats are exempt as hairs.

4. Gut segments, including oesophagus, are classified with faeces, ingesta, milk and urine.

   Vaccination scars are classified as foreign tissue, abcesses are classified as pathology.

5. Obvious nodules detected on the slaughter floor should be removed intact. When assessing brisket nodules, the nodule search in the boning room is accepted as a further safeguard against this defect. Where product is not boned at an establishment (for example quarter beef) nodule removal is critically assessed after trimming prior to wrapping or load out.

Boning

For assessment of trimmed product:

examine 10 carcases/sides per run per line to assess the effectiveness of the trim using the same defect criteria used for product monitoring
an acceptable target defect rating should be < 0.5,

defects identified during carcase monitoring should be removed immediately.

A **zero tolerance** detection on carcases selected for monitoring after the pre-boning trim, automatically rates this lot as unacceptable. It also triggers immediate corrective action in the form of increased monitoring and adjustment of the operation, regardless of the overall conformity index for the boning process. The affected lot is subject to further investigation and corrective action as described in the section on Corrective Action (Section 2.6).

Hot Boning

- Where carcases are passing directly from the slaughter floor to the boning room, it may **not be possible to re-trim** a lot assessed unacceptable or two consecutive lots assessed marginal on the slaughter floor.

  - In these cases, lots failing assessment on the slaughter floor are subject to a **double intensity of carton meat sampling** (ie. 2 x 13.5 kg from each product type from separate cartons at least every 30 minutes). These samples are recorded separately.

this increased level of carton meat assessment is **continued until 5 consecutive average monitorings** from carcases are rated acceptable, or

an intensified final trim on the slaughter floor or at the preboning trim (agreed between the Company and the AQIS supervisor) is employed until **5 consecutive average monitorings** from carcases are rated acceptable.

Hot Bagging of Carcases

- Lots **bagged straight from the slaughter floor** and assessed unacceptable by slaughter floor assessment are subject to further assessment and appropriate corrective action when necessary.

  - The further carcase assessments continue until **5 consecutive average monitorings** of carcases are rated acceptable at slaughter floor assessment, or
  - An intensified final trim on the slaughter floor (according to the established program agreed between the company and the AQIS supervisor) is employed until **5 consecutive average monitorings** of the carcases produced are rated acceptable at slaughter floor assessment.

Load Out and Cold Bagging

- All carcases (sides/quarters) shall be assessed using the **after the wash criteria** (Table 13) prior to load out. or prior to cold bagging. Where appropriate this shall be performed prior to bagging or telescoping. Marginal and unacceptable lots shall be trimmed in accordance with the corrective action requirements for carcases (Figure 2).

Load-in to Independent Establishments

- All carcases (quarters/sides) entering independent boning rooms and meat processing establishments shall be assessed using the after the wash criteria at load-in (Table 13).
- Samples shall be assessed from all different establishments of origin and all individual loads.
- Marginal and unacceptable lots shall be trimmed in accordance with the corrective action requirements for carcases (Figure 2) and details of defects reported to the establishment of origin via an Unsatisfactory Transfer of Meat report. It is expected that as a minimum a UTM would be generated whenever a marginal or unacceptable load is received.

2.4 ASSESSMENT OF OFFALS

Offals are assessed following final processing or at defrost.

Sample Size

- A **normal** sample size of 10 pieces of offal from each offal type for each species produced, selected at random are assessed in every shift unless the lot concept is adopted.
- Green offals are **not included.**
- The lot concept, as applied to carcases, also applies to offals.
    - Where adopted, monitors utilise the sample sizes detailed in Table 10 **provided at least 10 samples are assessed in the entire shift.**

Adjustment of Sample Size

There are **three levels of sampling**: **normal, intensified and reduced (see Table 10).**

- When two consecutive average monitorings of an offal type produced during a shift at the normal level of sampling are unacceptable, company monitoring shall move to the intensified level of sampling for that offal type.
- The **intensified** level shall be maintained until at least five consecutive intensified average monitorings of that offal type produced during a shift are acceptable, before reverting to the normal sampling level.
- When five consecutive average monitorings of an offal type produced during a shift at the normal level of sampling are acceptable, company monitoring can move to a **reduced** level of sampling for that offal type.
- After the first unacceptable or the second consecutive marginal assessment of an offal type at the **reduced** level, the sample size shall revert to the normal sample size for that offal type.

Table: 10 Lot Sampling of Offals

Number of Offal Sets Produced	Intensified	Normal	Reduced
0 - 100	8	4	2
101 - 200	12	6	3
201 - 300	16	8	4
> 300	20	10	5

Monitoring

- Monitoring is **random** during the shift and monitors should aim to select samples on **at least 3 different times** during each shift when the lot concept is not adopted.

Monitoring Frequency

- The frequency and pattern of offal monitoring by Company and AQIS is the same as for carcase assessment (Table 1)

Assessment of Samples

- The assessment shall be conducted under lighting of at least **600 lux**.

Classification of Offal Defects

Table: 11 Classification of Offal Defects

	Minor	Major	Critical	Zero Tolerance
Faeces, Milk, Ingesta, Urine				**Any Amount**[1]
Bruises / Blood Clots	<1 cm (GD)	1-2 cm (GD)	>2 cm (GD)	
Smears & Stains (inc bile, oil & grease)	<1 cm (GD)	1 – 2 cm (GD)	> 2 cm (GD)	
Hair & Wool Strands	≤2	3 – 8	>8	
Hair & Wool Clusters, (Numerous strands in a 10 mm circle)	1	2	>2	
Foreign Objects / Tissue # includes parts of other organs	1 incidence	2 incidence	3 incidence	
Scar Tissue parasitic, non-parasitic, telangiectasis	<4	5 – 8	>8	
Pathology [2]			**Any incidence**	

1. Gut segments, including oesophagus, are classified along with faeces, ingesta, milk and urine.
2. Urine retention cysts are considered pathology.

2.5 RECORDING OF DEFECTS

- Defects are recorded in the **appropriate column** (minor, major, critical or zero tolerance) on a carcase or offal defect recording sheet.
  - **Examples** of suitable recording forms are illustrated in Appendices 13 and 14.
  - Forms with a **different layout** can be employed provided they retain the concept and record at least all of the same data.
- **Carcase/Sides** assessment recording shall:
  - Record the **assessment** of samples in the appropriate columns on the recording sheet.
  - Record the assessment of multiple carcases/sides in each column.
  - Note the **number** of samples recorded at the top of each column.
  - Where carcases or sides are divided into sections for assessment, all defects from the sections that make up one complete carcases or side must be added together to determine how the defect is scored for that carcase.
  - Non-scoring defects for carcases and sides are not cumulative over the lot.
- **Offal** assessment recording shall:
  - Enter the **type of offal** at the head of the column
  - Record the total assessment for **10 pieces** of that type of offal in one column on the recording sheet.
- When all of the samples have been assessed and the defects recorded, the columns are added to establish the **total number** of defects for each classification (ie. totals of minor, major, critical and zero tolerance defects) in order to calculate the overall Defect Rating and determine trends.
- Defects observed for each individual offal type should also be totalled in order to determine Defect ratings for individual offals. This allows for identification of "offending offals" (offals which individually record unacceptable defect ratings) and appropriate corrective action.
- It is recommended that the frequency and/or number of checks done on high risk products (cheeks, lips, tails) is increased as these items have higher rejection rates overseas than other offals.

Defect Rating

- To calculate the defect scores, minor, major, critical and zero tolerance defect totals are multiplied by the **weightings** of 1, 3, 6 and 10 respectively. The total of these scores is divided by the number of samples to establish the Defect Rating.

- The defect ratings determined on the slaughter floor **after the final trim and before the final wash** and **after the wash** for the sides / carcases of the various species are categorised as in Table 10 and 12 and defects as in Table 12 and 13 respectively. Table 13 determines defect rating for carcase before final wash
    - Where there is no final wash Table 13 defect ratings shall apply.
- The defect ratings for offals after final processing are categorised in Table 13.
- Defect ratings **should be considered as a target** and not a standard.
- **Regardless of the defect score any detection of a zero tolerance defect during sampling will automatically rate the lot as unacceptable**

Table: 12 Target Defect Ratings for Carcases before the Final Wash for Horse, Cattle, Camel and Deer and for Sheep, and Goat not receiving a Pre-evisceration wash.

Horses Cattle Camels Calves	Lambs Sheep Goats Deer	Level of Macro-contamination
≤ 1.5	≤ 1.5	Acceptable
>.1.5 - 2.5	> 1.5- 2.5	Marginal
> 2.5	> 2.5	Unacceptable

Table: 13 Target Defect Ratings for Skin on Carcases and sheep carcases following a Pre-evisceration wash, all Species after the Wash, all species after pre-boning trim and for Offal

Skin-off carcases	Skin on Carcases Sheep with a Pre-evisceration Wash	Offal	Post Boning Pre-trim	Level of Macro-contamination
≤ 1.0	≤ 1.0	≤ 0.5	≤ 0.5	Acceptable
> 1.0 - 2.0	> 1.0 - 1.5	> 0.5 - 0.7	> 0.5 - 1.0	Marginal
> 2.0	> 1.5	> 0.7	> 1.0	Unacceptable

An average defect rating for each species processed in a shift (average of all lots) should be calculated to establish overall **trends** in dressing performance at the establishment and should be plotted in line graph form. It is this average defect rating which should be considered when adjusting the **level of sampling** for carcases and sides to normal, intensified or reduced.

2.6 CORRECTIVE ACTION

- Corrective action must address both immediate and the longer term preventive measures.

- Corrective action shall be approached on the basis of:

  - Immediate corrective action required with **unacceptable and marginal product and zero tolerance findings.**
  - Establishing trends and adjusting **unacceptable operations**.
  - Identifying repetitive and serious deficiencies and implementing corrective action to eliminate or reduce their occurrence (preventive action).

- For any **Zero Tolerance detection** identified during product monitoring the corrective action must be implemented as per the **written work instruction** (see AQIS Notice 2001/04). This instruction must cover the product involved (the individual item and the lot represented by it) and the process that produced it.

  - The corrective action must be **recorded** and the effectiveness of the action be verified and **recorded**. An example of the type of record required is at Appendix 15. Existing monitoring sheets could also be used as long as the record is comprehensive.

- **Trends** in the daily assessments should be considered in determining corrective and preventive action.

Immediate Corrective Action - Carcase

- All defects detected during monitoring shall be trimmed immediately.

  It is useful to keep the trimmed defects to help identify the areas where the process failed. This may allow the Corrective Action to be better targeted.

- One detection of a zero tolerance defect in a monitoring sample from a lot, shall subject the entire lot to the same corrective action as an unacceptable lot regardless of the overall defect rating.

- Corrective action for carcase lots recording marginal or unacceptable defect ratings shall be conducted in accordance with the appropriate option in Figure 2.

Figure: 2 Corrective Action for Carcases/Quarters

Categorisation of macro-contamination (Defect Rating) for a Lot	Corrective Action
Marginal	
• **FIRST SCORE** • **TWO SUCCESSIVE SCORES** (second on reassessment)	Repeat the assessment of that lot or treat as unacceptable as elected by the Company • Treat as unacceptable
Unacceptable	
• **FIRST SCORE** **or** • **TWO SUCCESSIVE MARGINAL SCORES** (the second from reassessment of the lot) **or** • **ONE OR MORE ZERO TOLERANCE**	• Impose an additional trim on all product in the lot - this trim is in additional and prior to pre-boning trim **or** - this trim is additional and prior to load out, pre-bagging or pre-cartoning trim of quarters, sides or carcases **or** Where product is boned on the same establishment, intensify the pre-boning trim by placing special emphasis on identified problem areas, according to the established program agreed between the company and AQIS. • The effectiveness of this trim must be verified by sampling and the results of this recorded. • There must be feedback to correct the process which created the defects and there must be a record of this.

- The efficiency of the re-trim should be **verified** by a further assessment and the results must be recorded.
- Trimming and assessment flow is summarised and illustrated in Figure 4.

Immediate Corrective Action - Offals

- All defects detected during monitoring shall be trimmed immediately.
- One recording of a zero tolerance defect in a monitoring sample from a lot, shall subject all of the offending offal types in the lot, to the same corrective action as an unacceptable lot, regardless of the defect rating.
- Corrective action for offal lots recording marginal or unacceptable defect ratings shall be conducted in accordance with the appropriate option in Figure 3.

Figure: 3 Corrective Action for Offals

Categorisation of Macro-contamination (Defect Rating) for a Lot	Corrective Action
Marginal	
• **First Score** • **Two Successive Scores (**on reassessment**)**	• Repeat the assessment or treat as unacceptable as elected by the Company. • Treat as unacceptable.
Unacceptable	
• **First Score** **or** • **One or more zero tolerance**	• Impose an additional trim on the **offending offal type/s*** (ie. determine from the recording sheet the offending offal type/s and re-trim **only those type/s**). This includes all product from the lot represented by the sample. • The effectiveness of this trim must be verified by sampling and the results of this recorded. There must be feedback to correct the process which created the defects and there must be a record of this.

* **offending offal types** are individual offal types recording an unacceptable defect rating in a monitoring sequence.

Zero Tolerance and Carcases/Quarters

♦ Where a zero tolerance defect is detected in a monitoring sample, the lot is rated unacceptable, Figure 2 provides two options for the application of corrective action to the unacceptable lot.

- Where the option of an intensified pre-boning trim is adopted, it should be tailored to the particular problem area/s and the degree of the problem.

as an example, where zero tolerance defects are periodically detected on hocks to a minor extent, the lot can be targeted for special attention to this area of the carcase at pre-trim - clearly where there is no contamination visible, there is nothing to remove.

- Where zero tolerance is identified, part of the corrective action should include a review and correction of the process controls and attention by slaughter floor trimmers to the problem area.

- These principles relating to corrective action for zero tolerance apply equally to load out.

Zero Tolerance and Offals

♦ One recording of a zero tolerance in a monitoring sample from a lot, shall subject all of the offending offal types in the lot, to the same corrective action as an unacceptable lot, regardless of the defect rating.

All offal pieces with a zero tolerance defect in a fresh offal pack shall be rejected as unsuitable for human consumption unless restored by employing the program approved for dropped offal.

Where a zero tolerance defect is detected in a thawed offal pack, the entire pack shall be rejected for human consumption.

Zero Tolerance and Boning

A zero tolerance detection after the pre-trim shall cause the boning process to be rated as unacceptable.

Corrective action should be taken as defined in the company Zero Tolerance procedure (AQIS Notice 2001/4) and should be directed at:

correcting the pre-trim;

checking product that has been pre-trimmed on the rail and on the table and in any available cartons still in the room and removing any defects.

where it has been confirmed that pre-trim has failed and contaminated product has entered the boning process, appropriate corrective action must be immediately implemented:
contaminated facilities must be identified and cleaned,
contaminated product in the room that has not yet been packaged must be subject to re-trimming using appropriate facilities, and
packaged product back to the last clear carton check should be re-examined and reworked if necessary. The sampling rate, assessment method and disposition will be as per the instructions for Zero Tolerance detections at Carton Meat Assessment.

possibly increasing the frequency of carton meat assessment to cover product that has been packed and is still in the room.

there must be feedback to the slaughter floor to ensure that any necessary corrective action is taken there as well.

where a zero tolerance defect is found during Carton Meat Assessment there must be automatic defrost procedures (described in the section 2.7).

the investigation, correct action and preventive action must be recorded.

Immediate Corrective Action - Operations

- **Critical and zero tolerance defects** shall be investigated immediately and corrective measures implemented promptly.
- Referral to the **operational source** of the defects should be sought and processes corrected.
- **Comments** on the defect recording sheets should provide a useful guide in this exercise.
- Reference should also be made to the results from **process monitoring** for operations.

Preventive Actions

Where there has been a breach of a critical limit an evaluation of why the problem occurred must occur. This assists in identifying follow-up action required to improve the future reliability of operations.

An evaluation of past monitoring sheets should occur regularly (especially where serious problems or repetitive defects have occurred). This assists in identifying follow-up action required to improve the future reliability of operations.

Examples of follow up action include:

Training in weak areas of the company's system. Records would have to be kept to verify that corrective action was taken.

Improving worker understanding of their Work Instruction through general training in meat hygiene.

Ensuring that workers who rotate through jobs understand the Work Instruction relevant to each job.

- Changing the work area or process in order that operators may more easily comply with required standards, i.e. proximity to equipment for sterilisation.

Seeking operator's opinions as to why some problems recur.

Recording follow-up action and cross-referencing the information back to the initial problem.

Implementing temporary solutions in order to overcome the immediate problem until the full cause has been identified and the problem rectified.

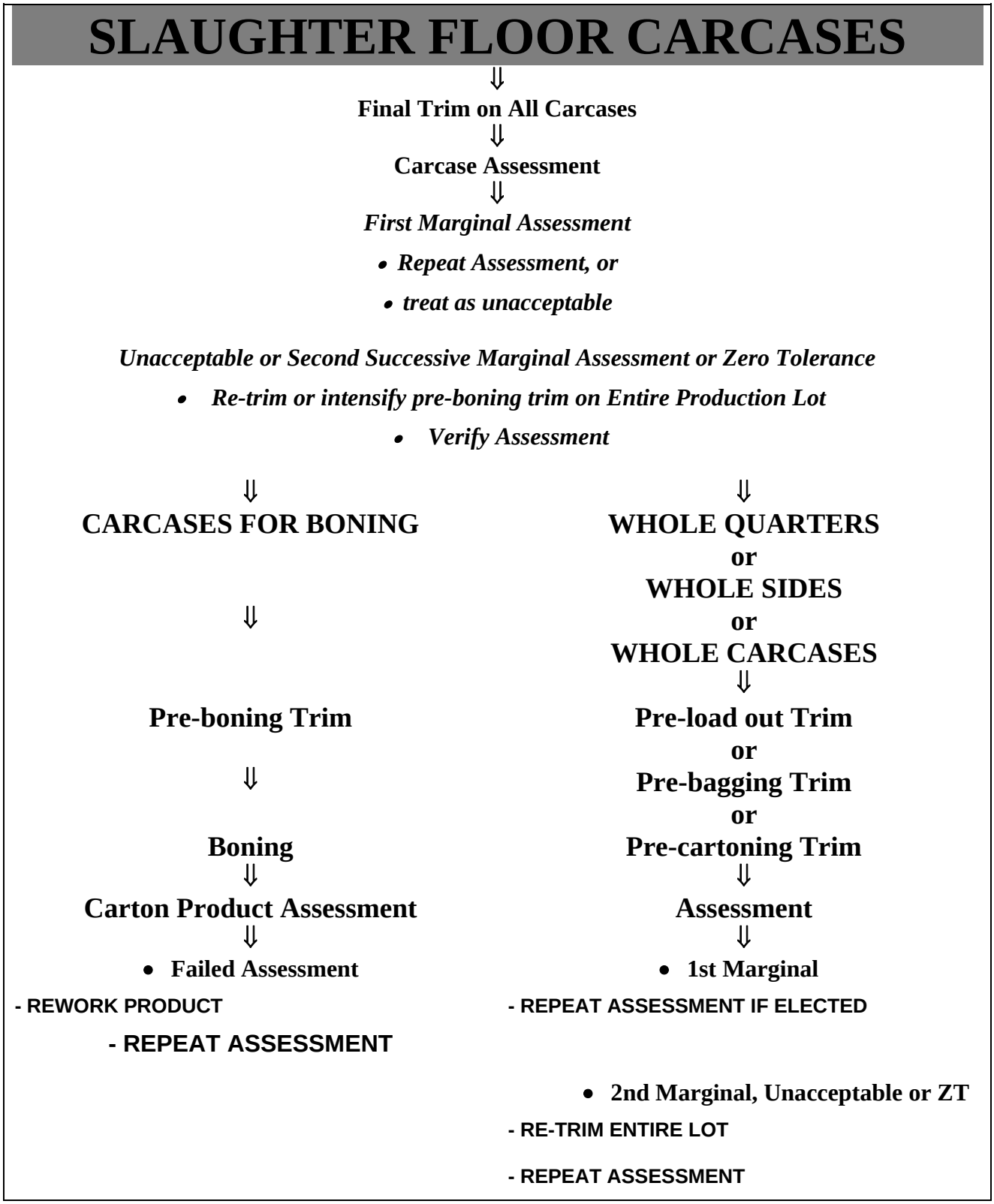
Reactions by QA monitors and company supervisors to problems should also be analysed to determine if these problems could be handled better in the future and if company policy needs to be amended.

Trends Leading to Corrective Action

♦ Trends in the average daily defect rating should be monitored and an **analysis of these trends** used in determining the overall rating of the establishment. Part 4 of the manual outlines trend analysis.

- Minor fluctuations around the mean are expected, but acute or prolonged unacceptable deviations should be included in an audit assessment of an establishment.
- The daily defect ratings should be plotted in **line graph** form and displayed as an adjunct to training.

Figure: 4 Corrective Action on the Slaughter Floor



2.7 CARTON MEAT ASSESSMENT

EMO 285 required a re-inspection of boneless manufacturing meat and bulk packed primals. Meat Hygiene Assessment extended the re-inspection scope to cover all carton meat, bulk and layer packs, boneless and bone-in.

Offal packs and primals are excluded except boneless and bone-in necks, briskets, shins, shanks and intercostals.

- **Sheep primals**, where they involve saw cuts, and shins, shanks, legs and necks are to be included in carton meat assessment.
  where legs, necks, shanks, shoulders, and breast and flaps are packed separately then a sample will be selected from one carton each half hour. Over the production shift all types must be inspected.
  it is advisable that bone dust be removed from saw cuts as it provides an ideal medium for microbiological proliferation and in the frozen state can be indistinguishable from faecal contamination.

Minimum Requirements - Assessment of Samples

- **Facilities** must be available and adequate to allow a thorough examination of the meat from the sampled cartons and to perform corrective action as necessary.

- **Lighting** at the assessment point must be **at least 600 lux**.

Sample Plan

Samples approximating 13.5 kg each must be drawn at a point following completion of carton packing (but not necessarily strapping or gluing) from each product type with a different trade description at least every 30 minutes during the day's production.

where the product is a slow moving line (i.e. 12 or less cartons produced per hour) then only 1 sample approximating 13.5kg shall be drawn from that product type for that hour of production.
Where “Combo bins are being packed the sampling rate is the same as that for cartons. That is 13.5 kg per 30 minutes, or 13.5 kg per 60 minutes for slow moving lines.

'Product type' means each product line bearing either a different trade description statement or a different trade description cipher (different chemical lean statements are different trade descriptions) but does not include lines that differ only with respect to cut mass, or fat depth.

Classification of Defects

- Appendix 9 (Appendix A to EMO 285) details defects and their classification and includes minor, major, critical and zero tolerance categories.

  The statistical basis for this program depends upon correct defect classification. Under no circumstances are defects to be either upgraded or downgraded.

Recording of Defects

- Appendix 10 (Appendix B to EMO 285) - "Control Form for the Assessment of Carton Meat Product" or an acceptable alternative form has to be used. A separate form should be used for each product type and must be used for each production shift.

  The number of defects must be progressively recorded by category (minor, major, critical) on the control form.

The description and classification of the defects (such as bone, ingesta etc.) are to be recorded

The results must be recorded in real time.

The standard for acceptability of boneless meat is that the cumulative level of defects must not exceed either of the following specified for the sample:
any defect limit for any class of defects
the combined total of minor, major, critical and zero tolerance defect limits.

Control forms must be correctly completed and copies of each completed control form retained on file for a period of not less than 2 years. This file must be freely available to authorised officers for examination.

An establishment employee assigned as a boning room quality control inspector must:

(a) conscientiously undertake these reinspection procedures
(b) be capable of recognising and classifying all defects likely to be encountered
(c) accurately and correctly record defects so that:
(i) where a sample is found to be defective the finding is entered in the correct square
(ii) all squares contain a figure (even if it is a 0 because no defects were found). Blank spaces, ticks and dashes are not acceptable on these forms
(d) inform an authorised officer whenever defect limits are approached or whenever trends develop within certain types of defects and initiate corrective action
(e) inform an authorised officer whenever defect limits are exceeded.

The criteria for minor, major and critical classifications refer to totals detected in a sample from one pack.

Zero tolerance should be recorded in the critical section of the recording form (Appendix 10) and appropriately highlighted.

One critical is allowable if there are no critical defects in the previous 26 samples from that shift.

the control sheets from the previous day or days of that same product type from the same shift must be taken into consideration in determining whether or not the limits of tolerance for critical defects have been exceeded (check back 1 or more sheets to provide the cumulative effect necessary to determine a statistical trend).

The recording sheet must be endorsed either that the previous 26 samples are clear or a defrost re-inspection is required. If a defrost re-inspection is required, the current recording sheet must be ruled off and a new sheet commenced.

In this context faeces, ingesta, milk and urine continue to be considered as critical as well as their zero tolerance classification.

A zero tolerance should also be treated as a critical for purposes of counting back 26 samples as per EMO 285.

When a major is detected in one of the first three samples of the day, the previous day/s records from the same shift shall be considered in determining if the limit has been exceeded.

for the purpose of totalling majors a critical or a zero tolerance finding is to be considered as a major and included in the total.

The recording sheet must be endorsed either that the previous 3 samples are clear or a defrost re-inspection is required. If a defrost re-inspection is required the current recording sheet must be ruled off and a new sheet commenced.

Minors are allowable provided the totals indicated in Appendix 10 are not exceeded.

for the purpose of totalling minors, any majors, criticals and zero tolerances should be included in the total count.

Corrective Action

Establishment management must take corrective action, as soon as practicable whenever adverse trends are identified or limits approached.

The principles detailed in the sections on carcases and offal should be followed.

Under the ruling for **zero tolerance**, any amount of faeces, ingesta, milk or urine detected in carton product, invokes automatic defrost re-inspection procedures (described in

the next section) on all previous product of that description produced since the last clear check (in most instances this would be the last 30 minutes) for a zero tolerance defect.

Where possible following a zero tolerance defect, the sample for reinspection as determined by Table 9 (Appendix A of EMO 286) shall be selected from cartons which have not entered the freezing process.

A zero tolerance should also be treated as a critical for the purposes of counting back 26 samples, or a major for the purpose of counting back 3 samples, as per EMO 285.

Where carton meat is found not to meet the standards set down in this Manual (EMO 285) for the carton meat assessment program, an authorised officer must be immediately informed and treatment and disposal of the meat represented by the samples must be as specified in this Manual (EMO 286)

The failed lot is that day's production of that product type up to that point.

For a zero tolerance detection, where the count-back reveals no other critical or major defects then the failed lot is all that product type since the last clear check.

The handling and disposition of all lots found unacceptable are detailed in the Australian Export Meat Manual Volume 1, under the reference to Order 286 (amended in AQIS Meat Notice 95/23).

All meat pieces with a **zero tolerance** defect in a fresh meat pack shall be rejected as unsuitable for human consumption unless restored by employing the program approved for dropped meat.

Where a **zero tolerance** defect is detected in a thawed meat pack, the entire pack shall be rejected for human consumption.

The disposition of the meat that fails carton meat reinspection is that it must not be passed as fit for human consumption unless it subsequently is judged acceptable on the basis of a defrost reinspection.

This re-inspection is undertaken by a company person under the supervision of an authorised officer in accordance with the procedures set out in below in the section "Defrost Re-inspection" (Appendix A to EMO 286).

Defrost Re-inspection

AQIS inspection staff shall:

1. Determine lot size in kilograms.
2. Select appropriate sampling plan from table set out below.
3. Randomly select required number of cartons and arrange for 5.5 kg samples to be sawn from frozen contents. Samples are to be immediately placed inside polyethylene bags, identified and allowed to thaw.

4. Have company person examine thawed samples in accordance with criteria set out in Appendix 9 (Appendix A to Order 285) under AQIS supervision.
5. Assess lot on basis of criteria set out below.
6. Permit accepted lots to be released for Human Consumption.

Unacceptable lots must either be:

- condemned, or

be subject to a treatment that ensures that it is fit for human consumption. This treatment must be acceptable to AQIS, or

be reassessed against the relevant guidelines referenced in the Australian Standard as per item 8.

Where lots have breached the limits for processing defects only, the lot may be acceptable for domestic consumption if it passes the criteria as defined in the relevant Guideline referenced in the Australian Standard. Written acceptance from the Relevant State Authority must be received prior to the product being released. To be able to take advantage of this option all defects should be recorded including the non-scoring ones during normal Carton Meat Assessment.

Table 14 – Carton Meat Re-inspection (Defrost) Sampling Plan and Accept Reject Criteria

Sampling Plan

Plan No.	Lot size	No. of sample units	Kg examined
1	less than 3628 kg	6	33
2	3628 kg to less than 10884 kg	9	49.5
3	10884 kg to less than 27210 kg	15	82.5
4	27210 kg to less than 108840 kg	22	121
5	108840 kg to less than 226750 kg	27	148.5

Acceptance and Rejection Criteria

Plan No.	Major Reject	Critical Reject	Total (major + minor) Reject
1	1	1	6
2	2	1	8
3	3	1	12
4	4	1	16
5	4	1	19

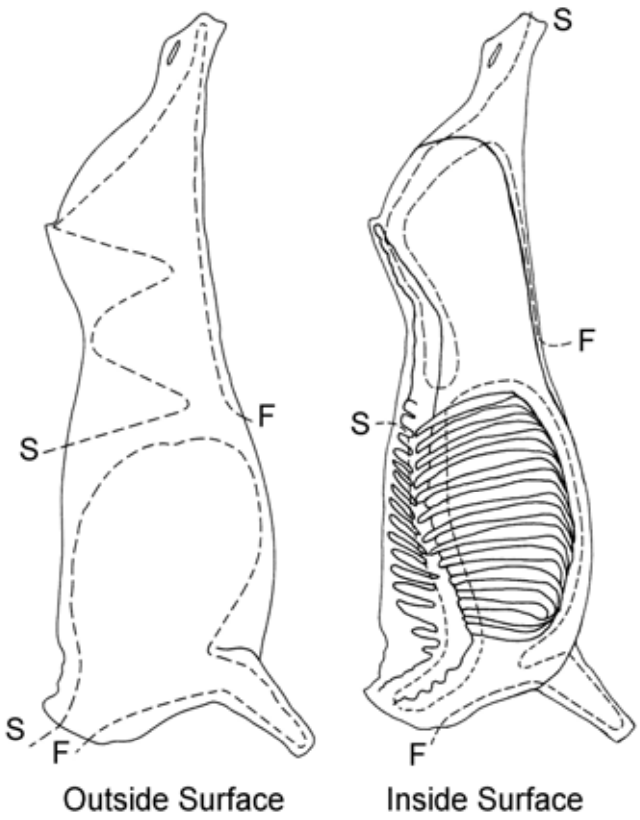
Note: For the purposes of this order, a lot includes all product produced with the product description specified in Appendix 10 (Appendix B to EMO 285) control form, from the commencement of that days production until the time that product was found not to be in compliance after carton meat inspection.

Product with the same product description produced subsequently on that day forms a new lot requiring sampling on a new - "Control Form for the Assessment of Carton Meat Product".

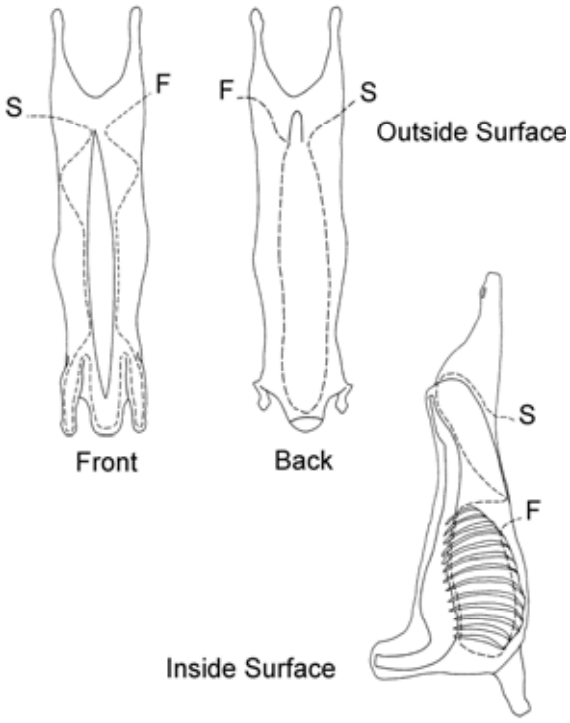
A2

Part 2: LIST OF APPENDICES

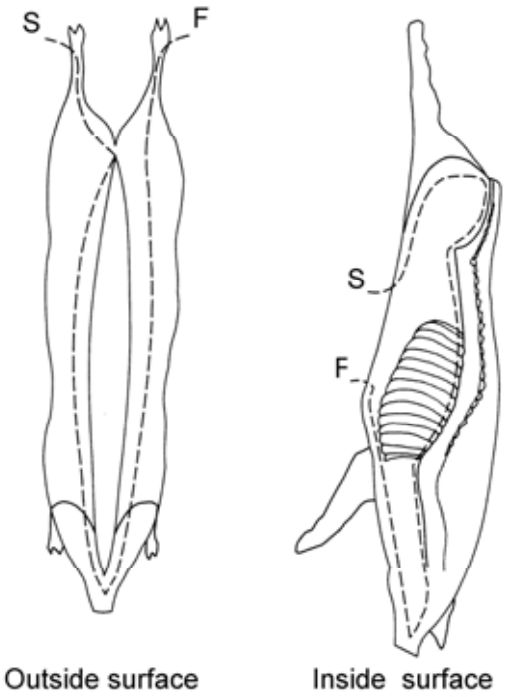
Appendix: 8A Horse/Bovine Scanning Lines



Appendix: 8B Sheep/ Goat Scanning Lines



Appendix: 8C Pig Scanning Lines



Appendix: 9 - Appendix A to Order 285

Defect Classification (Assessment of Carton Meat Packs)

	Minor	Major	Critical	Zero Tolerance
Faeces, Milk, Ingesta, Urine			**Any Amount**	**Any Amount**
Blood Clots	4-15 cm (GD)	> 15 cm (GD) or > 5 minor clots	Extensive	
Bruises	≤ 6 cm (GD) & 2 cm deep	> 6 cm (GD); or 2 cm deep; or > 5 minor bruises	Extensive	
Bone Fragments	Hard bone ≤ 4 cm (GD) or slivers (rib) < 7 cm (GD)	Hard bone > 4 cm diam (GD) or 5 fragments	Any fragment(s) that would seriously affect the product	
Detached Cartilage Ligaments	>2.5 cm long and free from muscle tissue	> 5 minor defects that would not seriously affect the product	Any cartilage or ligament that would seriously affect the product	
Seed (Not associated with inflammation)	≤ 3	4 - 10	> 10	
Rail Dust, Specks, Hide &Wool Dust	5 - 10 scattered specks	11 - 20 scattered specks	> 20 scattered specks	
Stains Discoloured Areas	1 - 4 cm (GD)	> 4 cm (GD) or > 5 minor stains	Extensive	
Other	Defects that would affect appearance but not product use	Defects that would materially affect product use	Defects that would seriously affect product use	
Hair Wool Hide	5 - 10 hairs 1 cluster of hair Hide < 1 cm diam	11 - 20 strands hair/wool 2 - 3 clusters hair/wool Hide 1 - 5 cm diam	> 20 strands hair/wool > 3 clusters hair/wool Hide > 5 cm diam	
Extraneous Material	Harmless material (not associated with inflammation eg paper, plastic, wood chips etc) < 4 sq cm	Harmless material > 4 sq cm and small insects	Any foreign substance that will cause injury or illness	
Off Condition			Any amount	
Pathological Lesions			Any lesion	

- Each minor found in a pack must be separately recorded and not amalgamated.
- Criteria for minor, major, critical or zero tolerance classifications refer to totals recorded in a sample from **one** pack
- Minors recorded under more than 5 different categories in any one pack should be treated as a major defect in that pack
- GD means Greatest Dimension

Appendix: 10 - Appendix B to Order 285

Control Form For The Assessment Of Carton Meat Product

Establishment No: Date Product Description

Classes of Defects	in sample	Cumulative Defects	Limit	in sample	Cumulative Defects	Limit	in sample	Cumulative Defects	Limit
	No 1			**No 2**			**No 3**		
Minor			2			4			6
Major			0(a)			0(a)			0(a)
Critical			0(b)			0(b)			0(b)
TOTAL			2			4			6
Time									
	No 4			**No 5**			**No 6**		
Minor			7			9			10
Major			1			1			1
Critical			0(b)			0(b)			0(b)
TOTAL			7			9			10
Time									
	No 7			**No 8**			**No 9**		
Minor			11			13			14
Major			1			2			2
Critical			0(b)			0(b)			0(b)
TOTAL			11			13			14
Time									
	No 10			**No 11**			**No 12**		
Minor			15			16			18
Major			2			2			2
Critical			0(b)			0(b)			0(b)
TOTAL			15			16			18
Time									
	No 13			**No 14**			**No 15**		
Minor			19			20			21
Major			3			3			3
Critical			0(b)			0(b)			0(b)
TOTAL			19			20			21
Time									
	No 16			**No 17**			**No 18**		
Minor			23			24			25
Major			3			3			3
Critical			0(b)			0(b)			0(b)
TOTAL			23			24			25
Time									
	No 19			**No 20**			**No 21**		
Minor			26			27			28
Major			3			4			4
Critical			0(b)			0(b)			0(b)
TOTAL			26			27			28
Time									

Establishment Operator ☐ product conforms with assessment standards

.....

.....

(signature) (AQIS signature)

(a) One is allowable if no majors in previous 3 samples from the same product description. For the purpose of totalling majors, a critical is to be considered as equivalent to a major and included in the total.

(b) One is allowable if there were no criticals in previous 26 samples.

Appendix: 11 Carcase Defect Recording Sheet

Date.....Assessor.....Establishment.....

☐ Slaughter Floor ☐ Post-pre-trim ☐ Pre-bagging ☐ Load-out ☐ Load-in

Ovine **Bovine** **Porcine**

☐ Sucker lamb ☐ Daggy ☐ Vealer ☐ Feedlot ☐ Domestic ☐ Porker

☐ Older lamb ☐ Dirty/Wet ☐ Yearling ☐Feral ☐ Baconer

☐ Sheep ☐ Seedy ☐ Back-Fatter

☐ Other.....

Number in Lot..... **Number of Samples**.....…… **Operation location**…….

Side/Carcase (Up to 5 per Column)

Defect	**Score**	1 to 5	6 to 10	11 to 15	16 to 20	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50	**Sub Totals** Mi ZT	Ma	Cr	
(1) Faeces, Milk	Zero Tolerance Any														
Ingesta,															
Urine															
(2) Strands - Hair, Wool,	Minor (5 - 10)														
	Major (11 - 20)														
	Critical (> 20)														
(3) Clusters - Hair, Wool,	Minor (1)														
	Major (2 - 3)														
	Critical (> 3)														
(4) Bruises, Clots, Offal Pieces	Minor (2-5 cm diam)														
	Major (> 5 cm diam)														
	Critical (≥ 2 majors)														
(5) Hide, Scurf, Toe-nails	Minor (< 1 cm)														
	Major (1 - 5cm)														
	Critical (> 5 cm)														
(6) Pathology	Critical Any														
(7) Smears, Stains (includes bile)	Minor (≤ 1 cm diam)														
	Major (> 1 cm diam)														
	Critical(> 2cm diam)														
(8) Specks, Rail Dust, Hide &	Minor (5 - 10)														
	Major (11 - 20)														

Wool Fallout	Critical (> 20)														
(9) Seed	Minor(5 - 10)														
	Major (11 - 20)														
	Critical (> 20)														
(10) Foreign Objects/ Tissue	Minor 1 incidence														
	Major 2 incidence														
	Critical 3 incidence														
											Total				

Defect Scores	Minor x 1	
	Major x 3	
	Critical x 6	
	Zero Tolerance x 10	
Total Defect Score		

Comments

Defect Rating = Total Defect Score / Number of samples =

Overall Defect Rating **Acceptable** **Marginal** **Unacceptable**

Appendix: 12 Offal Defect Recording Sheet

Date.....Assessor.....Establishment.....

Type of Offal Sampled (10 pieces per column, identify type)

Defect	Score	1	2	3	4	5	6	7	8	9	10
(1) Faeces, Ingesta, Milk, Urine	Zero Tolerance Any										
(2) Strands - Hair, Wool	Minor (2)										
	Major (3-8)										
	Critical (>8)										
(3) Clusters - Hair, Wool	Minor (1)										
	Major (2)										
	Critical (> 2)										
(4) Bruises, Clots	Minor (<1 cm diam)										
	Major (1-3 cm diam)										
	Critical (>.3 cm diam)										
(5) Foreign Objects / Tissue	Minor (1 incidence)										
	Major (2 incidences)										
	Critical (3 incidences)										
(6) Smears, Stains (includes bile)	Minor (< 1 cm diam)										
	Major (> 1 cm diam)										
	Critical (> 2 cm diam)										
(7) Scar Tissue	Minor (≤ 4)										
	Major (5-8)										
	Critical (>8)										
(8) Pathology	Critical any incidence										
Individual Offal Minors x 1											
Individual Offal Majors x 3											
Individual Offal Criticals x6											
Individual Offal Zero Tolerances x10											
Individual Offal Total Defect Score											
Individual Offal Defect Rating											

All Offals Total Defect Score	
All Offals Defect Rating	

Comments:

Defect Rating = Total Defect Score / Number of Samples

Overall Defect Rating	**Acceptable**	**Marginal**	**Unacceptable**

Appendix: 13 Carcase Defect Recording Sheet (Example)

Date...***30 Sept 1998***.....Assessor.....***John Smith.***.....Establishment.....***1002...***.....

Ovine **Bovine** **Porcine**

☐ Sucker lamb ☐ Daggy ☐ Vealer ☐ Feedlot ☐ Domestic ☐ Porker

☒ Older lamb ☐ Dirty/Wet ☐ Yearling ☐Feral ☐ Baconer

☐ Sheep ☐ Seedy ☐ Back Fatter

☐ Other.....

Number in Lot.....89.... **Number of Samples**.....13…… **Operation location** Slaughter Floor

Side/Carcase Number (Up to 5 per Column)

Defect	Score	1 to 5	6 to 10	11 to 15	16 to 20	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50	Sub Totals Mi ZT	Ma	Cr	
(1) Faeces, Milk															
Ingesta,	Zero Tolerance Any		***1***												***1***
Urine															
(2) Strands - Hair, Wool,	Minor (5 - 10)	*1*										***1***			
	Major (11 - 20)	*1*											***1***		
	Critical (> 20)														
(3) Clusters - Hair, Wool,	Minor (1)														
	Major (2 - 3)														
	Critical (> 3)														
(4) Bruises, Clots, Offal Pieces	Minor (2-5 cm diam)		***1***									***1***			
	Major (> 5 cm diam)														
	Critical (≥ 2 majors)														
(5) Hide, Scurf, Toe-nails	Minor (< 1 cm)														
	Major (1 - 5cm)														
	Critical (> 5 cm)		***1***											***1***	
(6) Pathology	Critical Any														
(7) Smears, Stains (includes bile)	Minor (≤ 1 cm diam)														
	Major (> 1 cm diam)														
	Critical(> 2cm diam)														
(8) Specks, Rail Dust, Hide & Wool Fallout	Minor (5 - 10)			***1***								***1***			
	Major (11 - 20)														
	Critical (> 20)														
(9) Seed	Minor(5 - 10)														
	Major (11 - 20)														

	Critical (> 20)														
(10) Foreign Objects/ Tissue	Minor 1 incidence														
	Major 2 incidence														
	Critical 3 incidence														
											Total	*3*	*1*	*1*	*1*

Defect Scores	Minor x 1	*3*
	Major x 3	*3*
	Critical x 6	*6*
	Zero Tolerance x 10	*1 0*
Total Defect Score		*2 2*

Comments

Zero tolerance - faeces

Critical - wool dust

Defect Rating = Total Defect Score / Number of samples = ***22*** / ***13*** = ***1.7***

Overall Defect Rating ~~**Acceptable**~~ **Marginal** ~~**Unacceptable**~~

Appendix: 14 Offal Defect Recording Sheet (Example)

Date.....***30 Sept 1995***.....Assessor.....***John Smith***.....Establishment***.....1002***....

Type of Offal Sampled (10 pieces per column, identify type)

Defect	**Score**	1 ***CK***	2 ***CH***	3 ***CL***	4 ***CTa***	5 ***LL***	6 ***LK***	7 ***LH***	8 ***PL***	9 ***PK***	10 ***PH***
(1) Faeces, Ingesta, Milk, Urine	Zero Tolerance Any										
					111						
(2) Strands - Hair, Wool	Minor (2)										
	Major (3-8)				***111***						
	Critical (>8)										
(3) Clusters - Hair, Wool	Minor (1)										
	Major (2)										
	Critical (> 2)										
(4) Bruises, Clots	Minor (<1 cm diam)	***11***			***11***				***11***		***11***
	Major (1-3 cm diam)					***1***					
	Critical (>.3 cm diam)		***1***								
(5) Foreign Objects / Tissue	Minor (1 incidence)	***1***									
	Major (2 incidences)										
	Critical (3 incidences)										
(6) Smears, Stains (includes bile)	Minor (< 1 cm diam)	***1***									
	Major (> 1 cm diam)										
	Critical (> 2 cm diam)										
(7) Scar Tissue	Minor (< 4)		***11***			***11***				***11 1***	
	Major (5-8)										
	Critical (>8)										
(8) Pathology	Critical any incidence										
Individual Offal Minors x 1		***4***	***2***		***2***	***2***			***2***	***3***	***2***
Individual Offal Majors x 3					***3***	***1***					
Individual Offal Criticals x6			***1***								
Individual Offal Zero Tolerances x10					***3***						
Individual Offal Total Defect Score		***4***	***8***		***41***	***5***			***2***	***3***	***2***
Individual Offal Defect Rating		***0.4***	***0.8***	***0.0***	***4.1***	***0.5***	***0.0***	***0.0***	***0.2***	***0.3***	***0.4***
All Offals Total Defect Score		***65***									
All Offals Defect Rating		***0.65***									

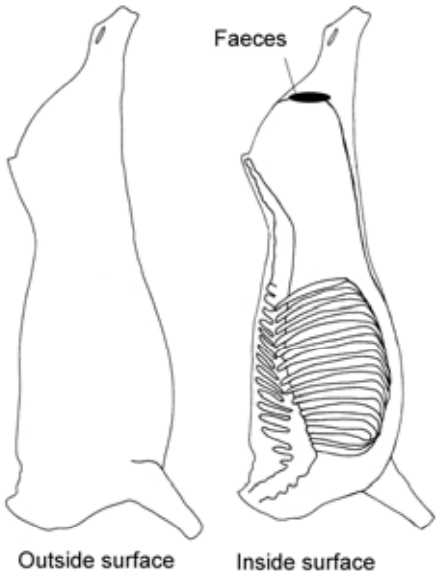
Comments:
Offending Offal Cattle Tails (DR 4.1)

Defect Rating = Total Defect Score / Number of Samples = 65 / 100 = **0.65**

Overall Defect Rating ~~**Acceptable**~~ ~~**Marginal**~~ **Unacceptable**

Note: Corrective action limited to Tails

Appendix 15 Zero Tolerance Detection Report (Example)



Lot Identification *Bodies 101 – 200 (lot size 100, 3 lots per day)*
Time ZT found *10.45 am*
Monitoring point *MHA check on the slaughter floor*
Defect *Faeces found on rim of topside of side 165 L.*

Corrective Action
Lot *Retained with tag 2301 (bodies 101 – 200). Boning room foreman notified.*
Side *Defect Trimmed*
Process *First leg opening cut in wrong place. Legger reinstructed. Trimmers instructed to be extra vigilant in this area particularly for the carcase between the first leg and the trim station (15 bodies).*

Verification *Follow-up MHA of lot(101 – 200) showed no ZTs present (MHA record completed). First legger procedure checked and is following work instruction correctly (11.15 am)*

Slaughter Floor Monitor Slaughter Floor Supervisor

Corrective Action (rework)
Location *Boning room pre-trim*
Process *Extra Pre-trimmer stood up for the day (offending lot intermingled due to grading into chillers). Pre-trimmers warned about defect. Instructed to be extra vigilant around the rim of the topside.*

Verification *Post pre-trim MHA checks doubled. No Zero tolerance defects found (pre-trim MHA record completed)*

Boning Room Monitor Boning Room Foreman

PART 3

RATITE MONITORING

3

RATITE MONITORING

3.1 AIMS

- To outline the procedures for monitoring processing and end product standards of ratite meat. The program has been designed to fulfil all of the requirements of the "Australian Standard for Hygienic Production of Meat for Human Consumption 2nd Edit." with respect to the implementation of quality assurance programs.

- To confirm that process standards of meat hygiene have been satisfied and that the operations have been conducted in accordance with best manufacturing practice resulting in minimal macro and micro-contamination of product.

- To identify:

    - Threshold levels for the triggering of remedial action when monitoring indicates that standards have not been met.
    - A mechanism which tracks trends in these outputs over time and reconciles process standards with the results of product monitoring.

3.2 SCOPE

- These procedures apply to all export establishments processing ratite meat for human consumption, from the time of receival of the animal at the establishment to load out of the processed and wrapped product.

    - The program has been primarily designed for ratite processing and product but may be expanded as deemed necessary.

- The scope of this protocol is independent of overseas country listings held by individual establishments.

3.3 MONITORING AND RECORDING

- Process monitoring should be conducted using the same principles as outlined in Part 1 of this manual.

    - Results should be recorded on forms which presents the same data as the example "Ratite Process Monitoring Sheet" (Appendix 16).

- Product monitoring should be conducted using the same principles as outlined in Part 1 and 2 of this manual.

- **Ratite carcases** should be assessed using the criteria detailed on the "Ratite carcase Recording Sheet" (Appendix 17).

    - **Ratite Carton product** should be assessed using the principles outlined in Part 2 of this manual, employing the criteria detailed in Appendix 9 (feathers and quills should be substituted for hairs and wool) and the recording form shown in Appendix 10.

3.4 CORRECTIVE ACTION

- Corrective action and verification should be conducted using the same principles as detailed in Parts 1 and 2 of this manual.

A3

Part 3: LIST OF APPENDICES

Appendix: 16 Ratite Process Monitoring Sheet

Establishment.…..…...Monitor.....….….....Date.....Time.....
.....

Check	Scale	Recording	M	U	Comments
Area 1	10		**M**	**U**	
♥ Bird Receival			(×2)	(×4)	
♥ Animal Welfare		No Rated			
♣ Ante-mortem Inspection		**Rating**			
♥ Stunning/ Sticking					
Area 2	10		**M**	**U**	
♣ Feather Removal			(×2)	(×4)	
♠ Feet and Head Removal		No Rated			
♠ Skinning		**Rating**			
♠ Evisceration					
♠ Post mortem inspection					
♠ Trimming					
Area 3	10		**M**	**U**	
♠ Hygiene, boning room			(×2)	(×4)	
♠ Meat Handling		No Rated			
♣ Accumulation, product flow		**Rating**			
♠ Dropped meat					
♣ Vacuum packaging					
♣ Wrapping material					
♣ Carton handling					
♠ Inedible material					
♣ Carton room					
♠ Hygiene personnel					
Area 4	10		**M**	**U**	
♠ Temperatures meat & air			(×2)	(×4)	
♠ Time to refrigeration		No Rated			
♦ Importing country requirements		**Rating**			
♣ Part cartons					
♦ Product description					
♠ Meat reinspection					
Area 5	10		**M**	**U**	
♣ Chiller structure/ hygiene			(×2)	(×4)	
♣ Freezer structure/ hygiene		No Rated			
♠ Chiller temperature records		**Rating**			

♠ Freezer temperature records
♠ Product temperature chiller
♠ Product temperature freezer
♣ Load out structure / hygiene
♣ Transport hygiene
♠ Product temperature load out

♥Animal welfare ♠ Contamination high risk ♣ Contamination low risk ♦ Legislation/Other country requirements (M - Marginal U - Unacceptable)

Conformity = 50- (total of marginal and unacceptable ratings on all critical operations) ---------- (Expressed as a percentage)
Index 50

Overall Process Rating	**Acceptable**	**Marginal**	**Unacceptable**

Appendix: 17 Ratite Carcase Defect Recording Sheet

Date.....Assessor.....Establishment..... .....

Species..... ….**Number in Lot**.....……**Number of Samples**.....……

Side/Carcase (Up to 5 per Column)

Defect	**Score**	1 to 5	6 to 10	11 to 15	16 to 20	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50	**Sub Totals** Mi ZT	Ma	Cr	
(1) Faeces, Ingesta															
	Zero Tolerance Any														
(2) Feathers, Quills	Minor (1 - 2)														
	Major (3 - 5)														
	Critical (> 5)														
(3) Clusters - Dander (GD)	Minor (<25mm)														
	Major (25-50mm)														
	Critical (>50mm)														
(4) Bruises, Clots, Offal Pieces	Minor (2-5 cm diam)														
	Major (> 5 cm diam)														
	Critical (≥ 2 majors)														
(5) Hide	Minor (< 1 cm)														
	Major (1 - 5cm)														
	Critical (> 5 cm)														
(6) Pathology	Critical Any														
(7)Smears, Stains (includes bile)	Minor (≤ 1 cm diam)														
	Major (> 1 cm diam)														
	Critical(> 2cm diam)														
(8) Specks, Rail Dust, Hide & Fallout	Minor (5 - 10)														
	Major (11 - 20)														
	Critical (> 20)														
(9) Seed	Minor(5 - 10)														
	Major (11 - 20)														
	Critical (> 20)														
(10) Foreign Objects/	Minor 1 incidence														
	Major 2 incidence														

Tissue	Critical 3 incidence														
											Total				

Defect Scores	Minor x 1	
	Major x 3	
	Critical x 6	
	Zero Tolerance x 10	
Total Defect Score		

Comments

Defect Rating = Total Defect Score / Number of samples =

Overall Defect Rating **Acceptable** **Marginal** **Unacceptable**

PART 4

GUIDE TO THE PREPARATION OF

CHARTS FOR TREND ANALYSIS

4

GUIDE TO THE PREPARATION OF CHARTS FOR TREND ANALYSIS

4.1 INTRODUCTION

Part 4 describes simple trend charts and their use in trend analysis. Part 4 also describes the construction and interpretation of control charts.

- The effectiveness of a process can be tracked by keeping accurate records and monitoring trends. Charts or graphs allow the mass of data from sampling to be viewed in an easily understood visual format.
- Charts can be used:
  - To monitor trends in a product line or process, and
  - To assist in deciding upon adjustments to a process.

Trend Charts

A simple trend chart shows general changes in a process by tracking variation in product standards and operations in a process. Adjustments in procedures can be made to promote or reverse a particular trend.

Control Charts

A control chart is a more advanced form of graph than the simple trend chart. It increases the ability to interpret data by indicating when a process is developing a problem more early than a simple trend chart.

4.2 SIMPLE TREND CHARTS

- Simple trend charts reveal the movement of product or process standards over time.
  - Patterns are observed and analysed for changes.
  - Adjustments can then be made to maintain or improve procedures and product.

- A simple trend chart for defect ratings plots the daily average from each group of samples taken.
  - The sample (or lot) values obtained in each group (or shift) are averaged.
  - The average of each shift is calculated by adding the lots together for that shift and dividing by the number of lots.

to calculate the average, the following general equation is used:

$$\text{Average} = \frac{\text{sum of lots}}{\text{number of lots}}$$

- For process monitoring, each conformity index can be plotted onto a simple trend chart.

- The defect rating and process monitoring data are plotted on separate charts along with their specified marginal and unacceptable zones.

- General trends can be monitored to determine production performance.

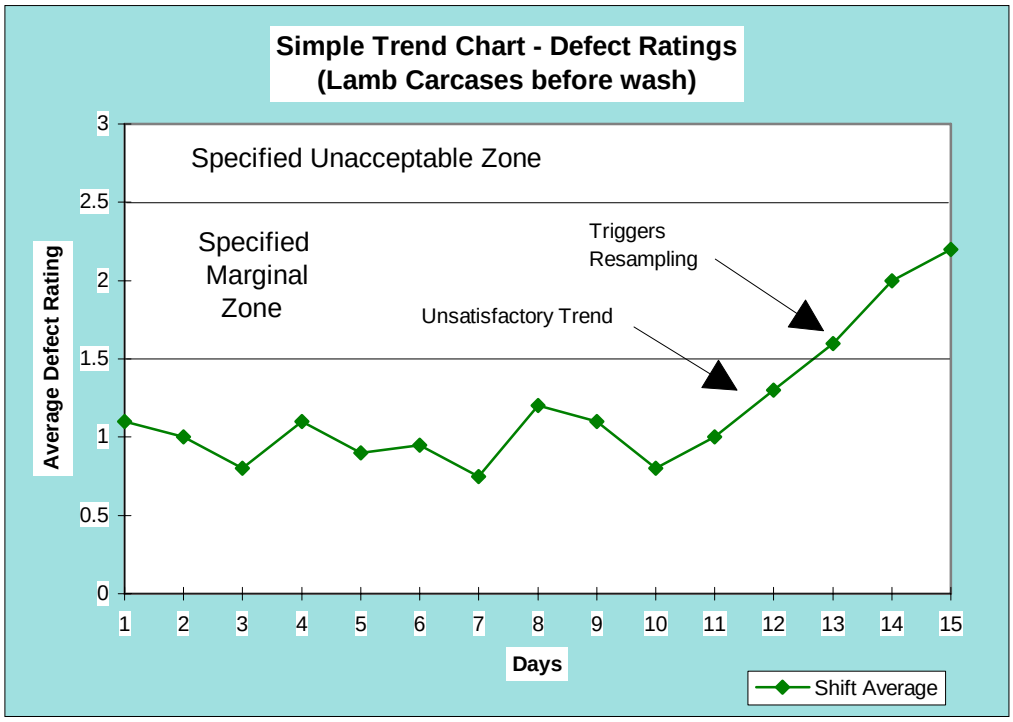
Preparing a Simple Trend Chart: Example

- Defect ratings for lamb carcases before the final wash are shown below in Table 15 .
  - The average of three lots for each shift is calculated.
  - The shift average is plotted on the Chart 1.

Table:15 Defect Rating Values for Lamb Carcases before wash (one shift per day)

Shift	Values for Lots			Shift
	1	2	3	Average
1	1.10	1.30	0.90	1.10
2	1.20	0.80	1.00	1.00
3	0.65	0.85	1.00	0.83
4	0.90	1.30	1.10	1.10
5	1.00	1.00	0.70	0.90
6	1.10	0.75	1.00	0.95
7	0.80	0.80	0.65	0.75
8	1.30	1.00	1.30	1.20
9	1.10	0.90	1.30	1.10
10	0.75	0.85	0.80	0.80
11	0.90	0.95	1.15	1.00
12	1.40	1.25	1.25	1.30
13	1.65	1.50	1.65	1.60
14	2.15	1.95	1.90	2.00
15	2.20	2.10	2.30	2.20

Chart: 1 Simple Trend Chart - Defect Ratings (Lamb Carcases before wash)



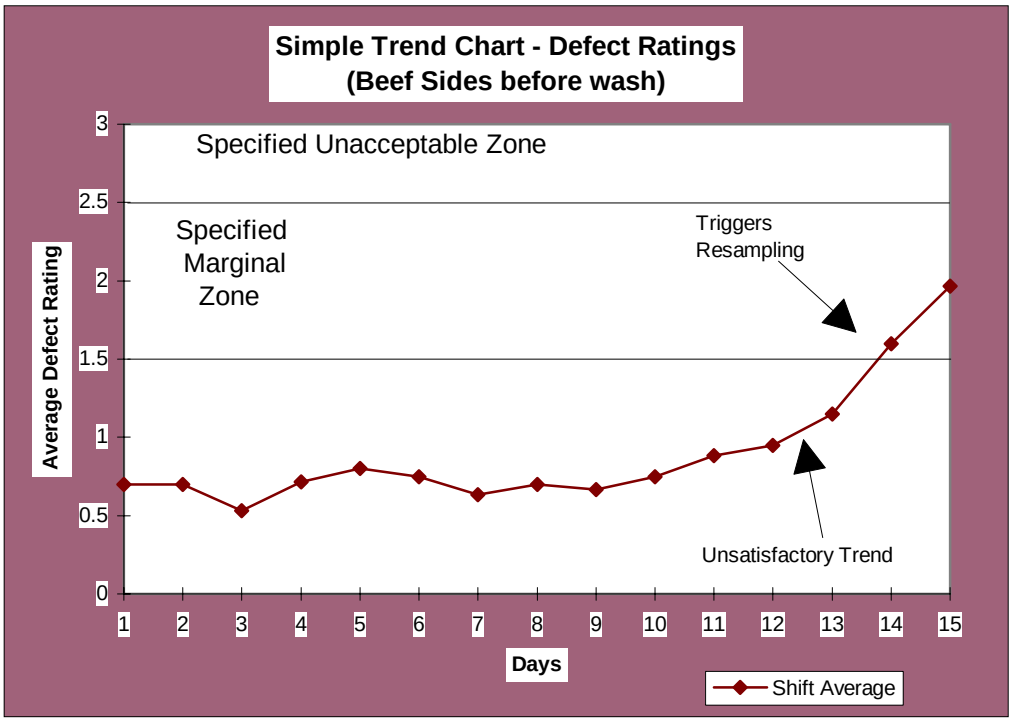
- ♦ General trends in the product standard can be followed from the chart.
  - Trends toward the marginal and unacceptable zones can be avoided by intervening before thresholds in the specified zones are reached.

- ♦ Using the same method, other defect ratings are converted into a simple trend chart.
  - Defect rating data for beef sides (before the wash) are shown in Table 16.
  - The shift average is plotted in Chart 2.

Table: 16 Defect Rating values for beef sides before wash (one shift per day)

Shifts	Values for Lots			Shift Average
	1	2	3	
1	0.60	0.70	0.80	0.70
2	0.65	0.75	0.70	0.70
3	0.45	0.65	0.50	0.53
4	0.80	0.70	0.65	0.72
5	0.85	0.75	0.80	0.80
6	0.70	0.80	0.75	0.75
7	0.60	0.70	0.60	0.63
8	0.80	0.60	0.70	0.70
9	0.60	0.65	0.75	0.67
10	0.70	0.80	0.75	0.75
11	0.90	0.85	0.90	0.88
12	0.90	1.00	0.95	0.95
13	1.20	1.15	1.10	1.15
14	1.60	1.70	1.50	1.60
15	2.10	2.00	1.80	1.97

Chart: 2 Simple Trend Chart - Defect Ratings (Beef Sides before wash)



♦ Trends in process monitoring can also be assessed on simple trend charts.

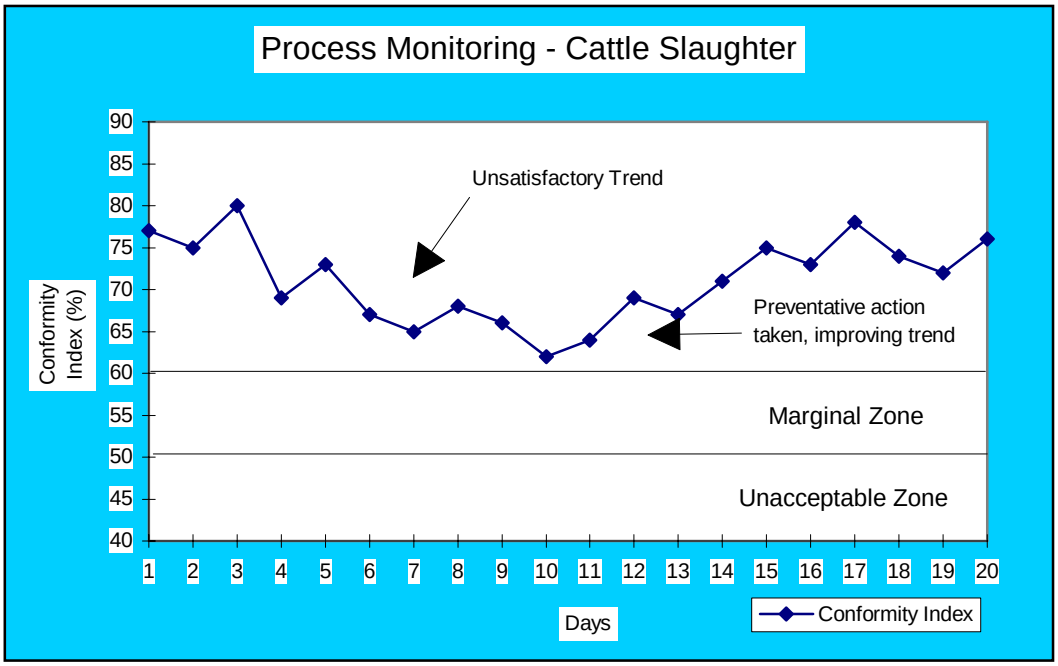
- Each conformity index is plotted on a chart.
- By tracking trends, intervention can be taken before the conformity index falls below the specified acceptable level.
- An example of process monitoring data is shown in Table 17.
- The data is plotted in Chart 3.

Table: 17 Conformance Indices for cattle slaughter

Day	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Conformity Index (%)	77	75	80	69	73	67	65	68	66	62

Day	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Conformity Index (%)	64	69	67	71	75	73	78	74	72	76

Chart: 3 Process Monitoring - Cattle Slaughter



4.3 CONTROL CHARTS

- Control charts are more advanced than simple trend charts. They show control limits which distinguish between intrinsic variation in a process and real deviation when a process is faulty.
    - The control limits are marked on the chart along with the sampling data and specified marginal and unacceptable zones.

values within control limits reflect intrinsic variation,

values outside limits indicate fault in the process.

- Control charts offer greater precision in interpreting the operation of a process than simple trend charts.
    - Problems or improvements are difficult to recognise early without control limits. Early detection allows action to be taken well before marginal or unacceptable zones are reached.
    - Intrinsic variation may be wrongly identified in simple trend charts as a process fault resulting in unnecessary searches for causes.
- The assumption in the construction of control charts is that a process is in control at the time of establishing control limits.
    - A process is in control when there is minimal variation in final product.
    - If a process is not in control, the limits will be too wide to act as an early warning.
- The key objective in bringing a process under control is to eliminate or minimise factors contributing to variation in the process.
    - Simple trend charts can be useful in achieving these objectives.
    - Control charts ensure control is maintained in a process once established.

Types of Control Charts

Two types of Control Charts can be constructed:

- First is the **X Chart** for plotting the overall average in product standards.
    - By plotting this overall average, variation can be tracked.
    - If a process is in control, then values should fall within control limits.

- Second is the **R Chart** for plotting the range of product standards.
    - The R Chart differentiates between constant and variable components of a process (displayed as a total in the X Chart).

variable components are inputs such as incoming livestock or different personnel,

constant components are machine operations that usually run with little change.

- Control Charts are constructed by manipulation of data.

Manipulation of Data

- As with the simple trend chart, **the average** of each group of samples is calculated.
- To create control charts, the **range** for each group of samples is also calculated. The range is simply the highest sample value minus the lowest sample value. The formula is as follows:

$$\text{Range} = x_{max} - x_{min.}$$

- The range for each group of samples is totalled and divided by the number of groups to obtain an **Average Range**.

X Chart

The X Chart shows the average values for each group of samples.

- Once the average of each group is calculated, a **Grand Average** is taken of all groups. In other words, the group averages are summed and divided by the number of groups.
- The Grand Average forms the centre line (CL) of the control chart.
- To determine the **control limits** on the X Chart, an easy to read table adopted from Grant and Leavenworth 1988 provides the **A_2 factor** (see Table 18). The Upper Control Limit (UCL) and the Lower Control Limit (LCL) are calculated as follows:
  - UCL = Grand Average + A_2 x Average Range
  - LCL = Grand Average - A_2 x Average Range
- Fluctuations within these limits can be expected in a controlled process because of intrinsic variation in a process.

R Chart

The R Chart shows the range for each group of samples.

- The Average Range of all groups forms the centre line (CL) of the chart.
- Table 18 shows the D_4 and D_3 factors. the UCL and the LCL for the R Chart are calculated as follows:

- UCL = D_4 x Average Range.
- LCL = D_3 x Average Range.

Table: 18 Factors for determining the control limits on X and R Charts

No of samples in a group	Factor for X Chart A2	Factor for R Chart LCL – D3	Factor for R Chart UCL - D4
2	1.88	0.00	3.27
3	1.02	0.00	2.57
4	0.73	0.00	2.28
5	0.58	0.00	2.11
6	0.48	0.00	2.00
7	0.42	0.08	1.92
8	0.37	0.14	1.86
9	0.34	0.18	1.82
10	0.31	0.22	1.78
11	0.29	0.26	1.74
12	0.27	0.28	1.72
13	0.25	0.31	1.69
14	0.24	0.33	1.67
15	0.22	0.35	1.65
16	0.21	0.36	1.645
17	0.20	0.38	1.62
18	0.19	0.39	1.61
19	0.19	0.40	1.60
20	0.18	0.41	1.59

Example

- This example uses defect ratings for lamb carcases before final wash to construct X and R charts. The values obtained are listed below in Table 18. Ten groups of samples are shown. Preferably, at least twenty groups of three samples should be used to improve the validity of the data.

- Control limits allow action to be taken early before the index falls below the specified acceptable level.

- Control limits ensure that action is taken to adjust controllable fluctuations.

- Trends in conformance indices can also be monitored on control charts.

    - An intensified frequency of sampling may be necessary to obtain sufficient data to construct the control charts. When twenty groups of three samples have been collected, the frequency can return to a normal or reduced frequency.

    - A sample equates to each monitoring sheet and a group of three averaged sheets produces the data for plotting values on control charts.

Table: 19 Defect Rating values for lamb carcases before final wash (one shift per day)

Shifts	Values for Lots			Shift	Shift
	1	2	3	Average	Range
1	0.60	0.70	0.80	0.70	0.20
2	0.65	0.75	0.70	0.70	0.10
3	0.45	0.65	0.50	0.53	0.20
4	0.80	0.70	0.65	0.72	0.15
5	0.85	0.75	0.80	0.80	0.10
6	0.70	0.80	0.75	0.75	0.10
7	0.60	0.70	0.60	0.63	0.10
8	0.80	0.60	0.70	0.70	0.20
9	0.60	0.65	0.75	0.67	0.15
10	0.70	0.80	0.75	0.75	0.10
			TOTALS:	7.017	1.40

$$\textbf{Grand Average} = \frac{7.017}{10} = 0.7071$$

$$\textbf{Average Range} = \frac{1.40}{10} = 0.14$$

For the X Chart,

- Table 17 shows that the A_2 value is 1.02 as there are three samples in each shift.
  - **UCL** = 0.7017 + A_2 x Average Range = 0.7017 + 1.02 x 0.14 = 0.84
  - **LCL** = 0.7017 - A_2 x Average Range = 0.7017 – 1.02 x 0.14 = 0.56
  - These can be plotted to create the X chart.

For the R Chart,

- Table 17 shows that D_4 has a value of 2.57.
  - **UCL** = D_4 x Average Range = 2.57 x 0.14 = 0.36
- Table 17 shows that D_3 is equal to zero.
  - **LCL** = D_3 x Average Range = 0 x 0.14 = 0

Future Sampling Data

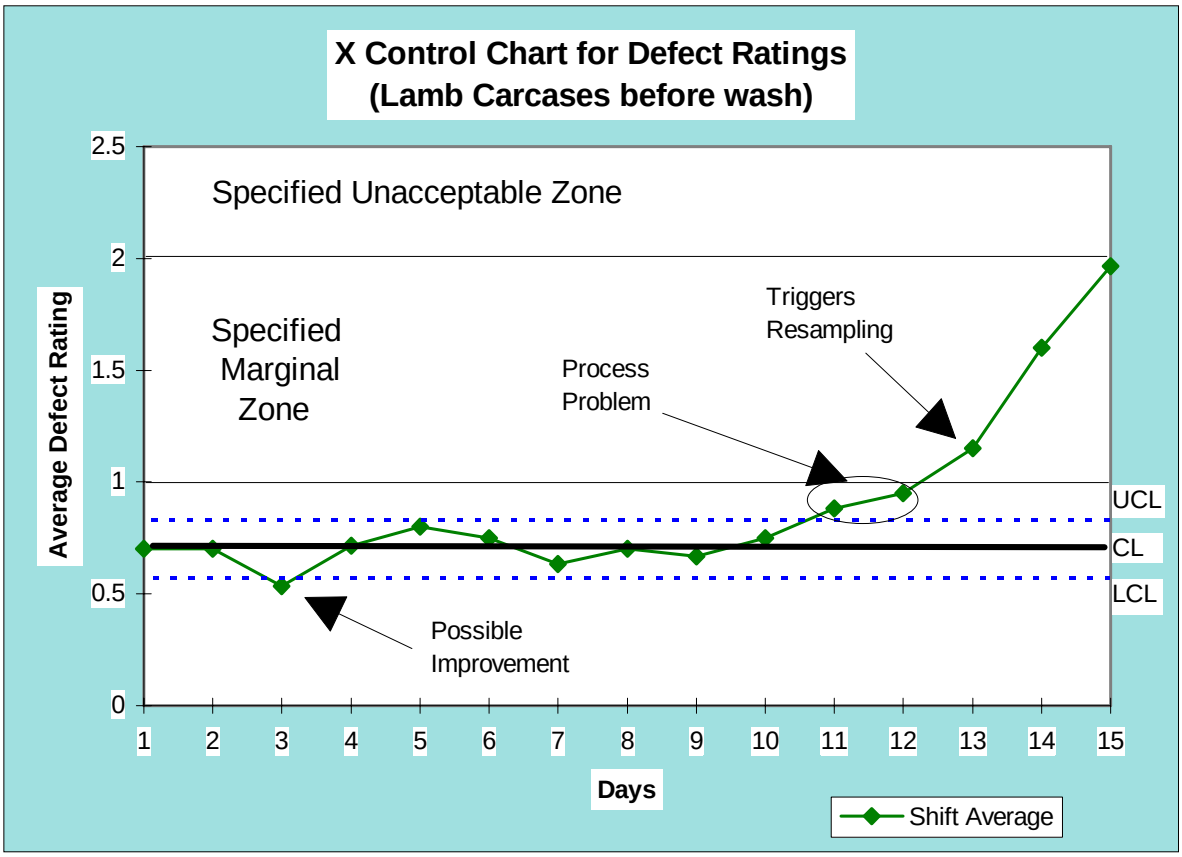
The charts are drawn up with the original data and future data is then plotted onto the chart. Further data, such as that below (Table 20), has been included on the X and R charts (Charts 4 and 5).

Table: 20 Further sampling data

Shifts	Values for Lots			Shift Average	Shift Range
	1	2	3		
11	0.90	0.85	0.90	0.88	0.05
12	0.90	1.00	0.95	0.95	0.10
13	1.20	1.15	1.10	1.15	0.10
14	1.60	1.70	1.50	1.60	0.20
15	2.10	2.00	1.80	1.97	0.30

The Charts

Chart: 4 X Control Chart for Defect Ratings (Lamb Carcases before wash)



- Fluctuations on the X chart relate to all (constant and variable) components of a process.

- When interpreting the X chart, averages that fall within the UCL and LCL can be considered intrinsic variation. There is a change in the process only when a value moves outside the UCL and LCL.

    - For example, the day three value fell outside the LCL.

This may be an improvement in the system. The source of the fluctuation could be identified and used in the future to improve the process.

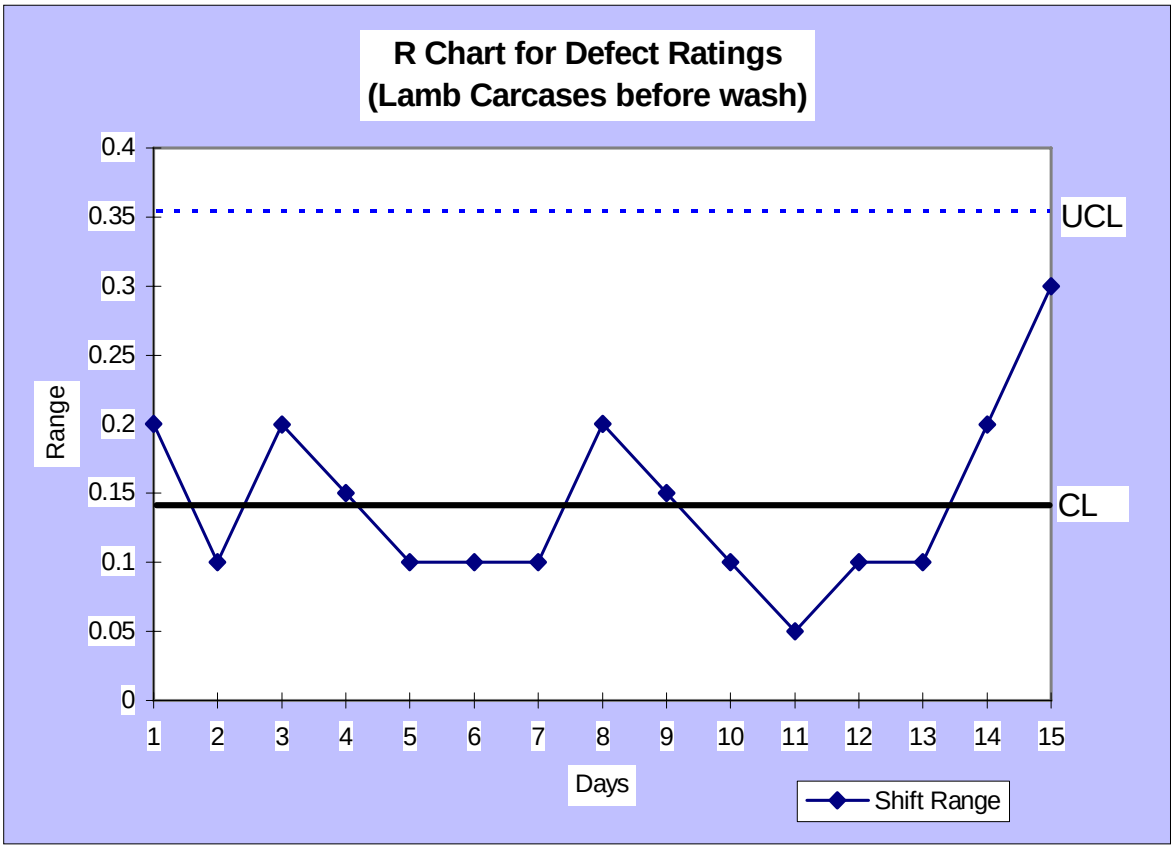
The points that fall outside the UCL are possible process faults indicating intervention is needed: this action which may not have been taken if the data was plotted on a simple trend chart.

By instituting action early, the process may be brought back into control before prescribed responses is triggered for the marginal and unacceptable zones.

Specified zones (i.e. marginal and unacceptable) are obligatory. They are totally separate from UCL and LCL which are management parameters to give an early indication of a process under pressure.

An investigation into process faults is conducted on a case by case basis at each establishment.

Chart: 5 R Chart for Defect Ratings (Lamb Carcases before wash)



Fluctuations on the R Chart generally relate to variable inputs of a process. These inputs can include, as examples, differences in the cleanliness of incoming stock or in the type of stock.

X and R Charts Working Together

Fluctuations outside control limits on the X chart can be cross-referenced with the R chart to narrow the possible source of a fault to constant or variable inputs.

- If control limits on the R chart are exceeded, then fluctuations in a process shown by the X chart are likely related to variable inputs.
- If control limits on the R chart are not exceeded, fluctuations shown by the X chart are likely related to constant inputs.
- Each time a process is changed to improve product standards, the CL and control limits will need to be re-calculated to reflect the newly achieved average of the establishment. This can be used as a basis for measuring continuous improvement.

PART 5

ADVANCED MEAT HYGIENE ASSESSMENT

5

ADVANCED MEAT HYGIENE ASSESSMENT

5.1 AIMS

The objects of this section are:

- To outline some further developments which can be incorporated into the basic MHA framework outlined in Parts 1 and 2.
- To demonstrate how the MHA program integrates with the AQIS MSQA program.

5.2 SCOPE

- Advanced MHA monitoring is not mandatory.
    - It is recommended for continuing improvement in process and product standards.
    - It is particularly applicable in establishments operating under an AQIS MSQA program.

5.3 CONFORMANCE MONITORING

Part 1 requires assessment of processes to determine an overall conformity index for each process.

- HACCP principles recommend increasing the monitoring frequency of high risk operations. This particularly applies to critical control points (CCPs) identified in an MSQA program.

Monitoring

Basic MHA monitoring requires where practical, 10 repetitive observation of operations to determine the performance.

- When in the opinion of the monitor, a judgment can be made on lesser performances of an operation, this approach can be adopted where previous monitoring supports the decision.

    - Alternatively, when doubt still exists after 10 observations, further observations can be included in the assessment.

Monitoring Frequency

- Intensified and reduced monitoring frequency should be conducted using the same basic principles as outlined in Part 1 of this manual, but can be modified to apply to individual operations and not the entire process.

    - Low risk operations identified by previous monitoring can individually be moved to the reduced frequency.

    - Individual high risk operations can be then be moved to the increased frequency without unnecessary strain on the monitoring facilities.

Process Rating

In Part 1, guidelines are given for establishing critical limits for determining whether operations are acceptable, marginal or unacceptable. These can be reviewed as a means of achieving continuing improvement.

- When monitoring indicates that individual operations are easily achieving acceptable ratings, the critical limits can be tightened to promote a higher standard.

For example if the acceptable critical limit for knife sterilisation is 9 out of 10 and is routinely achieved, it can be raised to 10 out of 10.

Conformity Index Targets

Part 1 suggests conformity index targets to be:

≥ 80%	Acceptable
70 to 80%	Marginal
≤ 70%	Unacceptable

- As standards improve these targets can be raised for the improved processes.

5.4 CORRECTIVE ACTION AND TRENDS

Corrective action is a major step in the HACCP program. Verification of the effectiveness of the corrective action is equally vital to the success of the program.

- The internal audit and management review should include an examination of the processes of corrective action with a view to determining their effectiveness and identifying better approaches to preventing future deficiencies.

- Trends established from the conformity index are explained in Parts 1 and 4 and give valuable early warning signs that the process control is deteriorating.

    - By recording individual operator performance, this concept can be expanded to advantage.

For example in a large establishment with more than one operator at each operational point, a deficient operator's performance could pass undetected when only the entire process is trended.

5.5 ASSESSMENT OF QUARTERS, SIDES OR CARCASES

Part 2 requires the initial assessment on the slaughter floor after the final trim and before the final wash.

- The final trim is basically a corrective action and benefit can be gained from **additionally** assessing carcases before the final trim.

    - A more realistic appraisal of the overall performance of slaughter floor operations can be obtained before the final trim.

the verification of the process is made increasingly more searching.

    - Verification of individual operations is also more realistic when conducted before the final trim.

the individual operator responsible for specific defects is more readily identified.

Monitoring

- Monitoring should be conducted in a manner which produces a result indicative of the entire day's kill.
    - All classes of stock in the day's kill (for example, short wool lambs and long wool sheep) should be represented in the monitoring sample.
    - Under the lot concept it is acceptable to segregate the different classes of stock into separate lots.

the different classes can be treated as high and low risk lots.

Monitoring Frequency

- As with process monitoring HACCP principles can be applied.
    - Increased monitoring frequency can be applied to high risk lots and economy of monitoring time achieved by applying reduced monitoring frequency to low risk lots.

Target Defect Ratings

Part 2 (Tables 13 and 14) defines target defect ratings which trigger appropriate corrective action on nonconforming product.

- For continuing improvement establishments should aim to progressively reduce the acceptable defect rating targets by introducing better process controls.
    - Improved processing floor designs and equipment will assist in achieving better process control.
    - On going training of operators will promote an increased awareness of better sanitary dressing procedures.

5.6 CORRECTIVE ACTION AND TRENDS

As with process monitoring, corrective action on nonconforming product is a major step in the HACCP program. Verification of the effectiveness of the corrective action is equally vital in achieving premium product quality.

- The internal audit and management review should include an examination of the corrective action measures employed to ensure maximum food safety is maintained.

- Trends established from the defect ratings are explained in Parts 2 and 4 and give valuable early warning signs that the process control is deteriorating and acceptable standards are endangered.

    - By linking defects to the offending operator, the overall defect rating can be improved.

For example faecal contamination in the channel indicates a deficiency in the performance of the bung drop operator.

In large establishments it may be necessary to determine which of two or more operators is at fault.

A

ACRONYMS

AQIS	Australian Quarantine and Inspection Service
ATM	Area Technical Manager
CCPs	critical control points
CI	conformity index
Cr	critical
EMOs	Export Meat Orders
DR	defect rating
GD	greater dimension
HACCP	Hazard Analysis Critical Control Point
LCL	lower control limit
Ma	major
MHA	Meat Hygiene Assessment
Mi	minor
MSEP	Meat Safety Enhancement Program
MSQA	Meat Safety Quality Assurance
OPS	On Plant Supervisor
OPVO	On Plant Veterinary Officer
QA	quality assurance
SOP	standard operating procedure
UCL	upper control limit
USDA	United States Department of Agriculture
ZT	Zero Tolerance defect

D

DICTIONARY

AQIS on plant monitors	The AQIS on plant officers who perform the function of "check the checker" during company monitoring.
AQIS Reviewer/Auditor	The AQIS Area Technical Manager who conducts an independent verification of company systems including the Meat Hygiene Assessment.
ATM Verification	The ATMs monitoring of the MHA program during the review of an establishment.
Average monitorings of product	The average defect rating for a shift determined by averaging the defect ratings recorded for all lots monitored during the shift.
Carton meat assessment	Reinspection applied to all carton meat bulk packs, boneless and bone in but not primal cuts.
Check the Checker	The AQIS on plant officers visual inspection of the company monitor(s) performing the monitoring to verify the requirements of the MHA program are being met.
Conformance monitoring	A method for monitoring processes based on objective evaluation of operations in a process.
Conformity index	An objective rating of a process based on the number of marginal or unacceptable operations conducted within that process.
Corrective Action	Any action to be taken when the results of monitoring indicate a loss of control.
Critical carcase defects	Defects seriously affecting product wholesomeness.
Critical Limit	A value which separates acceptability from unacceptability.
Defect rating	The total score for defects recorded during a monitoring sequence divided by the number of samples observed.
Dynamic Processes	Processes which are repetitive during a short period of time and allow successive observations of performance.

Food Safety	Means food will not cause harm to the consumer when it is prepared or eaten according to its intended use.
HACCP Plan	The written document, based upon the principles of HACCP, describing the processes for assuring the control of a specific process.
Hazard	A biological, chemical or physical agent that is reasonably likely to cause illness or injury in the absence of control.
Increased intensity of monitoring	The monitoring rate adopted when two consecutive monitorings of a process at the normal level are unacceptable.
Inspection	An assessment conducted on each item to determine whether it is wholesome.
Intensified level of sampling	The level adopted when two consecutive average monitorings of product produced during a shift at the normal level of sampling are unacceptable.
Lots	A production "lot" is the number of animals over which a monitoring sequence is conducted.
Major carcase defects	Defects with the potential to affect product wholesomeness.
Minor carcase defects	Defects which affect appearance but not wholesomeness of product.
Monitor	To conduct a planned sequence of observations or measurements to assess whether a process is under control and to produce an accurate record for future use in verification.
Non-Conformity	A deviation from accepted procedures or critical limits.
Normal level of sampling	The minimum number of samples required for a statistically valid assessment of product. It is dependent on the number of items processed in a day's production or during a shift.
Normal monitoring frequency	The minimum frequency with which checks shall be conducted. It is dependent on plant throughput.
Offending offals	All offal types recording one or more instances of zero tolerance or an unacceptable defect rating in a monitoring sequence.
Operations	Specific steps in a process, these are required to be detailed in work instructions.

Product Integrity	Complies with the trade description requirements of the Export Control Act
Process area	An area in a process covering a number of operations. It is selected for convenience of monitoring and is establishment specific.
Process monitoring	Assessment of operations in the production of meat for human consumption
Production lot	The number of animals over which a monitoring sequence is conducted. It may represent the entire production for a shift or any part thereof.
Product monitoring	Assessment of the level of macro-contamination on carcases, offals and carton meat.
Reduced level of sampling	The rate adopted when five consecutive average monitorings of product produced during a shift at the normal level of sampling are acceptable.
Sample	A number of carcases or carcase parts selected at random for monitoring to provide a statistically significant assessment of the whole production lot.
Static Processes	Processes which are only performed once or infrequently and cannot be easily rated by repetitive observations.
Target Levels	Company specifications which are more stringent than critical limits and which are used by an operator to reduce the risk of a deviation from critical limits.
Validation	The process of collecting and evaluating scientific and technical information to determine the effectiveness of controls in a program.
Verification	A method or procedure used to determine compliance in a system or program.

Wholesome	When used in relation to meat and meat products means that the meat and meat products may be passed for human consumption on the basis that they: (a) are not likely to cause food borne disease or intoxication when properly stored, handled and prepared for their intended use; and (b) do not contain residues in excess of established limits; and (c) are free of obvious contamination; and (d) are free of defects that are generally recognised as objectionable to consumers; and (e) have been produced and transported under adequate hygiene and temperature controls; and (f) do not contain additives other than those permitted under the Food Standards Code; and (g) have not been irradiated contrary to the Food Standards Code; and (h) have not been treated with a substance contrary to a law of the Commonwealth or a law of the State or Territory in which the treatment takes place.
Work instructions	Instructions for the person primarily responsible for applying the control measures and critical limits to an operation. A job description, an in line specification or a work procedure.
Zero tolerance defects	Contamination with visible faeces, ingesta, milk and urine.