Final Report

AUSTRALIAN MEAT PROCESSOR CORPORATION

# Sheep EID identification technology assessment continued

Project code
2025-1070

Prepared by
Andrea Rocha

Date submitted
05/01/2026

# Contents

# 1.0 Abstract

Western Australian sheep producers and processors must comply with legislative requirements mandating the use of eID technology for improved traceability and biosecurity throughout the industry by July 2025. These regulations ensure accurate stock traceability, providing improved disease control measures, and alignment with national livestock identification standards currently used in beef processing and production. Compliance involves tagging all sheep with approved RFID devices, maintaining up-to-date records in the National Livestock Identification System (NLIS), and ensuring accurate reporting of sheep movements within the supply chain when transferring animals to new owners and/or properties.

This project aims to implement a sheep electronic identification (eID) system at the selected meat processing facilities receival yards and processing floor, enhancing livestock management, tracking, and data collection efficiency. By leveraging RFID technology and digital databases, the initiative will improve traceability, compliance with regulatory requirements, and overall herd management. The project follows a structured methodology, progressing through multiple stages to ensure seamless integration, testing, and full-scale deployment using SCL, a New Zealand based eID technology provider, and Blue Trace, an AI Vision technology that uses AI cameras to verify sheep counts at time of delivery to cross reference with eID RFID technology accuracy levels.

# 2.0 Executive summary

Western Australian processors must meet mandatory sheep eID requirements to strengthen traceability and biosecurity by July 2025. This project implemented an RFID-based electronic identification system across receival yards and the process floor, with AI camera verification, to ensure compliant, accurate, and efficient tracking from receival through processing and reporting to NLIS. The work was delivered at V&V Walsh with SCL as the eID technology provider, Blue Sync/Blue Trace for AI verification, OPTIO for receival HMI and data handling, and Triton for process-floor data and NLIS upload. The system provides the foundation for future automation, hook tracking, and enhanced supplier feedback to levy payers and industry stakeholders.

- Objectives
    - Install and integrate a sheep RFID eID system and complementary AI vision to verify counts.
    - Achieve compliant traceability workflows aligned to DPIRD and NLIS requirements across multiple PICs.
    - Ensure data capture and transfer from yards to process floor and onward to NLIS, setting up scalable infrastructure for future automation.
- Methodology
    - Phased delivery: planning, design, procurement, installation, commissioning, monitoring, and final handover.
    - Multi-system integration: SCL eID hardware, Blue Sync AI cameras, OPTIO receival HMI and data store, Triton process-floor interface and NLIS upload via verified CSV/SQL workflows.
    - Progressive risk management and operator engagement to maintain operations during install and commissioning.

- Results/key findings
  - Infrastructure commissioned at Bunbury yards and process floor, including MCC, dual race readers and process-floor EID station; York site infrastructure installed with drafter concept approved and connectivity in place.
  - End-to-end data flow established: receival HMI to central store, cross-check of RFID and AI counts, Triton verification, and NLIS upload procedures defined and tested.
  - DOA management process implemented with handheld wanding and daily NLIS/OPTIO updates to keep receival and processing numbers aligned.
  - AI system successfully integrated to verify count accuracy and support exception handling.
  - Key operational insights that informed these findings are summarised in Appendix 12.1
- Benefits to industry
  - Compliance and biosecurity: operational eID solution aligned to legislative obligations, reducing risk and strengthening traceability.
  - Operational efficiency: automated receival and verified counts reduce manual reconciliation and errors, supporting smoother production scheduling.
  - Futureproofing: a scalable platform to integrate hook tracking, carcass data, and enhanced supplier feedback on quality and yield over time.
- Future research/extension/adoption and recommendations
  - Integrate hook tracking and hot-carcase scale data to link individual animal IDs to downstream grading and yield for richer supplier feedback.
  - Continue AI optimisation for lighting and vibration conditions and formalise periodic accuracy audits versus RFID.
  - Finalise and document SOPs for NLIS uploads, DOA handling, and exception management, and continue operator training and refreshers.
  - Progress York site drafter deployment and monitor receival ramp upgrade timeline to further improve flow and safety.

# 3.0 Introduction

## 3.1 Industry problem / knowledge gap

Australia is moving to mandatory individual electronic identification (eID) for sheep and goats to lift traceability and biosecurity performance under the National Livestock Identification System (NLIS). WA's phased adoption requires all animals born from 1 January 2025 to carry an eID tag, with full adoption across stock movements by 1 July 2026, which places new compliance and data-handling expectations on saleyards and processors.

Processors face a practical gap: achieving accurate, auditable, end-to-end identification from receival through slaughter and NLIS reporting in high-throughput plants while minimising operational disruption. The shift from visual tags to RFID necessitates integrated hardware on receival ramps and process floors, robust data pipelines, exception handling for DOAs, and alignment with multi-PIC operations typical of processors. This project directly addresses that gap by specifying, installing, and integrating a processor-grade eID solution, including AI vision to verify counts and support reconciliation.

## 3.2 Main research question and why

This project investigates whether a processor-based sheep eID solution that combines RFID infrastructure, AI camera verification, and fit-for-purpose data workflows can deliver accurate, compliant, and efficient traceability from receival through to NLIS reporting under WA operating conditions.

### Why it matters

Demonstrating processor-level accuracy and reliable NLIS uploads under real plant constraints is essential for meeting mandated eID standards. It reduces manual reconciliation, strengthens disease response through better traceability, and supports market access by increasing confidence in data integrity.

## 3.3 Target audience / demographic and why

- Meat processors and saleyards that must scan, reconcile, and report movements accurately under NLIS.
- Producers and supply-chain partners who depend on accurate downstream reporting and future feedback loops.
- Regulators and integrity system bodies seeking evidence that processor-level eID can meet performance standards and support biosecurity outcomes.

## 3.4 How the research outcomes act as solutions

The project delivered a practical, commissioned configuration for WA processing sites: SCL RFID readers at receival and on the process floor, Blue Sync AI cameras to verify counts, OPTIO for receival HMI and data handling, Triton for process-floor data verification and NLIS uploads, and a DOA management process to keep numbers aligned. Together, these outcomes create an auditable, scalable pathway to meet eID obligations and reduce reconciliation errors.

## 3.5 What makes this project unique

- Processor-first integration. Unlike many eID studies that focus on farms, this work validates end-to-end identification within a red-meat plant, including multi-PIC complexities and post-bleed reading on the process floor.
- Dual-modality verification. AI vision cross-checks RFID counts to improve accuracy and support exception handling in live yard environments sensitive to vibration and lighting.
- Future-proof data architecture. Workflows and storage choices allow later linkage to hook tracking and hot-carcase data for richer supplier feedback, beyond minimum compliance.

## 3.6 Intended use of the results

- Operational adoption of receival-to-NLIS workflows, SOPs, and exception processes, including DOA management.
- Industry guidance for other WA processors on hardware placement, integration risks, and commissioning sequences.
- Foundation for innovation, enabling future hook tracking and feedback to producers on quality and yield.

# 4.0 Project objectives

The Sheep eID Project is designed to modernise sheep traceability through the implementation of an electronic identification system. The project will introduce RFID-based eID tags, integrate them with existing livestock management systems and AI vision technology, and provide training for end-users. This initiative will streamline animal tracking and compliance with industry regulations, with future potential for greater traceability throughout the processing plant from slaughter, chiller management, boning and supply chain administration by capitalising on the successful implementation of the RFID tracking technology.

The project consists of multiple stages, from initial research and stakeholder engagement to full-scale implementation and evaluation. At project completion, 95% accuracy is required to be achieved with the RFID technology, as required by the Department of Primary Industries and Regional Development (DPIRD). The meat processing facility traceability requires different requirements to that of farms and feedlots, requiring the ability to transfer processed animals to the facilities property identification code (PIC), confirming the animal has been processed and the animal can be removed from the national database. As the meat processing facility has multiple PICs, this needs to be accounted for in the project planning of how these will be managed to prevent animals being transferred to a farm PIC, opposed to the processing PIC.

Integration of existing stock management technology (OPTIO) at receival locations in the stockyard with RFID data collected from the eID technology installed will provide greater stock management for specific orders and management of daily production scheduling, utilising AI vision technology as a verification system for RFID accuracy. Data will be held in a centralised SQL file, that will be cross referenced with RFID data collected from the process floor sheep eID reader technology. Both data sets will be cross referenced to verify stock numbers and specific PIC numbers, confirming stock processing numbers align with both stock received and allocated processing numbers scheduled for the production day.

# 5.0 Methodology

The project employs a phased approach, incorporating research, technology deployment, testing, and evaluation to ensure a robust and effective eID system. The methodology includes:

- Research and Planning – Identifying technological requirements, stakeholder needs, and regulatory compliance measures.
- Pilot Implementation – Deploying RFID tags on a controlled sample group to assess functionality and address potential challenges.
- System Integration – Ensuring the compatibility of eID tags with existing farm management software and databases.
- Training and Adoption – Providing training to farmers, veterinarians, and other stakeholders to facilitate smooth adoption.
- Evaluation and Optimization – Assessing the system’s impact and making necessary refinements before full deployment.

# 6.0 Results

## 6.1 Installation and commissioning

- Bunbury: receival MCC, race readers and cabling installed. Process-floor EID station at bleed installed with antenna, encoder, PLC and reader. Network provisioned for PLC and data paths. Commissioning completed and handover achieved.
- York: electrical and data infrastructure installed. Starlink connectivity, data cabinet, PC, monitor and switch in place. Three-way removable drafter concept approved. Site enabled for staged commissioning aligned with yard upgrades.
- Receival Ramp 1 installation was delayed and completed in the first week of November 2025. Commissioning was performed immediately after installation and included in the final handover.

Installation across Bunbury and York incorporated not only the project requirements but also the technical conditions identified in the NSW DPIRD external assessment. The NSW DPIRD evaluation confirmed that V&V Walsh required shielding, raceway separation and antenna isolation to mitigate cross reads. These elements were incorporated into the final installation design, including physical barriers, bracket adjustments and antenna tuning to minimise RF interference.

Commissioning activities benefited from prior external findings. The process floor reader was installed in a location validated as low risk for carcass swing and industrial noise, consistent with the NSW DPIRD observation that swinging significantly reduces read consistency. Structural decisions in the lairages, such as ceiling-mounted installations to reduce vibration, directly addressed risks highlighted during the external review. All MCCs, panel readers and AI systems were installed with these additional controls, resulting in a robust commissioning environment.

## 6.2 End-to-end data flow and NLIS readiness

- Receival HMI captures RFID reads and lot data to a central store.
- AI camera counts are used to cross-check RFID totals for each lot.
- Process-floor EID station verifies animals processed and reconciles exceptions.
- Triton performs QA checks and prepares validated files for NLIS upload.
- Routine NLIS uploads defined, tested and documented in SOPs.

The end-to-end data flow was strengthened with external validation that dual verification (RFID plus AI) significantly improves confidence in stock accuracy. The NSW DPIRD evaluation highlighted tag variability as a major driver of discrepancies and recommended independent verification during receival. This was fully incorporated through AI count alignment with RFID reads and OPTIO's reconciliation logic.

External assessments also confirmed that V&V Walsh's multi-PIC environment requires clear data segregation and LOT discipline. The implemented workflow, including SQL storage, CSV process floor uploads and QA verification prior to NLIS submission, aligns with these recommendations and ensures readiness for formal NLIS compliance.

As the system transitioned from commissioning into stable operation, discrepancies were identified between the total number of lambs processed and the counts reported through the PIC/eID workflow. During the bedding-in period, integration and configuration adjustments were required across the eID reader setup and the Triton interface to ensure alignment between processing activity and reported data.

Following these adjustments, the remaining variance is now minimal, typically two to three bodies. This residual difference is most likely associated with operational factors, such as carcasses that fall and are reintroduced to the line downstream of the process-floor reader. This behaviour is consistent with normal human and process interactions in a high-throughput environment, with the eID solution now operating as intended for NLIS and DPIRD reporting.

## 6.3 AI verification

- AI system integrated to verify animal counts at receival.
- Configuration accounts for plant lighting, vibration and camera placement.
- Exceptions flagged for operator review when AI and RFID are not aligned.

The NSW DPIRD evaluation reinforced the importance of environmental controls for AI performance, particularly light pollution and vibration. The AI installation at V&V Walsh incorporated these recommendations: shading panels to block daylight, ceiling mounts to reduce vibration and clear sightlines to minimise shadowing. As a result, the AI system operates under conditions validated during external assessment, improving consistency of count accuracy.

Dual verification, noted in the external assessment as industry best practice, is now embedded into the system. The AI output provides a secondary accuracy check against RFID reads and supports the identification of unread tags, tag failures and stock flow anomalies.

## 6.4 Exception handling and DOA

- DOA process implemented using handheld wanding and daily updates so receival and process numbers remain aligned.
- Multi-PIC handling supported in data structures and workflows.
- Clear roles and steps documented for corrections prior to NLIS upload.

The DOA workflow was enhanced using lessons from the NSW DPIRD findings, which emphasised the need for structured exception handling to maintain reconciliation accuracy. External observations highlighted that tags associated with DOA animals often present read challenges and require manual scanning to preserve data integrity. The handheld scanning plus dual upload method implemented at V&V Walsh fully addresses this recommendation.

## 6.5 Risk management during delivery

- Camera placement and shading used to reduce vibration and glare impacts on AI.
- Interference from existing cattle readers managed through reader replacement and separation.
- Ramp upgrade timing managed with contingency use of existing races to maintain schedule.
- The delay to Ramp 1 was managed by using existing races and staging the commissioning sequence. The cutover plan and operator communications were updated to maintain throughput.

Risk management incorporated both internal findings and external validation. The NSW DPIRD assessment identified interference from nearby readers and electrical equipment as a critical driver of read inconsistency across plants. This informed early risk identification and led to the replacement of beef yard readers, shielding installations and frequency separation checks.

External assessment also reinforced the risk of swinging carcasses reducing process floor read performance. In response, antenna placement and structural spacing were specifically selected to reduce swinging before the read point. AI vibration risks were mitigated following external guidance for mounting systems on structural beams.

## 6.6 Outcomes against objectives

- Integrated RFID at receival and on the process floor is operational under high-throughput conditions.
- AI verification in place to improve confidence in counts and support exception handling.
- Auditable data pipeline from yards to NLIS established, including QA by Triton.
- SOPs prepared for receival, process verification, exception management and NLIS upload.
- Sites prepared for future integrations such as hook tracking and linkage to grading and yield data.

External evaluation confirmed that V&V Walsh's infrastructure, layout and operational environment were suitable for achieving high RFID accuracy once shielding and lane separation were in place. These external validations strengthened the project's ability to achieve objectives, particularly end to end traceability and data integrity.

The project meets objectives not only in installation and integration but also in alignment with industry findings. The adoption of dual verification, interference controls and disciplined exception handling reflects best practice as identified through the NSW DPIRD evaluation of multiple processing plants.

## 6.7 Evidence of adoption and operator readiness

- Yard and process teams trained on receival HMI, handheld procedures and exception workflows.
- Daily reconciliation practices embedded to ensure numbers match prior to NLIS submission.
- Support arrangements in place with technology vendors for ongoing tuning and maintenance.

Operator involvement was strengthened by the external observations that human factors (such as carcass presentation, consistent stock flow and correct LOT allocation) directly affect eID performance. Operators were engaged in HMI design and process reviews to address these dependencies.

The NSW DPIRD assessment highlighted the importance of operator awareness regarding tag faults and unread tags. This has been incorporated through training on AI exception flags, DOA scanning and daily reconciliation workflows. Operators buy-in increased as they observed the system capture discrepancies in real time, demonstrating practical value.

# 7.0 Discussion

## 7.1 Meaning of the results

The results from this project show that an integrated RFID and AI verification system can operate reliably in a commercial multi-PIC processing environment when infrastructure, workflows and governance are deliberately designed to support it. The staged implementation, combined with progressive refinement of raceway layout, antenna placement, DOA handling and reconciliation practices, demonstrated that technical performance improves when operational discipline and system design are aligned. Internal implementation insights (Appendix 12.1) confirmed that clear roles, simple operator pathways and visible status at the point of use are critical to sustaining performance once the system moves from project mode into daily operation.

The NSW DPIRD assessment across four processors reached complementary conclusions. Their evaluation confirmed that system performance is strongly influenced by environmental factors such as interference, carcass presentation, tag quality, vibration and lighting, and that these must be addressed at design and installation stage, not retrofitted once problems appear. The consistency between the internal results at V&V Walsh and the external findings from NSW DPIRD increases confidence that the solution is robust and that the learnings are applicable to other plants.

## 7.2 Implications for adoption by processors

Implementation insights developed during the project at V&V Walsh, documented in Appendix 12.1, showed that adoption improves when workflows are simplified, data is available where decisions are made and reconciliation is treated as part of daily operations rather than an exception process. Practical elements such as clear LOT governance, consistent handling of DOAs, standardised operator actions and predictable escalation paths for discrepancies were essential to maintain throughput without sacrificing accuracy. These internal insights provide a realistic adoption pathway for processors who face similar constraints in yards, lairages and process floors.

The NSW DPIRD assessment across four processors reinforces these implications at an industry level. Their findings emphasised that processors who address infrastructure constraints early, who invest in raceway design, shielding and camera stability, and who adopt dual verification of counts are better placed to reduce disputes with suppliers, improve reconciliation accuracy and minimise NLIS reporting errors. The V&V Walsh implementation offers a concrete example of these principles in practice and can be used as a reference model for other sites planning eID adoption.

## 7.3 Data quality and audit readiness

Internal implementation insights (Appendix 12.1) showed that data quality and audit readiness depend less on any single piece of technology and more on how the entire data path is structured and governed. At V&V Walsh, centralised storage, defined QA checkpoints and structured reconciliation workflows create a traceable path from receival through verification to NLIS submission. Each step in the process, including DOA handling, LOT assignment, AI verification and final upload, can be evidenced and reviewed. This structure supports both regulatory audits and future analytical work, such as linking identification data with grading and yield outcomes.

The NSW DPIRD assessment highlighted that tag variability is a persistent industry wide challenge and that daily reconciliation is critical to maintain confidence in the data. Their findings also noted that processors benefit from independent verification mechanisms, such as AI vision, to counteract unread tags and presentation related errors. The approach taken at V&V Walsh aligns closely with these external observations. AI verification and structured exception handling form part of the system’s audit readiness strategy and provide additional resilience against known data quality risks.

## 7.4 Limitations and residual risks

Despite the progress achieved, several limitations and residual risks remain. The absence of hook tracking means that body level linkage between individual carcasses and their identification records is not yet available, which limits the depth of feedback that can be provided to producers. System performance remains sensitive to human factors, including carcass swing on the process floor, adherence to standardised shackling practices, consistent DOA scanning and correct LOT allocation. Tag failures and poor tag application practices, which are outside the direct control of the processor, continue to influence read rates and can only be mitigated, not eliminated, at the plant level.

The NSW DPIRD assessment confirms that these limitations are not unique to V&V Walsh but are common across processors. Their work shows that even well-designed systems experience residual risk from tag quality, environmental variation and operational behaviour. For V&V Walsh, these risks are being managed through infrastructure design, dual verification, routine maintenance, staff training and daily reconciliation. However, they also point to clear priorities for future work, including hook tracking integration, continued engagement on tag quality standards and ongoing refinement of operator practices to further reduce variability.

A small residual variance between processed numbers and reported counts may persist under normal operating conditions. This is primarily driven by human and operational factors that occur outside the physical read point, such as carcasses exiting and re-entering the line after the reader.

While this does not indicate a system limitation, it highlights the ongoing dependency on consistent operational discipline and clear procedures to manage these scenarios. Maintaining routine reconciliation and operator awareness remains essential to minimise these variances over time.

# 8.0 Conclusions

The project demonstrated that a processor-grade eID configuration can operate under commercial throughput and still deliver reliable end-to-end reconciliation from receival to NLIS submission. RFID at receival and on the process floor, paired with AI count verification, created a consistent identity chain and reduced manual correction. Centralised storage with defined QA produced an auditable trail that strengthens compliance and audit readiness.

Adoption proved most stable when workflows were simple, status was visible at the point of use and reconciliation was treated as a daily routine. Explicit handling of DOA and clear exception pathways closed the main sources of variance between yard and process counts. Following system stabilisation, any remaining differences between processed numbers and reported counts were minimal and attributable to normal operational handling rather than system performance. Performance of the AI layer depended on basic environmental controls. Camera placement, vibration isolation and consistent lighting improved agreement between RFID and AI and reduced operator interventions.

The architecture tolerated multi-PIC operations and staged yard works. The delay to Ramp 1, completed before report submission, validated the staged commissioning approach and confirmed that throughput can be protected during infrastructure changes. Residual risks remain in sensitivity of AI to plant conditions, procedural discipline for LOT and PIC data and the need for configuration control when adjacent systems change. These risks are manageable with routine monitoring, periodic accuracy checks and clear ownership of data quality.

Beyond compliance, the same data foundation enables value creation. Linking individual IDs to hook tracking, hot-carcase weights, grading and yield can support feedback to producers and continuous improvement across the chain. Taken together, the results provide a practical reference pathway for other processors and a sound platform for targeted RD&E and industry extension.

# 9.0 Recommendations

These recommendations are derived from the implementation insights in Appendix 1 and from the results in Section 6.

## 9.1 Practical application of findings for industry

These recommendations are derived from the implementation insights in Appendix 12.1, from the results in Section 6, and from cross-plant observations reported by NSW DPIRD in a multi-processor eID evaluation.

### For processors

- **Treat read rate as a daily performance indicator.** Track receival RFID read rate, agreement between RFID and AI counts, reconciliation between receival and process after DOA, and the percentage of NLIS files accepted without correction. Aim to keep read rates within the 96–98% benchmark range that NSW DPIRD observed as achievable across multiple processors.
- **Embed a short exception huddle before NLIS submission.** Hold a five-minute check before files are uploaded. Close or assign every open exception and record unresolved items with clear owners and due dates so reconciliation becomes routine rather than a recovery exercise.
- **Keep workflows simple and visible at the point of use.** Maintain clear SOPs at receival and on the process floor and mirror them in the HMI with prompts for DOA handling, multi-PIC management and exception pathways. Visibility of lot status, counts and exceptions supports stable adoption and reduces cognitive load for operators.
- **Manage the environment for RFID and AI performance.** Standardise camera mounts, vibration isolation and lighting checks, and include lens and antenna cleaning in routine maintenance. This reflects both site experience and NSW DPIRD observations that electromagnetic interference, dust and plant layout strongly influence read performance.
- **Invest in fit-for-purpose IT and on-site capability.** Ensure reliable yard and kill-floor hardware, networking and rugged computers are available to run eID systems consistently. NSW DPIRD noted that smaller processors, in particular, benefit from improved information systems and from having a dedicated innovation or supply-chain lead who monitors read rates and coordinates with vendors.
- **Maintain a simple fallback and clear escalation path.** Retain handheld wanding and a documented DOA and exception route so reconciliation can continue during peak flows or equipment downtime, while issues are investigated with vendors.

### For technology vendors

- **Deliver plant-ready configurations and tuning support.** Provide recommended reader and camera placement, lane design guidance, shielding options and commissioning checklists that reflect the electromagnetic and mechanical realities of processing plants. NSW DPIRD's multi-plant review showed that site-specific tuning and minor physical modifications are often critical to reach stable read rates.

- **Provide a standard data model and monitoring tools.** Define file formats, validation rules and error codes used before NLIS upload, and offer dashboards or regular reports so processors can monitor read rates, exception types and system health over time, rather than relying only on ad-hoc checks.
- **Support integration across plant systems.** Design readers, AI and middleware to integrate cleanly with existing HMI, process-floor systems and NLIS upload tools, using agreed interfaces. NSW DPIRD found that robust integration and clear responsibilities between vendors reduced commissioning delays and improved overall reliability.
- **Offer short, role-based training and responsive service.** Provide targeted training for operators, supervisors and maintenance, backed by prompt remote and on-site support. The NSW DPIRD evaluation highlighted that strong vendor responsiveness and tailored support were central to maintaining high read rates across different plants.

### For regulators and integrity bodies

- **Set and enforce minimum read-rate and tag-performance standards.** Establish clear national or state benchmarks for acceptable read rates and minimum eID tag performance under processor conditions and ensure that assessments are based on animals carrying tags rather than total kill numbers.
- **Provide clear guidance for data capture and NLIS uploads.** Issue practical guidelines on when and where tags must be read, how data should be structured, and what evidence is required to demonstrate compliance, including examples aligned to processor workflows and exception management.
- **Monitor uploaded data and feed results back to processors.** Regularly review NLIS uploads, share read-rate reports with plants and use this feedback loop to support continuous improvement in system configuration and operator practice, as recommended in the NSW DPIRD evaluation.
- **Support industry education and knowledge-sharing.** Facilitate webinars, workshops and communities of practice where processors, vendors and regulators can share configurations, issues and solutions, and extend education to producers on correct tag application to reduce non-tagged or damaged tags entering plants.

## 9.2 Future RD&E that flows directly from this work

- Traceability and downstream data integration
    - Link individual IDs to downstream data to enable full carcass-level insight. Pilot linkage to hook tracking, hot-carcase weights, grading and yield once the required infrastructure is available.
    - Quantify the accuracy and value of these linkages to support future producer feedback programs and end-to-end supply-chain analytics.
- Formal accuracy and performance study
    - Conduct structured accuracy studies comparing RFID and AI agreement across different lot sizes, lighting conditions, raceway behaviours and throughput ranges.
    - Develop plant-level performance targets and acceptable variance thresholds to support continuous improvement and industry benchmarking.

- Human factors and operator behaviour
  - Test HMI prompts, colour states and micro-training formats to evaluate which combinations reduce exception rates and shorten operator onboarding time.
  - Explore how operator behaviour, carcass presentation and decision points influence read-rate stability and data quality.
- Robustness and environmental resilience
  - Undertake robustness testing of alternative camera mounts, vibration controls, lighting solutions and reader configurations to improve stability in dusty, high-vibration or variable-light environments.
  - Use these findings to refine recommended design specifications for multi-PIC processors.
- Cost and benefit modelling
  - Develop a simple cost–benefit calculator that quantifies time saved on reconciliation, reduction in NLIS corrections, avoided disputes and the potential value of enhanced producer feedback.
  - Use data from V&V Walsh and the NSW DPIRD multi-plant evaluation to provide realistic default assumptions for processors assessing adoption.
- Industry-wide RD&E themes informed by NSW DPI
  - Investigate national tag quality standards, applicator guidance and minimum performance criteria to address recurring issues identified across multiple processors.
  - Advance analytics to detect unread-tag patterns, movement anomalies and environmental conditions that affect read performance.
  - Explore real-time exception detection and predictive insights to support operational decision-making and reduce downstream correction work.

## 9.3 Adoption and extension activities

### Implementation guide for processors

Produce a short, practical guide that summarises the processes developed during this project, including receival procedures, DOA handling, LOT governance, exception pathways, reconciliation steps and validated infrastructure configurations. Include examples of reader placement, shielding, vibration controls and HMI design. Reference Appendix 12.1 to provide contextual insight into what worked operationally and why.

### Operator capability

Operator capability can be further supported through targeted, role-based training focused on receival HMI use, handheld DOA scanning, exception clearing and NLIS submission. Short, practical training formats and on-floor prompts, such as colour-state cues in the HMI, may help reduce onboarding time and improve consistency. Refresher sessions could be considered once stable operations are established.

### Benchmark sharing

Anonymised performance benchmarks could be shared through AMPC and DPIRD channels, including read-rate trends, exception categories and NLIS correction rates. Using plant-level data alongside DPIRD's multi-processor findings may support wider adoption, highlight the value of independent verification layers and inform future system performance standards.

### Community of practice

Periodic forums with processors, vendors and integrity bodies could support knowledge sharing on exceptions, configuration improvements and emerging issues such as tag quality, environmental constraints and system integration. These sessions may help refine implementation guidance over time and maintain alignment with evolving DPIRD guidance and industry expectations.

# 10.0 Project outputs

## 10.1 System design and stakeholder alignment

- Defined the end-to-end eID process for a processor environment, integrating OPTIO for receival HMI and data capture, SCL RFID infrastructure, Triton for process-floor verification and NLIS preparation, and AI for count verification.
- Confirmed supplier roles, interfaces and responsibilities through Milestones 1 and 2, establishing a shared integration plan, commissioning sequence and data-ownership expectations.
- Incorporated DPIRD insights on raceway design, interference mitigation and lane separation into the integration plan to support stable read accuracy from early commissioning.

## 10.2 Operator HMI and floor assets

- Delivered receival HMI layouts and templates that display lot status, read counts and exception flags at the point of use, aligned with operator pathways refined during commissioning.
- Produced quick-reference sheets for operators and supervisors that mirror HMI states, exception pathways and DOA workflows, supporting faster onboarding and fewer errors.
- Embedded colour-state prompts and simplified HMI logic informed by human-factors lessons from early operation and DPIRD's cross-processor observations.

## 10.3 Installed infrastructure and site works

- Installed electrical and data infrastructure for receival and the process-floor EID station at the bleed point, including antenna, encoder, PLC and reader.
- Completed Bunbury networking upgrades to support PLC–AI–Triton–OPTIO data flows, and prepared York with electrical and data backbone, Starlink connectivity, data cabinet and monitoring stations.
- Applied DPIRD recommendations related to vibration isolation, lighting stability and shielding to enhance reader and camera reliability in high-noise and dusty environments.

## 10.4 Data workflow, QA and NLIS submission

- Implemented the full end-to-end data pipeline: receival RFID reads and AI counts to central storage, process-floor verification, Triton QA checks and validated NLIS submission files.
- Agreed and documented file specifications, validation rules and reconciliation steps for RFID reads, AI totals and NLIS packages, incorporating DPIRD's emphasis on multi-system verification.
- Embedded multi-PIC handling and LOT discipline in the workflow to prevent reconciliation drift, supported by daily exception review and a pre-submission NLIS huddle.

## 10.5 Exception handling and DOA

- Implemented a clear DOA pathway using handheld wanding and a documented data route so receival and process numbers remain aligned.
- Defined owners, steps and timing for resolving exceptions before NLIS upload, including a daily reconciliation check consistent with DPIRD's findings on audit-readiness.
- Reduced reconciliation workload by integrating DOA outcomes directly into the end-to-end data flow and HMI exception states.

## 10.6 AI verification and monitoring

- Integrated AI cameras at receival to provide an independent count cross-check, increasing confidence in receival numbers and reducing NLIS corrections.
- Tuned camera placement, vibration isolation and lighting parameters to improve agreement with RFID and minimise operator intervention, reflecting both internal tuning cycles and DPIRD's multi-site observations.
- Established monitoring rules for inconsistency patterns and low-confidence frames to support early issue detection.

## 10.7 SOPs, governance and configuration control

- Completed SOPs for receival HMI use, handheld DOA workflows, exception management, process-floor verification and NLIS submission.
- Established a configuration and change log for readers, cameras, HMIs and data interfaces to maintain integration integrity, supporting version control across Milestones 3 to 5.
- Embedded governance routines aligned with DPIRD's recommendation for structured daily checks and clear accountability for reconciliation accuracy.

## 10.8 Training and industry extension artefacts

- Delivered practical training for operators and supervisors covering HMI use, handheld DOA, exception clearing and NLIS submission, with on-floor demonstrations.

  Date: 22/08/2025
  Location: Bunbury
  Target audience: yard and process operators, supervisors

## 10.9 Foundations for future integrations

- Prepared the technical and data architecture required for future linkage to hook tracking, hot-carcase weights, grading and yield, enabling individual-animal traceability once infrastructure is commissioned.
- Documented a staged approach that can be reused at York and other sites while yard upgrades continue, incorporating DPIRD guidance on infrastructure sequencing.
- Defined future data-structures and validation rules to support downstream analytics, discrepancy detection and producer feedback models.

# 11.0 Bibliography

Department of Primary Industries and Regional Development (DPIRD) n.d., *Electronic identification for sheep and goats in Western Australia*, Government of Western Australia, viewed 2 October 2025, https://www.dpird.wa.gov.au/businesses/biosecurity/animal-biosecurity/livestock-ownership-identification-movement/electronic-identification-sheep-goats/. dpird.wa.gov.au

Department of Primary Industries and Regional Development (DPIRD) 2025, *Sheep and goat electronic identification (eID)*, Government of Western Australia, viewed 2 October 2025, https://yoursay.dpird.wa.gov.au/sheepgoateid. yoursay.dpird.wa.gov.au

Integrity Systems Company 2024, *NLIS Sheep and Goat Standards*, Integrity Systems Company, viewed 2 October 2025, https://www.integritysystems.com.au/globalassets/isc/pdf-files/nlis-documents/sheep--goat-traceability-standards-booklet-updated-june-2024.pdf. Integrity Systems Company

New South Wales Department of Primary Industries (NSW DPI) n.d., *eID explained*, NSW Government, viewed 2 October 2025, https://www.dpi.nsw.gov.au/dpi/biosecurity/your-role-in-biosecurity/primary-producers/nlis/sheep-and-goat-individual-electronic-identification/eid-explained. dpi.nsw.gov.au

Meat & Livestock Australia (MLA) 2023, *V.NLS.3000 | Victorian Abattoir RFID Sheep Project*, Meat & Livestock Australia, viewed 2 October 2025, https://www.mla.com.au/research-and-development/reports/2023/v.nls.3000--victorian-abattoir-rfid-sheep-project/. MLA Corporate

Burns, A., Wilmer, H., Miller, R.S., Clark, P.E. & Taylor, J.B. 2025, ‘Precision animal husbandry: using artificial intelligence for camera traps to optimize animal production and management decision support systems’, *Animal Frontiers*, 14(6), 68–71, viewed 2 October 2025, https://academic.oup.com/af/article/14/6/68/7942663

# 12.0 Appendices

## 12.1 Appendix 1 - Implementation insights

### Purpose

This appendix captures practical insights observed during implementation. It explains what worked, under which conditions, and why it matters for day-to-day reliability. It is descriptive rather than prescriptive. Section 9 translates these insights into actions.

### 1 - Simple, visible workflows keep adoption stable

#### What we observed

Operators engaged more consistently when lot status, read counts and exception states were visible at the receival HMI. On-floor, role-specific micro-training reduced hesitation, improved confidence in DOA and exception clearing, and accelerated onboarding.

#### Why it matters

Visibility and clarity reduce cognitive load and shorten onboarding time, which lowers reconciliation effort at the end of the day.

### 2 - Daily reconciliation prevents rework before NLIS submission

#### What we observed

A short end-of-day exception check, completed before NLIS upload, kept receival and process counts aligned. Exceptions left open overnight almost always resulted in additional investigation the following day.

#### Why it matters

Closing exceptions daily prevents batch-level rework, shortens time to submission and strengthens audit readiness. DPIRD’s broader observations across processors also emphasised the value of routine, structured reconciliation.

### 3 - DOA handling must be explicit and easy to execute

#### What we observed

Clear DOA steps using handheld wanding, paired with a documented data path, removed a persistent source of variance between yard and process counts. When handheld scanning was inconsistent, reconciliation effort increased significantly.

#### Why it matters

Explicit DOA handling stabilises the identity chain and prevents downstream mismatches. When DOA is simple and visible, NLIS corrections drop and the audit trail becomes predictable.

## 4 - AI performance depends on environment control

### What we observed

Camera placement, vibration isolation and consistent lighting directly affected agreement between AI counts and RFID reads. Regular lens cleaning and mount tightening reduced intermittent confidence dips.

### Why it matters

AI verification is effective only when environmental sensitivities are managed as routine maintenance, not as a commissioning-only activity. This reinforces DPIRD’s cross-site findings on the importance of stable physical conditions for accurate reads.

## 5 - Staged commissioning protects throughput during yard works

### What we observed

Yard delays, including the Ramp 1 upgrade, were absorbed through staged commissioning. Using existing races allowed the plant to maintain throughput while infrastructure was finalised.

### Why it matters

A staged approach maintains operational continuity and provides a replicable model for other sites that must retrofit infrastructure while keeping livestock moving.

## 6 - Treat traceability data as a product with QA ownership

### What we observed

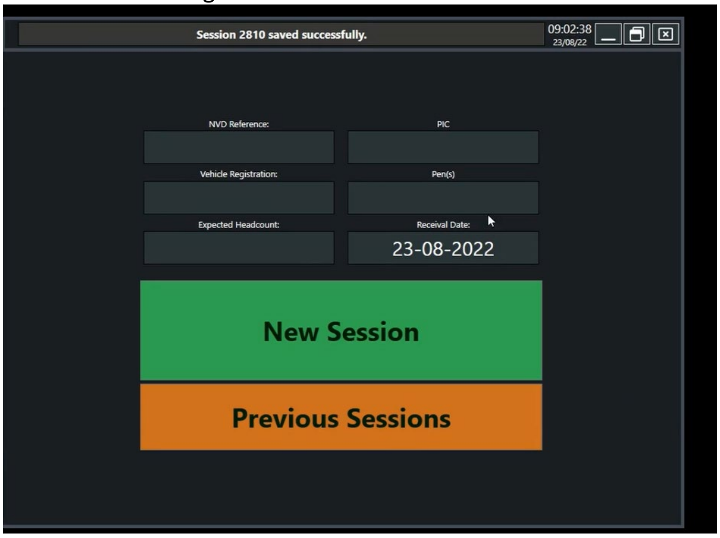
Centralised storage, clear QA responsibility via Triton and formal ownership of corrections created a clean audit trail from receival to NLIS. When roles were unclear, exceptions accumulated quickly.

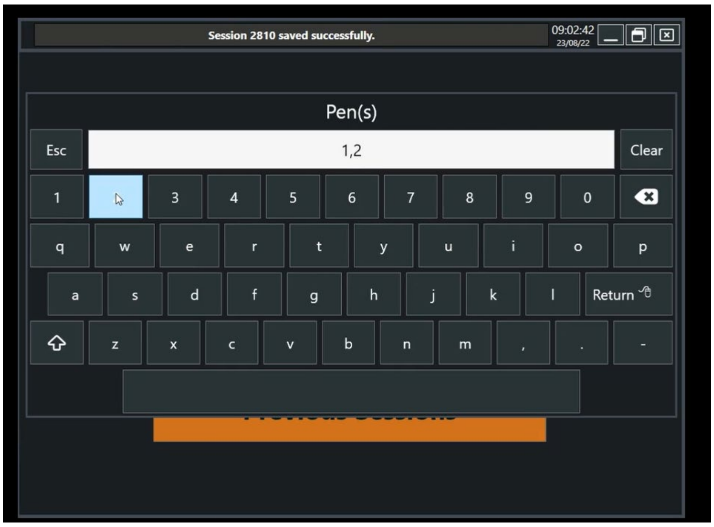
### Why it matters

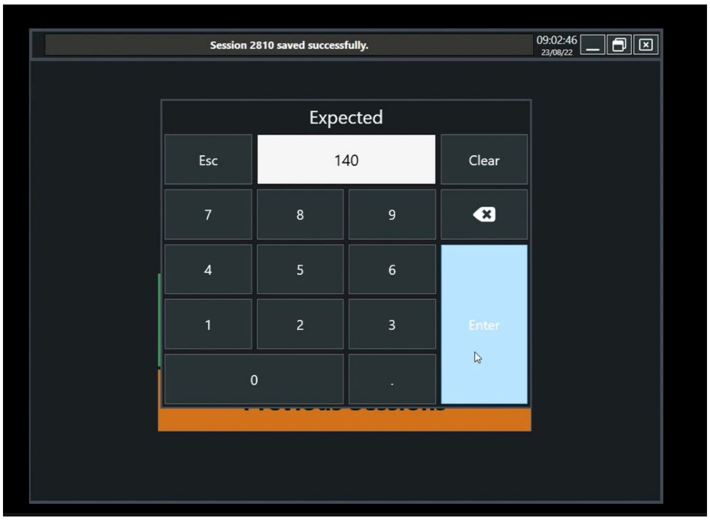
When data have defined owners and routine checks, compliance becomes predictable and less labour-intensive. This strengthens NLIS integrity now and enables future producer feedback once hook tracking and downstream data linkage are implemented.

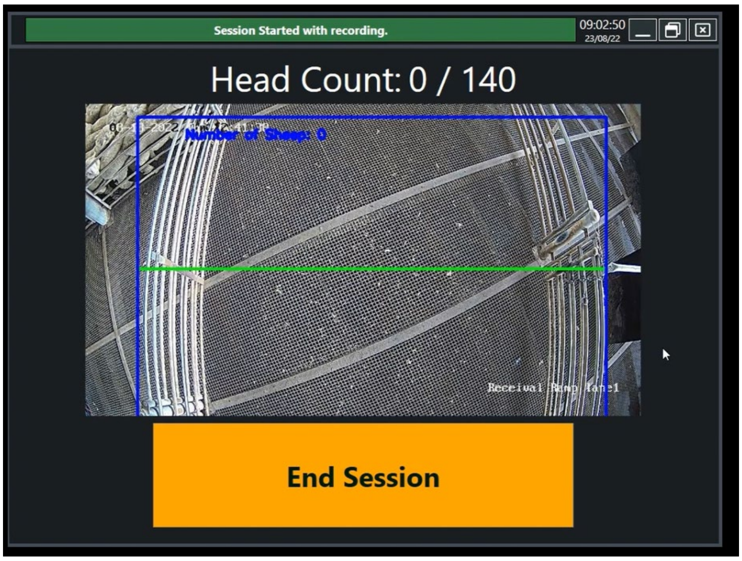
## 12.2 Appendix 2 - Photos

HMI interface design

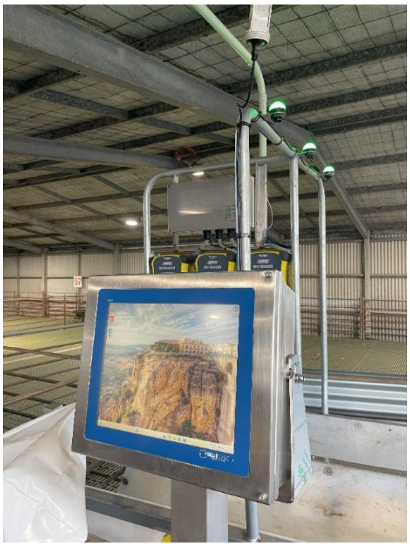





MCC Location



Slaughter board eID system

The blue light indicates a successful read from the tag

Green light shows reader is ready to read, indicating a no read from the tag as it passes

## 12.3 Appendix 3 – NSW DPIRD report – Appendix 4 – V&V Walsh

NSW DPIRD report - Appendix 4 – V&V Walsh.

## 10.4 Appendix 4

V & V Walsh is located at Bunbury, Western Australia and is multi species plant, processing sheep and beef. The Bunbury facility can process 5000 sheep and 400 cattle per day.

### 1. V & V Walsh Project Objectives

### 2. Technology/software installed

A three dual-lane multi-reader raceways system was installed at the receivals area where sheep are scanned via EID readers as they unload into pens. This system integrates directly with Bluesync sheep counting. This work was custom fabricated by SCL on site and installed into two existing and one rebuilt raceway.

The slaughter board RFID system is located at the bleed race post knocking and reads RFID tags as the animals move along the chain.

No direct User Interface was installed at this plant. An Indicator lights signal system was set up with 2 lights:

- Green Light: Operational and ready to read.
- Blue Light: Actively scanning

Direct interface to Triton with optional CSV output tool available for manual NLIS upload. There was seamless integration with both Triton and Bluesync throughout installation in the yards and slaughter floor.

### 3. Performance of the new system

Two site visits were conducted by NSW DPIRD to monitor the SCL system installed.
SCL uses their own RF diagnostic tools to mitigate industrial noise prior to and during installation. During trialling of the system there was a high read rate with minimal noise at the location of the RFID reader.
Trial 1 consisted of an eID mob with some missing tags which a temporary peg tag was allocated to the ear of the animal. Any tags that did not read, which was visible by the green light turning blue, were scanned further down past the reader. This was done to reduce potential interference from the handheld wand to the RFID reader. It was noted that the lambs killed in this consignment had recently been tagged with eID tags and some with visual tags. Trial 2 was a consignment of older lambs that had no eID tags, only visual tags. Temporary peg tags were put on the animal's ear prior to passing by the scanner with only 1.3% not read by the reader.

Trial 3 was conducted on the second visit with some minor adjustments made to the reader by SCL. Several consignments had no eID tag visible, and the temporary peg tag was applied to these animals. One consignment had black eID tags that could not be read by the reader or handheld wand suggesting poor quality tags were used. It was also noted that a small number of no reads may have been affected due to the animal swinging on the chain past the RFID reader. This was caused by a procedure located three meters prior to the reader at the end of the bleed tunnel. The results outlined in the below tables outline successful read rate. Further testing is required to gauge a better understanding of the technology.

| Date | Trial | EID animals | No tag or no read from tag | Valid NO READ | Read rate % |
|---|---|---|---|---|---|
| 17/06/25 | 1 | 579 | 0 | 4 | 99.3% |
| 17/06/25 | 2 | 245 | 0 | 3 | 98.7% |
| 28/08/25 | 3 | 1126 | 38 | 13 | 98.8% |
| 29/08/25 | 4 | 267 | 0 | 3 | 99% |

## 4. Key findings/lessons learnt

- **Faulty tags identified** - SCL inhouse trialling of the reader highlighted the importance of tag quality with several consignments with RFID tags not scanning, this was also evident in trial 3 with a group of RFID tags not being read by either the RFID reader or handheld reader.

## 5. Recommendations

SCl have recommended long-term integration with plant monitoring systems for real-time alerts.
Maintain minimum EID tag quality standards.

The blue light indicates a successful read from the tag

Green light shows reader is ready to read, indicating a no read from the tag as it passes.