

Final report

Technical advisor for post-mortem inspection

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Abstract

A technical review of post-mortem inspection and disposition judgement criteria Schedules 2 and 3 of AS4696:2007 (the standard) for beef, sheep and goats was undertaken in MLA Projects V.MFS.0020, V.MFS.0021, V.MFS.0022.

In the standard neither Schedules 2 nor 3 had been reviewed using the risk-based approach of the CODEX Meat Hygiene Code of Practice (2005).

Projects outputs resulted in the Australian Meat Regulators Group approving fourteen alternative procedures from 1 March 2020 in domestic abattoirs (AMRG Guideline 2020.1).

Project V.RBP.0026 (2018 – 2022) was commissioned to provide technical support for implementation of the approved alternatives into the domestic (Guideline) and export standard (AS4696:2022 pending).

Activities included:

1. Assisting drafting of the AMRG Guideline for release domestically https://www.foodauthority.nsw.gov.au/sites/default/files/2020-02/AMRG%20Guideline%202020_1_Alternative%20techniques%20guideline.pdf
2. Preparing explanatory documentation to support training including seventeen Fact Sheets (<https://www.mintrac.com.au/page.asp?p=175>) and revised DAWE Decision Notes
3. Implementing a training program for Operating Plant Veterinarians (OPV) in all capital cities
4. Participating in domestic and international meetings to extend the approved alternatives
5. Preparing additional reports and publishing four peer-reviewed papers targeting key export markets
6. Assisting submission of AS4696:2022 proposal to Standards Australia.

The outputs underpin modernisation of meat inspection, estimated at \$102M net present value to the Australian Meat Industry.

Executive summary

Background

Several research projects had examined the possibility of conducting alternative procedures for post-mortem inspection and disposition of carcasses and carcass parts of cattle, sheep, and goats at Australian meat processing establishments (V.MFS.0020, V.MFS.0021, V.MFS.0022). The Australian Meat Regulators Group (AMRG), representing the state and federal meat competent authorities has approved several procedures as alternatives to those found in Schedules 2 and 3 of the *Australian Standard for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption* (AMRG Guideline 2020.1 AS 4696:2007; Anon 2020).

The state-based competent authorities implemented these changes in slaughter establishments in their jurisdictions effective from 1 March 2020. The Commonwealth Department of Agriculture, Water and Environment (DAWE) is responsible for inspection activities and certification of meat at export registered establishments. The DAWE is subsequently responsible for negotiating acceptance of the alternative procedures with importing countries, requiring “notifications” and preparation of equivalent submissions and conduct negotiations when necessary for key export markets.

The purpose of this project was to provide resources to government and industry that will support the efficient and effective implementation of these alternative procedures i.e., steps towards implementation of alternative procedures in all red meat processing establishments in Australia.

Objectives

Provide MLA-specified technical advice, and training and extension services to support the efficient implementation of alternative post-mortem inspection procedures in Australian red meat processing establishments.

Methodology

The following types of activities were undertaken:

1. Assist drafting and reviewing the AMRG Guideline for release domestically.
2. Prepare materials and explanatory documentation to support training.
3. Implement a national training program.
4. Participate in domestic and international meetings to translate the approved alternatives.
5. Prepare additional reports and publishing peer-reviewed papers.
6. Assist submission of AS4696:2022 proposal to Standards Australia.

Results/key findings

The project outputs indicate there is an acceptance of risk-based reform of PMID. This reform was initiated by industry, not in response to unmanaged meat safety risk.

Domestic regulators embraced the principles of Codex to judge and accept the equivalence of alternative PMID.

There is now a package of resources available to support implementation of AS4696:2022 (pending) including training resources, a round of training completed for official plant veterinarians and two sessions with their managers.

The final progression of AS4696:2022 via Standards Australia, advising and gaining acceptance by export markets and subsequent implementation in export establishments rests with DAWE.

Benefits to industry

Review of AS4696:2007 and the proposed changes aimed at

- stopping unnecessary inspection procedures
- cross-contamination during inspection, and
- unnecessary waste.

The outcomes are estimated to deliver \$102M net present value to the Australian Meat Industry.

They also deliver a key outcome of the Export Meat Modernisation program: *Post-mortem Inspection and Disposition Reform*.

Future research and recommendations

Further support for the development of Equivalence Proposals to key export markets for acceptance of alternative post-mortem inspection for Beef Measles (*Cysticercus bovis*) is underway in a project funded by the Australian Meat Processing Corporation.

Acknowledgements

The development of the implemented domestic Guideline AS4696:2020.1, and proposal AS4696:2022 is in large part due to the contributions of Dr Andreas Kiermeier and Dr David Hamilton. Their technical expertise and industry nous was critical in delivering these outcomes to industry.

It is also important to note that the contribution of industry was essential in providing and interpreting data needed to underpin nationally applicable standards.

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1. Background

1.1 Risk management questions

In 2016 Australian meat producers and processors initiated a review of carcass inspection of the domestic meat safety code for *Hygienic Production and Transportation of Meat and Meat Products for Human Consumption* (the standard; Anon 2007). While this report details outputs and outcomes for beef, sheep and goat sectors, parallel work was conducted by the pork industry which partnered in the activities described.

The terms of reference (TOR) included:

- removing techniques that are no longer necessary due to the improved animal health status of Australian herds and flocks
- altering or removing techniques where new knowledge of animal or foodborne disease indicates current risk management techniques are not effective
- assessing the effect of contamination of edible tissues arising from current organoleptic post-mortem inspection (PMI) techniques
- reviewing disposition judgment criteria for total carcass condemnation where appropriate, and
- identifying techniques that are principally related to product quality rather than food safety that might be transferred to companies' Quality Assurance systems.

These risk management issues target provision of better protection of public health, meeting the food safety requirements of domestic and international trade, and supporting allocation of food safety resources commensurate with contemporary risks as is occurring internationally (CR 2014; Alban *et al.*, 2018; FSIS 2019). Codex risk-based guidelines were followed to conduct the review (Codex 2005; FAO 2019).

1.2 Scope of the review

While risk-based guidelines encompass a "farm-to-plate" approach to food safety, traditional carcass post-mortem inspection remains a major activity. In keeping with these terms of reference, the scope of this review was restricted to organoleptic post-mortem inspection and carcass disposition criteria of the standard (PMID) that had not been subjected to a performance-based assessment. This approach brought into play the following considerations.

- There was a need to quantify the performance of current techniques for red meat species in the first instance (i.e., establish non-detection rates of gross abnormalities affecting both food safety and suitability), as a basis for comparison of alternative techniques;
- Along with the increasing recognition that traditional PMI techniques are insufficient to prevent and control the microbiological risks of illness associated with consumption of meat, the potential for counter-productive microbiological contamination of edible tissues resulting from the actual PMI techniques is a cause of unease (Jordan *et al.*, 2012; EFSA 2011, 2013; Costa *et al.*, 2016), hence the inclusion in the TOR;
- In addition, the Code of Hygienic Practice for Meat (CAC 2005) recognises that at the national level the activities of the Competent Authority have jurisdiction at the slaughterhouse that

very often serve animal health as well as public health objectives. This applies to ante and post-mortem inspection where the slaughterhouse is a key point in animal health surveillance, including zoonoses and latterly, animal welfare (Stärk *et al.*, 2014). Consequently, the review of the standard recognised this important duality of function. This resulted in quantification of any adverse effect on performance of alternative techniques on detection of gross abnormalities and determining carcass disposition arising from animal health and welfare conditions.

1.3 Official risk management processes

In Australia, risk management arrangements for domestic meat safety are jointly overseen by government officials from each state jurisdiction and the federal Department of Agriculture, Water and Environment. The latter is responsible for negotiating export market access arrangements. These members comprise the Controlling Authority, namely the Australian Meat Regulators Group (AMRG) which specified that proposals for alternative PMI reflect risk analysis guidelines for meat (Codex 2005).

In keeping with this approach, the AMRG specified that proposals for assessment of equivalence of alternative PMI techniques with the standard were required to address any adverse effects on food safety, suitability, and animal health (including zoonoses) and welfare surveillance.

1.4 Previous technical outputs

Several MLA research projects previously examined the possibility of conducting alternative procedures for post-mortem inspection and disposition of carcasses and carcass parts of cattle, sheep, and goats at Australian meat processing establishments (V.MFS.0020, V.MFS.0021, V.MFS.0022 etc). The Australian Meat Regulators Group, representing the state-based meat competent authorities has approved several procedures as alternatives to those found in Schedules 2 and 3 of the *Australian Standard for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption* (AMRG Guideline 2020.1 AS 4696:2007: Anon 2007).

The state-based competent authorities implemented these changes in slaughter establishments in their jurisdiction effective from 1 March 2020. The Commonwealth Department of Agriculture, Water and Environment (DAWE) is responsible for inspection activities and certification of meat at export registered establishments. The DAWE is subsequently responsible for negotiating acceptance of the alternative procedures with importing countries, requiring “notifications” and preparation of equivalent submissions and conduct negotiations when necessary for key export markets.

The purpose of this project was to provide resources to MLA that will allow MLA to support the efficient and effective implementation of these alternative procedures, working with all parties that require technical support i.e., steps towards implementation of alternative procedures in all red meat processing establishments in Australia.

2. Objectives

- Assist drafting and reviewing the AMRG Guideline for release domestically.
- Prepare materials and explanatory documentation to support training.

- Implement a national training program.
- Participate in domestic and international meetings to translate the approved alternatives.
- Prepare additional reports and publishing peer-reviewed papers.
- Assist submission of AS4696:2022 to Standards Australia.

3. Methodology

3.1 Assist drafting and reviewing the AMRG Guideline for release domestically

Drafted the alternative procedures approved by AMRG into the wording and format of AS4696:2007.

3.2 Prepare materials and explanatory documentation to support training

Prepared Fact Sheets covering the principles, approaches, and results of fourteen alternative procedure protocols approved by AMRG.

In each, the data was interpreted against the criteria specified by AMRG for judgement of equivalence.

3.3 Implement a national training program

Prepared a seminar program covering the risk-based principles, projects, and approved alternatives.

This was delivered at six OPV Training meetings covering all capital cities for the majority of OPVs.

3.4 Participated in domestic and international meetings to translate the approved alternatives

Presented the seminar/results outlined in 3.3 at:

- two Meat Leaders Conferences hosted by DAWE in Canberra attended by ATMs, FOMs and officials from Meat Exports Division
- meetings of AMRG
- Inspection Roundtable Panel, at the conference of the *International Association for Food Protection* in Kentucky USA.

3.5 Prepared additional reports and publishing peer-reviewed papers

An additional report *Risk-based review of post-mortem inspection for bovine eosinophilic myositis (BEM)* was prepared to address concerns raised at OPV Training sessions.

3.6 Assisted submission of AS4696:2022 to Standards Australia

Provided a technical review of the proposal to Standards Australia for Meat Export Division, DAWE.

4. Results

4.1 Domestic Standard, pending AS4696:2022 and Associated Fact Sheets

As a first step in implementation, these alternative carcase inspection procedures and disposition judgements have been given effect in domestic establishments from 1st March 2020 by means of the AMRG Guideline 2020:1 (Anon 2020). The approved Equivalence proposals are Listed in Tables 1 and 2.

Table 1: AMRG approved alternative techniques in Guideline of AS4696:2022 Schedule 2 (Anon 2022)

Number	AS4696:2022 Alternative techniques	Approval date
1	Minimal risk inspection for bovine tuberculosis	February 2018
2	Observation of spleens in sheep and goats	July 2017
3	Reduced number of incisions for detection of beef measles (<i>Cysticercus bovis</i>) in cattle	July 2017
4	Routine visual inspection of pigs	July 2017
5	Inspection of kidneys in sheep and goats	August 2018
6	Inspection of kidneys in pigs	August 2018
7	Inspection for caseous lymphadenitis (CLA) in sheep and goats	August 2018

Table 2: AMRG approved alternative techniques in Guideline of AS4696:2022 Schedule 3 (Anon 2022)

Number	AS4696:2022 Alternative techniques	Approval date
1	Melanoma in pigs	December 2016
2	Peri-acute pneumonia in pigs	March 2017
3	Polyarthritis in pigs	July 2017
4	Peri-acute pneumonia in cattle	July 2017
5	Polyarthritis in cattle	August 2018
6	Polyarthritis in sheep and goats	August 2018
7	Pneumonia and pleurisy in sheep and goats	August 2018

Risk communication of these approved alternatives is supported by Fact Sheets explaining the rationale, quantitative approach and data on which equivalence was approved. These are available via <https://www.mintrac.com.au/page.asp?p=175>.

All have been reviewed and revised following the Meat Leaders Conference in May 2022 to ensure language is harmonised, further reading is consistent and feedback incorporated. There has been no change to content or interpretation as approved by AMRG.

Finalisation of the *Cysticercus bovis* Fact Sheet is dependent on the final expression of the risk management “Notes” being considered as part of the formalisation process of Standards Australia. This is being managed by a Technical Steering Group of industry and government managed by Standards Australia.

A process has been initiated via AMRG/DAWE to authorise final versions of the Fact Sheets and provide access to inspectors in the domestic and export sectors as well as Registered Training Organisations.

In terms of supporting progression of AS4696:2022 via Standards Australia Provided, a technical review of the proposal was conducted at the request of Meat Exports Division, DAWE.

4.2 Training and Extension

Delivery of a seminar program covering the risk-based principles, projects, and approved alternatives at:

- OPV Training weekend programs in each capital city hosted by DAWE
- RTO Training Workshop hosted by MINTRAC
- *Meat Inspectors* meeting hosted by Cameron Dart

All training presentations have been handed over to Dr Stewart Lowden at his request to use in further OPV meetings as the new standard is implemented.

4.3 International advocacy

Awareness and acceptance of the technical merit of the approach, methodology and outputs of the risk-based review of PMID in Australia is assisted by publication in mainstream peer-reviewed journals used by leading researchers and trade regulators in this field.

Pointon, A.M., Hamilton, D.H. and Kiermeier, A.K. (2018). Assessment of the post-mortem inspection of beef, sheep, goats, and pigs in Australia: Approach and qualitative risk-based results. *Food Control*, 90,222-232. <https://doi.org/10.1016/j.foodcont.2018.02.037>

Kiermeier, A.K., Hamilton, D.H., and Pointon, A.M. (2019). Quantitative risk assessment for human *T. saginata* infection from consumption of Australian beef. *Microbial Risk Analysis*, 12:1-10. <https://doi.org/10.1016/j.mran.2019.01.001>

Pointon, A.M., Hamilton, D.H. and Kiermeier, A.K. (2019). Equivalence of alternative post-mortem inspection procedures for Caseous Lymphadenitis in Sheep and Goats in Australia. *Veterinary Record*. 185 (2), 54 <https://doi.org/10.1136/vr.105353>

Samantha Allan, Andreas Kiermeier, David Hamilton, Baden Pearse, Peter Day and Andrew Pointon (2022). Modernisation of post-mortem inspection of cattle, sheep, goat, and pig carcasses in Australia. *Fleischwirtschaft international* (drafted – pending publication of AS4696:2022).

These reports complement earlier peer-reviewed publications that present the risk-based principles of the review in our key markets (Pearse *et al.*, 2009, 2010; Jordan *et al.*, 2012; Sergeant *et al.*, 2017).

The Principal Investigator also participated in an international roundtable on modernisation of meat inspection at a conference in the USA. This provided opportunity for informal discussions of senior FSIS administrators regarding application of the risk-based approach to modernise PMID.

5. Conclusion

a. Key findings

The project outputs indicate there is an acceptance of risk-based reform of PMID. This reform was initiated by industry and not in response to unmanaged meat safety risk.

Domestic regulators embraced the principles of Codex to judge and accept the equivalence of alternative PMID. Decisions on Equivalence Proposals was done in a very timely manner.

There is now a package of resources available to support implementation of AS4696:2022 (pending) including training resources, a round of training completed for official plant veterinarians and two sessions with their managers.

The final progression of AS4696:2022 via Standards Australia, advising and gaining acceptance by export markets, and subsequent implementation in export establishments rests with DAWE.

b. Benefits to industry

For the last 40 years there has been a ramping up of animal disease control programs which has resulted in significant decrease in the number of positive cases detected for animal diseases. and carcass disposition practices have not been amended in line with this lower positive detection rate as they were not captured by the text of AS 4696:2007.

This has resulted in significant loss to the meat industry as well as arguably increased human health risk as many lymph nodes are either being palpated or incised needlessly, spreading bacteria of human health significance (e.g., *Salmonella* spp.) to muscle tissue.

Internationally, post-mortem inspection practice has been changing over the years to enhance a risk-based approach, so lymph nodes are palpated or incised only when necessary.

Review of AS4696:2007 and the proposed changes are aimed at stopping:

- unnecessary inspection procedures
- cross-contamination during inspection, and
- unnecessary waste.

The outputs are estimated to deliver \$102M net present value to the Australian Meat Industry.

They also deliver a key outcome of the Export Meat Modernisation program: *Post-mortem Inspection and Disposition Reform*.

6. Future research and recommendations

The opportunity for industry to fully capitalise on the research outputs depends sequentially on the following steps being undertaken by DAWE:

1. Publishing AS4696:2022 via Standards Australia.

2. Notifying key export markets according to World Trade Organisation (WTO) rules and via Equivalence submissions to key export markets where appropriate.
3. Implementing alternative procedures in export-listed establishments once accepted by export markets.

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