AMPC
AUSTRALIAN MEAT PROCESSOR CORPORATION

Final Report

Smallstock Traceability Pilot Study Evaluation

Project Code
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1.0 Executive Summary

In 2021 AMIC received funding from the Australian Government, through the Traceability Grants Program. The Grant was successfully leveraged by industry co-funding from Australian Meat Processor Corporation (AMPC). The aim of these pilot studies was to examine the benefits of electronic Radio Frequency Identification Device (RFID) readers in sheep processing plants, outside of Victoria. Five processors from NSW, SA and WA participated in these pilot studies and are at different stages of validating the installation of RFID readers. The sixth processor involved in the initial stages of the project was unable to complete the pilot study due to issues with availability, purchasing and installing of hardware in the required time. The trial therefore progressed with five plants, rather than six.

At this stage the benefits of installing RFID technology have not fully been realised as there have been significant delays within the project at most sites and systems are still being established. Another major limitation for processors to realise the benefits of such technology is the lack of sheep processed with EID (individual electronic identification) tags prior to the mandatory implementation of the tags. Three of the five processors achieved their project focus areas and the remaining two are still developing their systems and working towards the proposed focus areas.

However, outcomes from this study have shown the benefits of installing RIFD technology when fully operational will be to:

- Improve data collection from objective measurements and how that information is used to improve the business.
- Provide a pathway to integration of full carcase tracking.
- Use data measured along the chain to inform boning room decisions.
- Improved accuracy of animal counts.
- Improve ability to record animal health and defect status.
- Improve accuracy of the mob-based traceability system and reduced human error when manually entering data.
- Improve feedback systems to producers and deliver improvements to grid compliance of carcases in better meeting market specifications.
- Provide individual carcass feedback to producers to link with on farm animal data.
- Provide producers with animal health feedback, in the long-term improving the product they are producing with less wastage saving them money and improving returns to the farmer.

There were several barriers, challenges and lessons learnt from the implementation of RFID readers across the five participating processing plants including:

- Noise interference,
- Insufficient space or modifications were required to locate readers alongside the chain,
- Complications in linking with current software,
- Interference from other RFID readers in multispecies plants,
- Positioning of the reader,
- An important consideration is the time it takes for planning, supply of technology, installation of the hardware and updating of software required.

- The importance of a dedicated innovation manager/supply chain officer and the critical role they played in the progress of the installation, validation and monitoring of the RFID readers.

Each processor is working with the supply companies to find solutions, improve readability and optimise the new technology. Hardware and software providers continue to improve and develop RFID technology. Issues highlighted from the implementation in Victoria were found to be still impacting the installation process throughout these pilot studies and continue to affect some Victorian processors.

Each processing plants is a complex and unique system making a 'one size fits all' approach to having traceability through a plant not feasible. More work needs to be done to fully understand and provide solutions to the issues faced so far by the five processors as well as addressing on-going issues in Victorian plants.

All processors across Australia will have mandatory scanning of sheep and goats implemented. There are several key recommendations identified by interviewing Agriculture Victoria staff, consultants, industry representatives and processors to assist and underpin a timely and effective process to the implement mandatory scanning:

- State governments and research development corporations are encouraged to provide adequate information, support, resources, and funding.
- Substantial time and accurate planning is required for the supply of the technology, installation of the hardware and updating of software required.
- Ensure there is a clear plan, knowledge and understanding from the start to assist the budgeting and installation of RFID readers.
- Ensure there is adequate information, cooperation and support from the technology suppliers in all stages of implementing, validation and monitoring the RFID readers.
- The employment of key industry personnel with an extensive knowledge of the implementation of mandatory EID scanning in processing plants and saleyards played a pivotal role in the successful implementation of RFID scanners across Victoria.

2.0 Introduction

In the past two years, key activities have highlighted the importance of traceability for the Australian Livestock industries. In May 2022, an outbreak of foot-and-mouth disease (FMD) was reported in Indonesia and then the spread of this outbreak into Bali was confirmed in July 2022. The imminent threat of FMD following its diagnosis has reinforced the critical importance of biosecurity to the sustainability of the Australian livestock industry. Traceability and biosecurity have been identified as key areas of focus by industry bodies, highlighting the importance and benefits of this project.

In September 2022, all agricultural ministers in Australia agreed to work towards mandatory implementation of sheep and goat EIDs nation-wide by 1 January 2025. State Government agencies continue to work with industry to facilitate the implementation of individual state and a national, industry-led sheep and goat EID system. There is ongoing engagement from key industry stakeholders including producers, agents, processors, saleyards, and equipment manufacturers.

With all sheep and goat meat processors required to have systems in place to scan EID tags by 30th June 2024 in NSW, and 1st January 2025 for Western Australia and Northern Territory, it is imperative that all processors have support, knowledge, and access to funding to implement the mandatory scanning. This report highlights key

recommendations for each state body, industry groups and processing plants to consider in assisting the implementation of RFID readers in processing plants outside of Victoria.

Based on experience in Victorian processing plants published in O'Halloran (2021), there is a reader solution available for all sheep processing plants, however space constraints and electromagnetic interference (noise) can limit the available options in some plants. Victorian processors have installed a range of different reader designs including readers above the restrainer, barn door style panel readers and single panel readers positioned in close proximity to the chain soon after carcasses are hung. In 2021 Agriculture Victoria reported that these readers were typically reading 98 per cent or more of functioning electronic NLIS (Sheep) tags, where carcasses are hanging correctly. Victoria Agriculture produce weekly read rate reports which are provided to the Victorian Processors. These reports are to monitor the compliance of each processor, providing information on their performance and how their systems are operating.

O'Halloran (2021) outlined the value to processors of an EID system, identified by interviewing processors in Victoria. Value to processors differed depending on whether the aim was to simply comply with NLIS requirements or to record carcass data along the chain for use in improved processing efficiency.

Benefits from meeting NLIS requirements included:

- Improved ability to differentiate suppliers within mixed saleyard lots.

Further value could be obtained with carcass tracking throughout the plant:

- Improved ability to differentiate suppliers and individual carcasses within supplier mobs.
- Ability to do the same within mixed saleyard lots.
- Recording the disease status of individual carcasses and the property of origin electronically at evisceration.
- Improved feedback to producers on disease status of their flock.
- Touch pad or other similar system at inspection, carcass EID could be uploaded automatically to AQIS and NRS.
- Improved disease prevention in Australian flocks.
- Using data measured along the chain to inform boning room decisions.
- Better information on stock source – can reduce the need for trim.
- With carcass yield feedback to producers, they can adjust genetics used.

Additionally, preliminary outcomes from the Advanced Livestock Management Technology project advised that RFID EID readers will underpin the success of objective measurement technologies in being able to record and provide feedback on individual animals (Dean Gutzke, MLA, personal communication).

The Smallstock Traceability Pilot Study intended to examine the benefits of RFID readers in sheep processing plants, outside of Victoria. A range of small, medium and large sheepmeat processors participated in these pilot studies. The staged pilot studies were anticipated to create a better understanding of the additional benefits of RFIDs outside of NLIS compliance, including but not limited to:

- Supply chain integrity.
- Compliance with market access requirements.
- Better carcase selection for markets
- Animal health and biosecurity.
- Provenance claims.

- Raising claims.
- Sustainability claims.
- Advanced objective carcase measurement.
- Integration of full carcase tracking systems.
- Carcase yield feedback to producers, to facilitate adjustments in genetics.

3.0 Project Objectives

3.1 Engage with processors as part of the pilot studies.

3.2 Monitor and evaluate the installation of technology and software.

3.3 Enhance industry knowledge and understanding of the technology.

4.0 Methodology

- Phone meeting with each processor and AMPC Co-innovation Manager to discuss current systems, project focus areas, timelines, potential date for site visit from a DPI representative.
- Phone meeting with participating technology providers.
- Developed spread sheet with project focus areas of each processor as well as equipment and software installations.
- Industry consultation with other processors outside this project, state bodies and representatives from Victorian EID committees.
- A site visit with each processor. The visit included an inspection of the technology and software installed. EID tags were used to run a trial to validate the readability of the readers installed. A meeting was then conducted to discuss project focus areas and if they were achieved, systems implemented, performance, effectiveness, what could be done differently or to improved, and other benefits. For example: “How have you found the process and the pilot studies, what key recommendations do you have for other pilot studies?”
- Developed the Evaluation report (one page) on each of the five processors.
- Phone meeting with each processor representative and AMPC Co-innovation Manager to discuss final data, results collected and the evaluation report.
- Development of Final Industry report.
- In addition to the required commitments resources to aid the implementation of mandatory RFID scanning in Australian processing plants:
  - Development of 1 page fact sheet (Appendix 2)
  - Development of case studies on previously installed RFID readers

5.0 Project Outcomes

5.1 Engage with processors as part of the pilot studies.

Five processors were engaged via phone and/or site visit where possible as part of the project. Each processor was asked the same questions and an open conversation was encouraged. As part of the project each processor developed key objectives which were to be achieved or were working towards by installing RFID readers and are outlined in Table 1. To maintain confidentiality, each processor has been given a number P1 to P5. The six processor was contacted and due to management changes they were unavailable to participate in the survey.

Table 1. Processor objectives

Processor	Objective
P1	1. Improved end-to-end traceability (back to farm)
P2	1. Improved supply chain integrity 2. Detailed feedback to producers on individual carcase basis 3. Advanced carcase composition info back to producers 4. Sorting carcases in boning room for better market specifications
P3	1. Accurate mob traceability 2. Through-plant traceability through full carcase tracking 3. Reliable feedback to producers e.g. stock weights, animal health
P4	1. Improved traceability and biosecurity for individual carcases 2. Animal health/disease/food safety feedback to producers 3. Advanced carcase composition data back to producers 4. Through-plant traceability through full carcase tracking 5. Individual MSA carcase-grading for lambs 6. Tracing stolen livestock and reconciliation
P5	1. Animal health/disease & other detailed feedback to producers 2. Enhanced carcase sorting/selection & improved market claims 3. Better data capture functionality e.g. WHP, time off feed (for MA) 4. Through-plant traceability through full carcase tracking 5. Full automation of carcase transfers (chillers/boning/loadout) 6. Establish truth in provenance, raising or sustainability claims

Table 2 provides the survey questions and responses from 4 of the 5 processors. The technology provider is confidential and for the purpose of this report they will be labelled X. The aim of this survey was to engage the processing plant and develop an understanding of their plant and what they were trying to achieve. Processor number 5 was unavailable for comment to this survey in August 2022.

Table 2. Survey Question - Introduction

1. Confirm their current proposed project focus areas
Each abattoir confirmed their focus areas (shown in Table 1).
2. Describe your current/previous traceability systems and their effectiveness (prior to instalment)
P1 No traceability
P2 Full hook tracking system
P3 Mob base traceability
P4 No traceability
3. Has installation and development of this project started and if yes what has been installed?
P1 Yes installation is complete
P2 RFID panel reader ordered
P3
P4 No equipment ordered
4. What is the approximate time plan for remaining installation and completion date?
P1 October 2022
P2 December 2022
P3 December 2022
P4 No equipment ordered
5. Which company is being used for installation and software? Are you happy with their products, service and communication? What could be improved?
P1 Technology provider X
Lack of information from supply company on what to install, what was needed for installation and possible problems could have been avoided.
P2 Technology provider X
Communication from installer could be improved.
P3 Technology provider (Not Applicable)
Satisfied with provider. Installation was done in-house.
P4 Technology provider X
Have previously worked with provider with the beef tracking system and have a good working relationship. Have not had any issues.

5.2 Monitor and evaluate the installation of technology and software.

Five processing plants completed the required installation of RFID readers, equipment and required software upgrades as part of this project. Processors were engaged via phone meetings and email correspondence during the installation and progress of the project. An onsite visit was conducted once installation of the new technology was complete at four processing plants. Table 3 provides a guide to the interview questions and their responses. Individual reports were developed as part of milestone 2 with several key learnings and industry recommendations outlined:

- Read rate issues:
  - Interference to the installed RFID reader from RFID readers within the Beef system.
  - Interference from the fluorescent lamp above the antenna which was replaced with an LED equivalent.
  - Positioning of the reader in relation to the distance from the reader to the animal's head.
  - Reduced voltage on the panel reader required the installation of a new antenna and panel reader.
  - Type and positioning of the EID ear tag affected the ability of the scanner to read.
  - Installation of two readers to read the EID of animals improves the readability rate and acts as a back-up if one of the units is not working.
- Modifications to infrastructure:
  - Changing of gambrels which incorporated RFID required rail modifications as the units that were purchased were thicker then metal counterparts adding additional costs.
  - Positioning of dual walk-through reader – issues when unloading pigs resulted in installing an additional gate and modifying the unloading area to allow pigs to bypass the scanner.
  - Interference occurred from large amounts of surrounding metal, plastic panels were purchased additionally to the budgeted project for the reader to work.
- Upgraded Software:
  - There is a need to incorporate software that can access all data from both RFID readers to reduce manual checking of data.
  - Issue in the translation of information between the panel reader output and how this information is reflected in the plant software system.
  - Issues in the reader and software communicating information.
- Reliance on contractors to install and make any changes to the new technology installed can be costly and timely.
- Multispecies plants can be quite complex when incorporating a traceability system.
- Communication between the processing plant and the hardware and software providers is critical to the success of this work. Good planning and goals from the outset are important.
- Lack of EID sheep has made this project difficult to validate and test the system. More trial work needs to be conducted to fully validate the system at all five processing plants and to gain a better knowledge of the benefits.
- The installation of the readers has now provided the ability to work towards full hook tracking at two processing plants.

- The installation of RFID readers has improved the ability to give animal health feedback to producers to support an improved product.
- Challenges in supply companies working together.
- Interference to the Beef NLIS scanner when the sheep RFID scanner is on at one multispecies plant.

Table 3 – Survey Questions – Project progress

1. Were project proposed focus areas met?
P2 Yes, still working on the system being fully incorporated.
P3 Yes
P4 Working towards, this project is the starting point.
P5 Working towards.
2. What was installed as part of this project?
P2 - 1 RFID reader P3 - 7 IMF High frequency readers - RFID high frequency tags were purchased and placed into gambrels. P4 - 4 RFID readers were installed. - Approximately 2000 RFID Gambrels were purchased . - The software system used has been upgraded with a new version to be compatible with the new readers. P5 - Dual walk through panel reader with a steel enclosure with a data box with touch screen. - 4 other RFID readers were installed.
3. What have been the main benefits/advantages of what has been installed?
P2 - When working correctly, individual carcass data will be able to be provided to producers, linking on farm data with carcass data. - Reduce work-load on staff when needing to collect individual carcass data.
P3 Saving labour and minimising mistakes when entering each different mob details.
P4 NA
P5 Yet to see the benefits from the project as installation is not complete but endeavouring to: - Improve accuracy around sheep inventory from either saleyard, feedlot or producer to unloading area to processing. - Opportunity to supply feedback to producers. - Improve commercial aspect of the business in what can be offered. - Different market opportunities.
4. What were the issues and difficulties during and after installation?
P2 - The voltage decreased to low levels, decreasing the read range dramatically. The antennae (panel reader) will have to be replaced to fix the issue.

- The information moving into the software system is not always correct with EID numbers not showing the output, or EID numbers being out of order.
- There was a high amount of noise in the area of installation when testing was carried out, but it is not believed to be causing the low read issues.

P3

- Had issues with high frequency tags and metal hooks at installation and had to change system of chains with the RIF chips to counting hooks instead.

P4

- Issues when unloading pigs at the unloading area due to the installation of dual walk-through reader. An additional gate was installed to send pigs past the scanner.
- At the second RFID reader located just after the knocking box there were problems with Interference from the beef reader which is located approximately 10m away. When the beef reader was on there were very low read rate percentages.
- Distance between the ear and the panel reader.
- Interference with the Beef NLIS scanner, in the months after installation they ran into cases where beef bodies were being missed on the secondary scanner. Current fix is to isolate the scanner on specie changeover.
- Changing of gambrels with RFID inbuilt required rail modifications as the units we purchased were thicker then metal counterparts.

P5

- Currently no issues.

5. ***Are you satisfied with what has been installed?***

P2 Has been a long process to get to this point with several changes required. Still making adjustments to improve readability.

P3 Have installed everything ourselves, satisfied with installation.

P4 There have been a number of challenges with installation and making the new system work in with the complexity of a multispecies plant.

P5 Yes, still have not been able to fully validate the system yet.

6. ***Were the equipment providers easy to work with?***

P2 There were difficulties in getting the hardware and software company to communicate and work together. There could have been more onsite testing of the reader.

P3 N/A

P4 Have developed a good relationship with the provider.

P5 Yes, happy with the service they have provide so far.

7. ***With the implementation of mandatory EID's for sheep and goats across Australia and the mandatory scanning of these animals required for all processors, do you see other opportunities. (full hook tracking)***

P2 Already have full hook tracking but development of further technologies. Potential for a traceability app where everything was linked.

P3 Will have to install RFID readers that are able to read EID tags. Current system cannot read EID tags due to their frequency.

P4 See an opportunity with further funding to develop a full hook tracking system. Further work also needs to be done to improve the problem of interference between the beef and sheep readers so they can be on at the same time.

P5 The installation of RFID readers is part of the possibility of implementing full hook tracking through-out the plant. The sharing of information between processing plants across Australia will aid the implementation of mandatory scanning. P5 are happy to share knowledge and experiences

8. Relevant industry comments?

P2

- In Victoria, Agriculture Victoria staff assisted with the role out of mandatory EID by providing support, trialling and testing which is critical for this to happen in NSW.
- Having one person dedicated to this project has been critical to keep this project going.
- Case studies would be a great tool to be able to gain information on how different systems are used. Especially when trying to work out which supplier to use. Information on how and if they have integrated with specific software.
- Decision making guidance would have been helpful for this project.
- We currently do not have an IT person on site, this person could improve our knowledge of the software system and ability to conduct projects.

P3

- Case studies would be a good guide to what has previously been installed at Victorian processing plants.

P4

- A clear plan, knowledge and understanding is important from the start to assist the budgeting and installation of RFID readers.
- This project went over budget due to changes needed at the unloading area, interference from the Beef readers and incorporation of Gambrels.
- Multispecies plants can be quite complex when incorporating traceability system.
- To improve the roll out of RFID scanners in other abattoirs more information needs to be provided on what has happened as part of this project and the roll out in Victoria. Information from Victorian processes on what they installed, barriers they encountered and how they were overcome and troubleshooting solutions would have been valuable at the start of this project.

P5

- An important consideration for other processing plants is the time it takes for planning, ordering and supply of products and installation of the hardware and updating of software required.
- More information from state governments is required on disease monitoring. Is there a template?
- The potential for a development of an app then could be used in recording movements of stock purchased for the processing plant. Important from saleyard or feedlot.

9. Installation completion date:

P2 Installation was completed in April 2022, still not working correctly

P3 March 2023

P4 April 2023, still developing the system

P5 Installation of hardware was completed in mid May 2023, software upgrades and connections still to be completed.

10. Read rate validation from onsite visit and inhouse trials.

P2 Number of animals with EID tags recorded (Conducted 23/05/23).

- 60 from 100 animals with peg tags - Read Rate 60%.
- 368 from 452 EID tagged animals – Read rate 81%

P3 Not applicable for this project

P4 Number of animals with EID tags recorded. 92 from 100 animals. Read Rate 92%

July 2023 – inhouse trial – 45/50 read – 90% read rate

P5 Not able to validate at onsite visit

Due to the lack of animals presenting to the processors with EIDs, NSW DPI conducted read rate trials at two participating processors to examine the installed technology working and gain an insight into the read rate. The remaining processors were not at the stage of fully validate their new systems at the time of the onsite visit conducted. The results of these read rate trials can be seen above in question 10 of Table 3.

5.3 Enhance industry knowledge and understanding of the technology.

As part of the pilot studies and from recommendations outlined by O'Halloran (2021), five equipment and software companies where recommended. The hardware/software providers were engaged via phone meetings and/or face to face to ascertain their view of the implementation process (if involved in this project), merit of their products and any new developments in their technology since the implementation of this technology in Victoria. Their responses are outlined in Table 4.

Since the roll out of RFID readers in Victoria, the hardware and software supplies continue to update and improve RFID scanning technology.

Table 4. – Suppliers survey responses

What hardware/software do you supply for EID reading or carcass tracking solutions?
Allflex - Australia made Allflex/Aleis have become a household name in the abattoir, saleyard and feedlot industry dating back to 1987. - Abattoir HookTracking and Kill Floor Systems to 3 Way Draft solutions in the saleyard Allflex have you covered. - Our Abattoir and saleyard RFID Systems integrate with all major software providers in this space. We have both abattoir and saleyard systems all across Australia and NZ, used by some of the major stakeholders such as JBS, Teys, TFI, ALC and Stanbroke to name a few in the processor space as well as a majority of Victorian Sheep saleyards. BlueTrace. - BlueTrace (BT) EID readers for smallstock and beef within stock receival yards, slaughter floors, saleyards and feedlots. - Manufacture our own range of flexible panel antenna to compliment the reader, capable of supporting multiple antenna (up to 8 per reader) enabling us excellent flexibility when determining the right reader solution to suit the target environment and deliver excellent read rate results. - As no two sites are the same, we offer a fully integrated design and engineering service for hardware, software, artificial intelligence or a combination thereof to provide the best possible solution. - The BT software solution displays EID reader status, transaction history and provides virtually unlimited RFID storage while offering as standard real-time output of RFID transactions into 3rd party systems. Optional management of carcase upload to the NLIS database, current holdings and animal/PIC exceptions updates. - Our StockCount solution uses a camera and Artificial Intelligence (AI) to capture and record the stock count at predefined locations such as truck unloading areas, through EID reader, in the yards (saleyard drafting), at the knocking box or across the processing floor. StockCount can provide real-time display of stock count and video records as proof. - We also supply a number of different kill floor carcass hook tracking solutions: - Individual body tracking using either LF or preferred HF transponders inserted into hook/gamble with readers strategically placed on processing floor. A PLC system manages the tracking and interfaces with 3rd party systems.

- Mob based tracking without the use of LF/HF in hook or added readers/PLC. Basically, a FIFO solution tracking bodies from EID reader to final weigh/grading station. Requiring minimal input from workers to maintain correlation such as for dropped carcases.
- BT offers livestock receival and booking management software that can be linked with yard EID readers, integrating into existing management solutions.

SCL.

- SCL supply RFID readers and software solutions designed to fully integrate with any existing processing system.
- We purpose design and build reader hardware that fits with all existing applications – this means that system development is led by the project demands, unique specifications and information needs.

ITP.

- ITP supply both hardware and software products development in meat and livestock industry specifically inclusive of RFID panel and stick readers both HDX and FDX and associated data capture and further processing through industry compliant software.

Marel Cedar Creek

- Software we provide covers SCADA carcase Tracking and MES Slaughter floor software.
- Hardware we provide are HEC's (Harsh Environment Computers), industrial printers, scales, PLC equipment.
- Complete end to end carcase tracking of unique RFID Ear tags from the point of live animal receival in lairage through the slaughter floor into Chillers and into the Boning room.
- Provides unmanned sorting of carcases into chillers based on selected carcase characteristics when used with our Chiller Automation solution and opportunities for automated unmanned weighing of carcases into the boning room to capture individual carcase shrinkage details.

Triton

- Triton provides total solutions (software and hardware) around Livestock Procurement and Receipts and track animals through yards. Animals are put up for slaughter and into our Grading System where data can be captured along the kill line, including RFID, sex/dentition, animal health, and IMF/LMY or any other objective grading measure before ultimately the weight and final grade is calculated. Buyer Created Invoices or Service Kill Charges can be raised from the system, checked and emailed directly to farmers/clients. These also transfer directly to accounting systems.
- Where RFID in skids is utilized automatic carcass sortation can be provided onto like rails to optimize cutting and ensure the right carcasses are used for the right markets.
- Boning Room Input captures the Cold Weight and time of a carcass into a room where it is associated into a boning run for yield.
- Production is recorded and labelled for export and supermarket needs including (price weigh label) of individual primal/trays. Automation and integration with CL, lidders and carton weigh/label & apply/validate/reject is provided at the end of the process prior to palletising. Integration or sorting into storage and retrieval systems incorporating robot palletising is gaining momentum in processing operations.
- Sales and Inventory systems allow the product to be shipped to Supermarket DC's and exported with advanced shipping notices or Meat Message as required.

Are there any new technology or developments in relation to EID reading in processors since the rollout in Victoria?

Allflex

- Allflex continue to innovate and improve our systems such as improving and using new noise cancelling technology as well as their RFID Systems being remotely monitored for early detection of any issues that may arise (Proactive not Reactive). The reliability and performance of our Transponders is taking HookTracking to another higher level in accuracy.

BlueTrace

The BlueTrace system:

- Offers unlimited storage being PC based - Traditional Abattoir readers have had limited memory, restricting the number of tags they can store onboard and once the memory is full the reader will stop recording further EIDs without warning causing a loss of tags.
- Is a fully customisable PC based solution overcoming these limitations allowing faster remote access support with ability to monitor live and fault find, reducing downtime and need for expensive onsite callouts.
- Provides a I/O ports allowing maximum flexible connecting to external devices like smart body/chain sensors, relays, push buttons, alarms, and touch screens. Unmanned readers on the processing floor can be fitted with an alarm triggered by a "No Read" to indicate missing tags or other system issues live.

S3.

S4.

- ITP is always making changes both hardware and software development to keep up with industry requirements.

Marel Cedar Creek.

- Lairage scanning (i.e., capture of RFID Ear tags against a lot at point of live animal receival) against a livestock booking and through to Kill Agenda.

Triton

- Triton provides the ability to consolidate data from multi-site operations but also through our API can easily incorporate third party data in our cloud-based FUSION system. Farm Management data, MEQ, DEXA are all examples of how we integrate data from other sources and often provide the total history and animal passport for consolidated data management.
- FUSION is an auditable system that tracks changes and enables live visibility of total operations including group production, inventory and shipments.

What main issues were encountered when installing EID reader or carcass tracking equipment in Victorian or in your involvement with the AMPC funded Smallstock traceability pilot study?

Allflex

- Generally over the last 20+ years we have had no serious issues but occasionally we encounter issues such as high noise (out of our control) the new noise cancelling will mitigate this problem in the future,
- 3rd party integration issues sometimes needs to be worked through by both parties,
- The site knowing exactly what is expected from them regarding the prep work that is required before an install such as making brackets and fabricating the area if required.
- The comfort for the customer is knowing that they have an experienced team within Australia who can rectify issues as quickly as possible.

BlueTrace

- Solution of choice for existing abattoir sites that were not achieving acceptable read rates.
- The existence of electrical background noise levels on sites that significantly impact the RFID reader performance resulting in non-compliant performance of the site with the department. BT provided a path forward for these sites that current reader providers were unable to overcome.
- Reader memory that had limited RFID storage capability and when storage was full would stop working with no alarms or warning, resulting in lost RFID records.

SCL - NA

Marel Cedar Creek - NA

Triton - NA

What has been learnt from Victoria?

Agriculture Victoria staff and consultants involved in the implementation of RFID scanners in Victoria and Victorian processing plants were interviewed via phone meetings to gain a better understanding of what lessons have been learnt since the implementation in 2021 and provide recommendations to assist the implementation to other processing plants nation-wide (Appendix 3). The key points identified were:

- The implementation of an EID based system in Victoria included state government funding assistance. Funding was prioritised to support Victorian processors to instal essential equipment. Funding was also

allocated to plants for NLIS-related non-essential infrastructure such as carcass tracking systems, on a case-by-case basis.

- Agriculture Victoria employed a key industry consultant with an extensive knowledge of processing plants and the use of RFID readers. They visited each processing plant in person and assisted and guided each processing plant through the process. Without support and ongoing help, the roll-out would not have been the success it is today. Processors need support and part of that is motivation to continue. Agriculture Victoria have experienced advisors who continue to monitor and work with Victorian processors.
- Victoria established priorities when implementing scanning in processing plants:
    - Scan rate
    - Consigning pic rate
    - Correlation between PIC and EID
- With the implementation of mandatory scanning of EID's in sheep and goat processing plants, processors firstly need to decide if they want basic mandatory or work towards full hook tracking.
- A small number of Victorian processing plants continued to have some issues with low read rates and performance since the Implementation in 2021. Mainly due to:
    - Positioning of the reader
    - Noise interference
    - Database not accepting the read
    - Untagged interstate sheep
    - Issues with software upload
- Methods Victoria processors has adopted to improve readability:
    - Adding a second reader. Depending on placement of the first reader, a second reader was either added to the lairage area or bleed tunnel at several Victorian processing plants. This addition improved the read rates to 98% to 100%. It also acts as a backup if there is an issue with a scanner. The scanner could be turned off, not uploading to the software or have a default.
    - Placement of the reader is critically important for the ability of the reader to work effectively. Some processors have placed their reader in the lairage race just before the knocking box to reduce the potential effect of interference and noise levels.
    - Development of new technology with the RFID readers.
    - Installation of new readers.
- Agriculture Victoria have a weekly monitoring which is critical to the performance, effectiveness of monitoring surveillance. Each week all Victorian sheep and goat processors are emailed a 2-page Sheep/Goat processor KPI report (Appendix 1). They currently have no bench marking but is something that could be done in the future. The weekly report includes the following information:
    - NVD/Mob base kill upgrades
    - Carcass feedback uploads
    - Deceased animal information
    - EID transfers to holding PIC
    - KPI's and overall performance

- Victoria Agriculture staff commonly pick up faults due to load read rates before the processing plant do and can contact them to rectify the issue. If processing plants have a problem, they are able to ring the software/hardware provider as well as Agriculture Victoria.
- Not all Victorian processing plants are at the required state read rate of 98% but the Victorian Agriculture continue to work with them to improve their read rate. The Victorian EID system was implemented in a staged approach. During the implementation phases of the Victorian system, performance levels were put in place as "performance" levels in abattoirs, not as performance measures, but as trigger points for corrective action. The action levels and performance levels were originally set at 80 per cent, increased to 90 per cent, and increased incrementally to reach 98 per cent. Agriculture Victoria recommend a national read rate of 98% from the beginning.
- Victorian processors with carcass tracking continue to see the benefit of the mandatory EID system including:
    - Improved feedback to producers
    - Improved disease prevention and traceability
    - Ability to record individual carcass information and animal health and provide feedback to the producer.
- Processing plants with hook tracking outlined the quality and durability of RFID gambrels to be the biggest challenge. RFID chips are not suited for the meat processing environment.

6.0 Discussion

At the time of this report all five processing plants had installed their RFID readers and were still trialling and making modifications to their systems. The benefits of RFID scanners have not been realised and so not clearly identified in these plants due to late installations and lack of numbers of livestock being processed with EID tags.

This project has highlighted that no processing plant across Australia is the same. Each processing plant whether it be a single specie plant or multiple specie plant has varying levels of traceability systems implemented. Each processing plant has had their own barriers, challenges, and success with the implementation of the RFID scanners. The information gained from this Smallstock traceability project, and the Victoria implementation of RFID readers needs to be used to benefit the roll out of mandatory RFID scanning across Australian processing plants. Supply companies are improving their technology to reduce interference from noise and improve readability rates. There are major supply concerns for industry based on the current and forecast rollout and implementation phase of mandatory EID across Australia.

There is anecdotal evidence that ultra-high frequency tags and readers may have more advantages than low frequency. This assessment was not part of this project, but further investigation should be considered as an option for improving readability in livestock traceability and data recording.

7.0 Recommendations

The staged pilot studies conducted, and a review of the Victorian implemented EID scanning, has outlined key recommendations for the mandatory scanning requirements for all processing plants:

- State government funding has been beneficial for the roll out of mandatory small stock EID in Victoria.
- An important consideration for processing plants is the time it takes for planning what is needed for installation for mandatory scanning of EIDs as well as the supply of technology, purchase, installation of the hardware and updating of software required. Ensure there is a clear plan, knowledge and understanding from the start to assist the budgeting and installation of RFID readers.
- A dedicated innovation manager/supply chain officer is highly beneficial to the progress of the installation, validating and monitoring of RFID readers. Appropriate personnel that manage and coordinate the project are also beneficial to the project and will keep it moving forward as well as dealing with any issues.
- There is the potential for additional technology that involves counting of animals as they come off the truck as well as reading of EID tag to be of additional value to processors.
- The high cost of software and programs to collect the data for smaller processing plants that process limited numbers needs to be considered.
- Investigation of alternatives to RFID technology to trace an animal through the processing plant.
- Assessment of pros and cons of low and ultra-high frequency tags and readers.
- The same technology provider was used by each processor within this project, assessment of the other technology providers recommended by O'Halloran (2021) would be useful to gain a better knowledge and understanding of the RFID technology.

The following recommendations may improve the implementation of mandatory scanning:

- Ensure each processing plant has access to experienced personnel to assist and guide them through the process. Processors will need support to implement these changes.
- Provide information from Victorian processors on what they installed, their integration with specific software systems, barriers they encountered and how they were overcome.
- Encourage technology providers to provide clear information, guidelines, and case studies from previous installed technology. Adequate support needs to be provided by these technology providers in all stages including development, installation and monitoring of the RFID readers.
- Development of Industry guides for installation of RFID readers and traceability technology.
- Ensure tag quality and readability - A national standardisation of tags will play an important role in the readability and read rates for processors across Australia.
- Read Rate Monitoring – The National read rate required by processors will be 98%. Each state needs to clearly identify:
    - Who is responsible for monitoring?
    - How is it recorded?
    - How is it managed?
- A weekly monitoring report is recommended.

- Ensure there are adequate resources provided to processors for the roll out of mandatory processor scanning.
    - Development of a fact sheet outlining instalment date and guidelines, recommendations, and technology providers. A draft version of this document has been developed. (See appendix 3)
    - Development of Case Studies - previous learnings, guidelines, barriers, lessons learnt in an easy-to-use format.
    - Technology providers - What services and who is providing these services to processors for the instalment, monitoring of the RFID technology and post instalment help?
- Webinar series - Opportunity for each state or industry bodies to conduct a series of webinars for all processors to come together and talk about what they are going to install, what are some issues that may arise.
- A platform for the sharing of information between processing plants across Australia will aid the implementation of mandatory scanning.

8.0 Bibliography

Department of Primary Industries. (2022). *Sheep and goat electronic identification NSW industry eID implementation plan.*

O'Halloran, B. (2021). *Review of Traceability Outcomes from electronic tagging of sheep – implications for small stock processors outside Victoria* (pp 1-33) AMPC final report 2021-1131.

Department of Agriculture, Fisheries and Forestry. (2023). *Sheep and goat eID National Implementation Plan*.

9.0 Appendices

9.1 Appendix 1

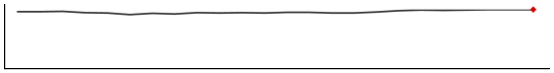
Agriculture Victoria weekly monitoring report

Sheep/Goat Processor KPI Report

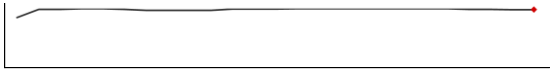
Week ending: 09/10/2022

Est 1234 - Processor Name

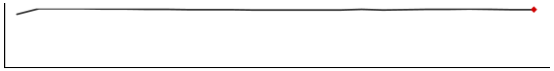
Read Rate 98%



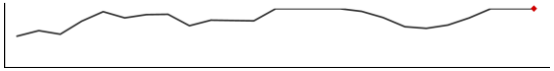
Consigning PICs 98%



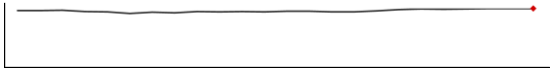
Correlation 96%



Uploading 100%

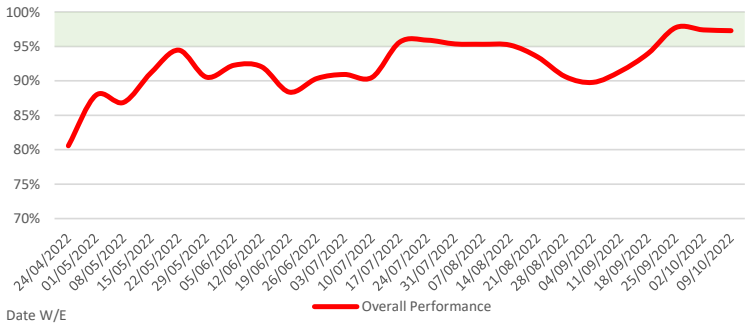


Holdings 96%

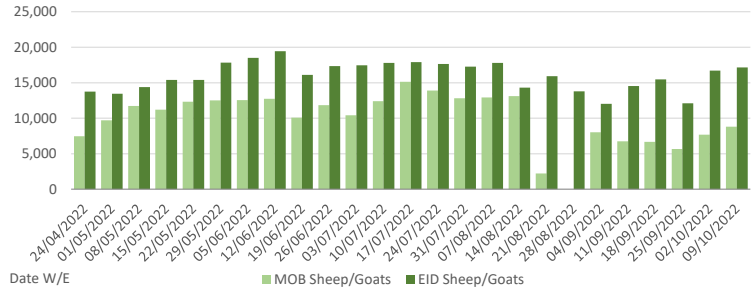


KPI assesment from CFB uploads for 12/09/2022 to 09/10/2022, Report generated 30/01/2023 11:06

Overall Performance 97%



Weekly Production



Sheep/Goat Processor KPI Report

Est 1234

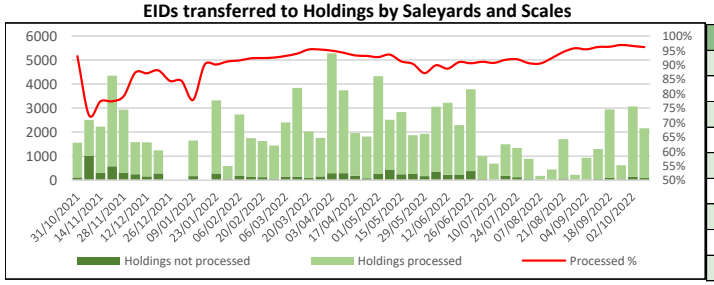
Processor Name

3ABCD123

AGRICULTURE VICTORIA

NVD/MOB Based Kill uploads	12 Sep 22	13 Sep 22	14 Sep 22	15 Sep 22	16 Sep 22	17 Sep 22	18 Sep 22	19 Sep 22	20 Sep 22	21 Sep 22	22 Sep 22	23 Sep 22	24 Sep 22	25 Sep 22	26 Sep 22	27 Sep 22	28 Sep 22	29 Sep 22	30 Sep 22	01 Oct 22	02 Oct 22	03 Oct 22	04 Oct 22	05 Oct 22	06 Oct 22	07 Oct 22	08 Oct 22	09 Oct 22
Head	550	1598	2508	2007				108	1973	3571					2848	874	1846	2097					3041	3864	1884			
Direct Head	100%	100%	100%	100%				100%	100%	100%					100%	100%	100%	100%					100%	100%	100%			
Saleyard Head																												
Consigning PICs	100%	100%	100%	100%				100%	100%	100%					100%	100%	100%	100%					100%	100%	100%			
NVD Numbers	100%	100%	100%	100%				100%	100%	100%					100%	100%	100%	100%					100%	100%	100%			
Uploading	100%	100%	100%	100%				100%	100%	100%					100%	100%	100%	100%					100%	100%	100%			
Carcase Feedback uploads																												
Bodies	3899	3762	4019	3791				4093	3758	4251					4144	4085	4360	4104				4171	4365	4485	4138			
Sheep/Goat EID	1085	1517	644	431				1729	1448	1601					1014	1368	1597	720				1693	702	1649	1236			
Cattle/Other EID				6					17									2				3						
System Transfer EID	1%	22%	19%	32%				1%	6%	33%					14%	2%	26%	12%				2%	3%	4%	1%			
Life Traceable EID	98%	58%	55%	68%				62%	52%	44%					84%	85%	53%	78%				72%	72%	77%	84%			
Consigning PICs	81%	100%	100%	100%				100%	100%	100%					100%	85%	100%	100%				100%	100%	100%	100%			
NVD Numbers	100%	100%	100%	100%				100%	100%	100%					100%	100%	69%	87%				65%	97%	100%	100%			
Correlation (PIC to EID)	98%	98%	94%	90%				96%	95%	96%					95%	95%	97%	97%				97%	97%	98%	97%			
Uploading (2 Days)	100%	100%	100%	100%				100%	100%	100%					100%	100%	100%	100%				100%	100%	100%	100%			
Dead in pens / Dead on arrival / Admin kill (Transfers from Holdings PIC to Deceased)																												
EID to Deceased																												
Sighted at Processor																												
EID Sighted																												
Saleyard/Scales EID transfers to Holdings PIC																												
EID transferred to Holdings	758	1344	69	768				621							928	694	551	895				773	620	770				
Processed	97%	98%	97%	95%				95%							96%	94%	96%	96%				96%	94%	96%				

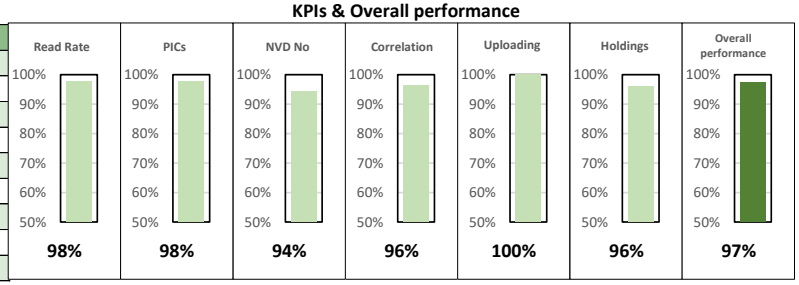
EIDs transferred to Holdings by Saleyards and Scales



Abattoir Tools App - Audit Tags

Date	RFIDs	Deceased	Read Rate
20/06/2022	75	70	**93.33%**
04/07/2022	50	48	**96.00%**
27/07/2022	50	47	**94.00%**
15/08/2022	61	61	**100.00%**
07/09/2022	60	59	**98.33%**
12/09/2022	2065	2006	**99.75%**
13/09/2022	60	60	**100.00%**
27/09/2022	60	57	**95.00%**
30/09/2022	3272	3193	**97.58%**

KPIs & Overall performance



Report generated on 30/01/2023 11:06

Information contained within this report has been compiled using data obtained from the mirror of the NLIS database during the period specified on this report.

9.2 Appendix 2

Fact Sheet - Australian Processors Mandatory reading of EID tags in sheep and goats

FACT SHEET:

Australian Processors Mandatory reading of eID tags in sheep and goats

What is to be installed to meet the new guidelines?

All processing plants must install a RFID panel reader to read RFID tags and compatible software to then upload the EID tags to the NLIS database.

When a processor scans any sheep or goat with an electronic NLIS device, they will generate a kill file containing a record for each animal that they process.

The kill file must accurately link the:

- PIC from which a sheep or goat was sourced,
- processing establishment identifier or PIC,
- date of slaughter/processing,
- species,
- the movement document serial number, for sheep or goats consigned directly from a farm or feedlot,
- the electronic transponder number when an approved electronic NLIS device is present that has been read electronically, and
- the unique body number assigned to each processed sheep or goat carcass.

Date for Implementation:

State or territory	Newborn lambs & kids eID tagged	All managed farmed sheep & goats eID tagged before leaving a property	Abattoirs scan devices and notify movements to the NLIS database
ACT	1 January 2025	1 January 2025	N/A - no abattoirs in the ACT
New South Wales	1 January 2025	1 January 2027	30 June 2024
Northern Territory	1 January 2025	1 January 2025	1 January 2025
Queensland	1 January 2025	1 January 2027	TBC
South Australia	1 January 2025	1 January 2027	TBC
Western Australia	1 January 2025	1 January 2025	1 January 2025
Tasmania	TBC	TBC	TBC

Recommendations:

- Each processor is advised to develop a site/business plan looking at required equipment and software is required and any plant modifications that may be needed. Each processor will be unique in relation to the number of readers and software requirements and eligibility for funding of this equipment. Each state government agency will require information for funding opportunities, including quotes for purchasing and installation of equipment and software.
- An important consideration is the time it takes for planning, supply of technology, installation of the hardware and updating of software required. Ensure there is a clear plan, knowledge and understanding from the start to assist the budgeting and installation of RFID readers.
- Innovation manager/supply chain officer – Accessing appropriate personnel to manage and coordinate the implementation of the new technology is encouraged.

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The AMPC Smallstock Traceability Pilot Study highlighted key issues that should be considered when developing your plan:

- Electromagnetic interference (noise reduced),
- Insufficient space or modifications were required to locate readers alongside the chain,
- Complications in linking with current software,
- Interference from other RFID readers in multispecies plants,
- Positioning of the reader – (distance from reader to the animals head),
- Interference to the Beef NLIS scanner when the sheep scanner is on.

NLIS hardware and software providers for the processing sector

Readers:

ALLFLEX
Chris Richards
T: 1300 138 247
M: 0477 326 125
E: chris.richards@msd.com
W: www.allflex.global/au

Blue Trace
Anthony Browne (Northern NSW, WA, QLD, NT),
Neil Pitt (Southern NSW, VIC, SA, TAS)
M: 1300 396 085
E: info@bluetrace.com.au
W: www.bluetrace.com.au

Systems Control (SCL)
Dave Wright
M: 64 21 721013
E: davew@scl.co.nz
W: www.scl.co.nz

Software:

Integrated Technology partners (ITP)
George Ciecko
M: 0409 892114
E: gciecko@itp-australia.com
W: www.itp-australia.com

Systems Control (SCL)
Dave Wright
M: 64 21 721013
E: davew@scl.co.nz
W: www.scl.co.nz

Triton
Michael Bourke
T: 1300558438
E: mburke@tritoncomsys.com

Marel Cedar Creek
Craig Daff
T: 073356 0999
E. craig.daff@marel.com

Yartoo
Shaun Cunniffe
M: 0412 800 565
E: shaun@yartoo.com.au
W: www.yartoo.com.au

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9.3 Appendix 3

Responses from Agriculture Victoria staff, consultants and Victorian processors

Recommendations/learnings

- Victoria Agriculture employed key industry personnel with an extensive knowledge of the implementation of mandatory EID scanning in processing plants and saleyards. They visited each processing plant in person and assisted and guided each processing plant through the process. Without support and ongoing help, the roll-out would not have been the success it is today. Processors need support and part of that is motivation to continue.
- Processors need to have a clear objective of what they need to install and what they want to install. They could be after the basic mandatory reader installation or work towards full Hook tracking.
- Not all abattoirs are operating at 98% or above read rate. It takes time to implement the system in each individual abattoir and get it working. Agriculture Victoria continue to work with these processors to improve their readability.
- Set priorities.
- Ensure there is a contact point with knowledge of the processing plant systems, other than the supplier if there are any issues.
- When implementing mandatory scanning Victorian Agriculture provided the following resources
  - Industry experienced contact person who could be a link between hardware and software providers, provide Tech support and guide them through the process.
  - Weekly reporting
  - Suppliers list
- Ensure there is an appropriate monitoring system.
- Ensure all states provide weekly report with key metrics.
- Recommendation of a national read rate of 98%
- Provide case studies on specific abattoirs from Victoria highlighting the range of different systems implemented. Agriculture Victoria can provide assistance with this process.
- There are other options other than RFID technology to trace carcasses through the processing plant.

Are there any resources including fact sheets, reports or case studies from the Victorian roll out of EID scanners?

- Weekly monitoring report
- Bill O'Halloran AMPC report
- ALMtech findings

Challenges, barriers or issues that have been raised at Victorian abattoirs.

- Low read rates due to several variables within each plant.
- Noise interference.
- Software issues including not being on or not uploading correctly.
- Database not accepting data.
- Not reading every animal.
- Untagged interstate sheep.
- Communication between hardware and software companies can be challenging.
- Hook tracking biggest issue is quality and durability of RFID gambrels and their ability to work in meat processing environment.
- There is no perfect system.
- Cultural shift in business is required to understand the benefits of traceability, objective measurements and hook tracking.

Improvements or changes implemented by Victorian abattoirs to improve read rates.

- Installing a second reader ideally one at liarage and on the kill floor.
- Higher read rates at the liarage area.
- Installation of a restrainer to improve readability.
- Agriculture Victorian approached reader supply companies to develop and trial new technology to improve readability rates within Victorian processing plants.