Rural R&D for Profit Program

Enhancing supply chain profitability through reporting and utilization of peri-mortem information by livestock producers.

Final Report

Australian Pork Limited
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HEALTH 4 WEALTH

Contents

Plain English summary

The project, 'Enhancing supply chain profitability through reporting and utilization of peri-mortem information for livestock producers' (referred to as Health 4 Wealth) is one of seventeen projects that received funding under Round 2 of the Rural Research and Development for Profit Program administered by the Department of Agriculture, Water and the Environment. The Project is a partnership between Australian Pork Limited (APL), Meat and Livestock Australia (MLA), Australian Meat Processor Corporation (AMPC), Department of Economic Development, Jobs, Transport and Resources, Victoria and South Australian Research and Development Institute.

The Health 4 Wealth project had the objective of collecting animal health disease and defect data (peri-mortem data) at processing plants and feeding this information back to producers. The aim of this is to provide meaningful data to producers on their herd or flock health to allow them to make more informed husbandry practice decisions on farm. This project was conducted across the beef, sheep and pork supply chains.

The project was delivered through sixteen subprojects across the country, addressing the following Rural R&D for Profit Program outcomes of:

- **Generating knowledge, technologies, products or processes that benefit primary producers**

  - A business case and a subsequent cost benefit analysis for a peri-mortem data capture and reporting system that meets the needs of relevant stakeholders across the beef, goatmeat, pork and sheepmeat supply chains and that considers all of the risks and rewards arising from such a system has been delivered.
  - Development of a voluntary data standard and software infrastructure that can be used to collect and consistently report the causes and prevalence of disease-related carcase (total and partial) and offal condemnations during ante- and post-mortem inspections. These data standards have been developed to allow the correlation of certain disease/parasite conditions with meat yield and offal recoveries in terms of both quantity and quality. Draft business rules were used during the project that detail the type and extent of condemnation information collected by processors.

- **Strengthening pathways to extend the results of rural R&D, including understanding the barriers to adoption**

  - Pilot studies at 10 processing plants that identified the challenges and barriers to implementing the standards and software, and provided recommendations before rollout of a project nationally
  - A national extension and adoption strategy that provides agreed outputs to be integrated into Australia's livestock production, meat inspection and verification systems. This allows for the cross-sector implementation of common reporting frameworks which in turn will maximise the efficiencies of on-farm production through animal health disease and defect data capture, analysis, reporting and extension.

- **Establishing and fostering industry and research collaborations that form the basis for ongoing innovation and growth of Australian agriculture**

The project has fostered industry and research collaborations between the:

- Cattle, sheep, goatmeat and pork industries
- Australian Meat Processors Corporation, Australian Pork Limited and Meat & Livestock Australia
- Department of Economic Development, Jobs, Transport and Resources, Victoria and the South Australian Research & Development Institute.

The project surpassed its initial aims by establishing and fostering industry and research collaboration beyond these organisations to include 15 additional research and consultancy companies, public health and livestock veterinarians, processing companies, software providers and training organisations across the cattle, sheep goatmeat and pork industries. This in turn will strengthen the pathways to extend the results of the *Enhancing supply chain profitability through reporting and utilization of peri-mortem information by livestock producers* project as the organisations continue to work together in this area into the future.

Abbreviations and glossary

Acronym	Description
AHA	Animal Health Australia
AMPC	Australian Meat Processor Corporation
ALFA	Australian Lot Feeders' Association
APL	Australian Pork Limited
DAWE	Department of Agriculture, Water and the Environment (Commonwealth of Australia)
DEDJTR	Department of Economic Development, Jobs, Transport and Resources, Victoria
EAS	South Australian Enhanced Abattoir Surveillance Program
EPACS	Australian Government Establishment Production and Condemnation Statistics System
GPCP	Goat Production Condition Project
H4W	Health 4 Wealth - Enhancing supply chain profitability through reporting and utilization of peri-mortem information for livestock producers
KPI	Key Performance Indicator
LDL	Livestock Data Link
MINTRAC	National Meat Industry Training Advisory Council
MLA	Meat and Livestock Australia
NLIS	National Livestock Identification System
NSHMP	National Sheep Health Monitoring Project
OJD	Ovine Johnes Disease
SARDI	South Australian Research and Development Institute

1 Project rationale and objectives

The project *Enhancing supply chain profitability through reporting and utilization of peri-mortem information for livestock producers* (referred to in this document as 'Health 4 Wealth') was one of the seventeen projects that received funding under Round 2 of the Rural Research and Development for Profit Program. The Project is a partnership between Australian Meat Processor Corporation (AMPC), Australian Pork Limited (APL), Meat & Livestock Australia (MLA), the South Australian Research & Development Institute (SARDI) and the Victorian Government Department of Economic Development, Jobs, Transport and Resources (DEDJTR).

The Australian Government's Rural Research and Development for Profit Program is a competitive research initiative with funding available over eight financial years (2014-22). The objective of the program is to realise productivity and profitability improvements for primary producers by:

a) generating knowledge, technologies, products or processes that benefit primary producers;

b) strengthening pathways to extend the results of rural R&D, including understanding the barriers to adoption; and

c) establishing and fostering industry and research collaborations that form the basis for ongoing innovation and growth of Australian agriculture.

Consistent with the Program's objectives the Health 4 Wealth project was established to unlock productivity and profitability improvements for livestock producers by providing peri mortem animal health data collected during animal processing, back to the person(s) responsible for the husbandry of the animal, in a way that promoted positive action to reduce the incidences of animal diseases and defects which had been identified.

Therefore, in summarised form, the aim of the Health 4 Wealth Project was to introduce a standardised and comprehensive approach to data collection of disease-related carcase and offal condemnations and feedback this information to livestock producers, in order to prevent the condemnations from occurring in the future.

Underpinning this aim was a long-established belief that abattoir animal health disease and defect feedback systems would improve the profitability of the Australian livestock industries if the data that is provided to producers is accurate and provided in a manner that positively impacts on producer decision making to reduce incidents and rates of animal disease or defects.

An abattoir animal health disease and defect data collection and reporting system can positively impact the supply chain in several ways. For example, the system could provide information that:

- Producers can act to reduce the on-farm prevalence of disease (if actionable).
- Improves farm productivity (generates a positive return for producers).
- Leads to a reduction in the number of ante-mortem carcase condemnations due to disease

- Leads to a reduction in the number of post-mortem full carcase condemnations due to disease.
- Leads to a reduction in the number of partial carcase condemnations due to disease.
- Improves animal welfare along the supply chain.
- Improves disease surveillance.
- Supports market access.
- Helps to inform future reviews of meat inspection.

The establishment of any of the above has the potential to bring benefits to segments of the supply chain and even to industry as a whole.

However, to be cost-effective and add value, an abattoir animal health disease and defect data collection and reporting system must:

- Cost less to implement than the potential returns from the system over a user-defined payback period to those parts of the value chain that are making the investments to establish and operate the system.
- Be applicable to single animals/ carcases or whole consignments, depending on the species (beef, goats, pigs or sheep).
- Be able to be incorporated into current abattoir systems.
- Not interfere with the primary aim of meat inspection, which is to pass a carcase as fit for human consumption.

Data collection on disease-related carcase and offal condemnations and reporting of this information to producers varies considerably. The project identified that there are currently limited commercially available off-the-shelf options for recording animal health disease-related carcase and offal condemnations in abattoirs. The systems currently being used across multiple processing plants include the Establishment Production and Condemnation Statistics (EPACS) database utilised by the DAWE, Meat Exports Branch, the National Sheep Health Monitoring Project (NSHMP) and the South Australian Enhanced Abattoir Surveillance Program (EAS). Data collection for the NSHMP does not usually rely on live data capture at the point of inspection.

There are also multiple past and present initiatives to implement data collection on disease-related carcase and offal condemnations and feedback of this information to producers. Examples include Ovine Johnes Disease (OJD) abattoir surveillance; the National Meat Industry Training Advisory Council (MINTRAC); Voice Data Capture Project undertaken for AMPC; the South Australian Enhanced Abattoir Surveillance Program; Livestock Data Link (LDL) direct upload pilots; Zoetis producer tours of abattoirs; the pork cost-benefit analyses and risk assessments undertaken by SARDI and the Draft National Standard for the Development, Collection and Reporting of Animal Health Data through the Supply Chain developed through funding provided by AMPC and MLA. Therefore, it was important that the Health 4 Wealth Project positioned and focused its communications activities to complement and add value to these past and present initiatives. In this way, the Health 4 Wealth Project was part of the broader body of work focused on developing data collection and reporting systems for disease-related carcase and offal condemnations in Australian abattoirs.

The project aimed to deliver the following key outcomes:

- A business case for a peri-mortem data capture and reporting system that meets the needs of relevant stakeholders across the beef, goatmeat, pork and sheepmeat supply chains and that considers the risks and rewards from such a system.
- Standards and software modules that can be used to collect and consistently report the causes and prevalence of disease-related carcase (total and partial) and offal condemnations during ante- and post-mortem inspections, together with associated pathology, to producers by processors. Business rules were to be developed that detail the type and extent of condemnation information collected by processors that will be made available to key stakeholders, producers and their veterinarians.
- Pilot studies that identify the challenges or barriers to implementing the standards and software modules, and the recommended solutions before rollout of a national feedback system.
- A national extension and adoption strategy that will allow agreed outputs to be integrated into Australia's livestock production, meat inspection and verification systems. The cross-sector implementation of common reporting frameworks will maximise the efficiencies of on-farm production through animal health data capture, analysis, reporting and extension.

These objectives remained consistent over the life of the project.

2 Method and project locations

At its inception, the Health 4 Wealth Project proposed eight Activities, each with its own outputs and KPIs. The project was managed through APL as the lead Research & Development Corporation. A Project Steering Committee comprising representatives from all partners overseeing the project was developed, while a Project Management Committee was established and responsible for the proper conduct of the project.

The eight Activities, their linked outputs and KPIs were actioned through the work of the Project Steering Committee, Project Management Committee and through the contracting of sixteen sub-projects.

i. Project Initiation Activities:

This Activity aimed to initiate and setup the Project. A Project Manager was to be appointed, a Project Steering Committee established, and agreements executed with partner organisations.

These activities were actioned, under sub-project *2016/2225 – Project Manager Role for RR&D4P 'Enhancing supply chain profitability through reporting and utilization of peri-mortem information by livestock producers'(H4W)* a Project Manager hired until 2018 at which point project management activities were incorporated into the sub-project contracts as needed.

A Project Steering Committee was developed with members from AMPC, APL, MLA, SARDI and DEDJTR. In addition, a Project Management Committee was established to ensure continual traction was gained on the project and to allow for linkage between the sub-projects to be undertaken. An Expert Panel was also established to provide technical expertise and advice to support the key objectives of the project. Panel members represented AHA, MINTRAC, DAWE and a private consultant. Panel members participated in steering committee meetings, reviewed drafts and reports, provided technical insight and knowledge where needed and completed specific research and activities when deemed necessary in consultation with the committee.

Standard contract agreements were executed between the partner organisations.

ii. Project Planning and Management Activities

This activity aimed to manage, monitor and evaluate the Project.

A project operations plan was developed, setting out the schedule for activities and the human and financial resources required. Risk management, communication and extension, and monitoring and evaluation plans were also developed.

In addition to the project operations plan, the project team initiated sub-project *2017/2251 H4W Pilot Studies Design Workshop*. This sub-project conducted a workshop aimed to design and develop the Health 4 Wealth pilot studies.

iii. Communication and Extension Activities

Communication and extension activities were envisaged with stakeholders across the red meat and pork sectors to support the various stages of the project. It was intended that these would result in agreed outputs being integrated into Australia's livestock production, meat inspection

and verification systems. A national extension and adoption strategy was to be developed and implemented. As part of this, the peri-mortem data capture and reporting system was to be demonstrated and promoted to processing establishments, producers and production veterinarians. Producer workshops, in collaboration with processors, were to be conducted to introduce the system to individual supply chains. These were to include methodologies for producer education involving targeted focus groups and workshops to discuss feedback reports, how identified carcase defects could be minimised and the resulting impact of changed management practices on farm profitability and productivity. An inspection extension activity was also to be undertaken, with the involvement of veterinary public health experts, to provide operational and Quality Assurance personnel with the information and training to underpin the system.

Consultation and communication with a range of stakeholders, including veterinarians, producers, processors and veterinary public health experts, was considered crucial to the success of the Project. In the absence of a data collection system for carcase and offal condemnations and feedback to producers, a number of independent activities have arisen, for example the National Sheep Health Monitoring Project, feedlot cattle animal health monitoring, the expanded Livestock Data Link, the on-line curriculum for meat inspectors and initiatives by individual processors. It was considered essential that the Project work with these existing activities to promote cross-sectional implementation of the new peri-mortem data capture and reporting system. It was also essential that this Project was perceived as an opportunity, not a threat, by on-plant and production animal veterinarians, meat inspectors and processing plants.

All sub-projects included aspects of communication, collaboration and extension activities. Four sub-project specifically focuses on these activities.

Between 8 June to 18 July 2017 sub-project *2016/2238 - Design and provision of an online collaboration event ('jam') to support engagement and idea generation for the development of standards for the consistent reporting, recording and analysis of peri-mortem disease information across pork, beef and sheep production systems ('improved Animal Health Feedback Systems') (H4W)* was undertaken by Era Innovation. This was an online collaboration event as part of the Health 4 Wealth initiative. This event was designed to discover new ideas on how to improve animal health feedback systems and to work towards creating national standards for the consistent reporting, recording and analysis of peri-mortem information. This event was established to engage as many stakeholders from the different areas of the supply chain as possible.

Sub-project *2017/2227 - Communications Strategy for the Health 4 Wealth Project for RR&D4P - Enhancing supply chain profitability through reporting and utilisation of peri-mortem information by livestock producers* was undertaken to develop the project's communications strategy. This sub project developed a refined communications strategy for the Health 4 Wealth project. The refined approach to Project communication was developed. As part of the revised approach, the overarching strategy for the Project was re-focused on four research themes:

i) abattoir animal health feedback systems reduce the prevalence of disease in animals presented for slaughter;

ii) abattoir animal health feedback systems can be accurate to the level of the individual animal/ consignment/ farm/ animal);

iii) the data collected is relevant to the species being slaughtered (cattle, goats, pigs and sheep) and to different supply chains;

iv) abattoir animal health feedback systems cost less to implement and run than the potential returns.

These research themes could be embedded within the KPIs and Outputs of the Health 4 Wealth Project, helping to ensure the success of the Project. The four research themes also underpinned the recommended key communication message for the Health 4 Wealth Project, that Abattoir animal health feedback systems are useful, cost-effective and add value throughout supply chains. The sub-project also identified and separated stakeholders into 4 tiers to allow for effective communication. The plan was approved by the project steering committee on 20 March 2018

Sub-project *2018/0085 - Development of Factsheets for beef and pork conditions detected in abattoir monitoring* developed a total of eighteen factsheets for pork conditions that have been selected for the pilot trials and up to five factsheets for beef conditions (nephritis, liver abscess, liver fluke, hydatids and pneumonia). These were completed by mid-September 2019. The factsheets are to be provided by processors to inform and assist producers when a condition is identified in their animals. The factsheets are available at Attachment 1.

Sub-project *2021/0036 - Animal health and disease extension and adoption strategy* conducted a gap analysis on the work completed under the Health 4 Wealth project. This gap analysis was used as a preliminary component of a draft animal health and disease extension and adoption strategy. The methodology of the project was to construct a framework to methodically interrogate elements of an extension and adoption process applicable to all stakeholder groups involved in abattoir surveillance and reporting.

iv. Business Case Activities

This activity aimed to develop a business case for the peri-mortem data capture and delivery system that encompasses the needs of relevant stakeholders across the entire supply chain and consider all of the risks and rewards arising from such a system. The business case was intended to provide a basis for undertaking the key stages of the Project to ensure success.

Business requirements were to be developed across all industry sectors to identify the value proposition of each sector and its effect on the sector and industry as a whole. The business case was to examine the barriers to change including practical, political and technological barriers. Design principles for the system were to be developed, including data ownership and security, data structure principles and a delivery model assessment including cost benefit analysis, and the skills and resources required to deliver the system.

These activities were completed through three sub projects. Sub project *2016/2202 - Enhancing supply chain profitability through reporting and utilisation of peri mortem information by livestock producers - Business case development* investigated components of business case development.

Sub project *2017/2262 - Assessment of value from reporting peri-mortem data collected at abattoirs* further attempted to identify benefits from collection and reporting of animal health data via examination of data collected from existing programs in the sheepmeat industry.

Data was obtained from the NSHMP, EAS and the EPACS program for the period 2007-17. Only NSHMP and EAS data were suitable for detailed analysis as EPACS data was provided as 2007-17 summary counts for each state. This data was analysed at a state, region, abattoir and individual producer level to determine whether the data has led to a reduction in diseases in sheep when this data has been supplied to producers. The analyses accounted for seasonal variations.

Frontier Economics was engaged under sub-project *2020/0021 – An ex-post benefit cost analysis of the validation studies completed in pork, sheep, beef and goat supply chains (H4W)* to undertake a cost benefit analysis for the Heath 4 Wealth project using the experience from the pilot trials. This was delivered to the Project Steering Committee on 12 November 2021.

v. Standards Activities

This Activity aimed to develop the reporting standards that will support the national uniform reporting system across the pork, sheepmeat and beef industries.

Species-specific standards for ante-mortem and post-mortem data collection and reporting were to be developed and refined, including communication standards for transmission of data from point of collection to data end users. Competency assessment standards were to be developed to ensure the accuracy of data collection across processing establishments. Business rules were to be developed to govern the reports generated and the type of data to be provided by processors to regulators, producers and other key stakeholders. The business rules were to include the details of data ownership and the type and extent of condemnation information collected that may be made available to regulatory authorities.

Generic report interfaces for animal health and disease conditions were to be developed for integration into industry information platforms, for example the Livestock Data Link, to deliver feedback to producers on animal health and disease incidences.

The draft *Australian National Standard for the Development, Collection and Reporting of Animal Health Data through the Supply Chain* was developed in 2016 with support from MLA and AMPC. The Standard was presented to the Australian Meat Industry Language and Standards Committee in 2016. This standard allowed the collecting, reporting and transmission of species-specific animal health disease and defect data between users. The standard covers bovine, ovine, caprine and porcine species during processing, however has the capacity to be broadened to other species and other sections of the supply chain. This draft was the foundation of the sub-project focusing on the red meat supply chain. Sub project *2017/2205 - Collection, utilisation and sharing of post-mortem animal health data in the red meat supply chain* was undertaken to assess red meat industry views on the collection and feedback of relevant animal health and defects data.

Sub project *2017/004 - Development of standards for ante/post-mortem processor data collection and reporting for the pork industry* focussed on the development of a core list of disease conditions and engaging with stakeholders on the topic of the introduction of a national standardised feedback system for the Australian pork industry. SARDI brought key industry stakeholders together including processors, farmers, veterinarians, APL, AHA and state and federal government representatives; to review and establish agreed animal health conditions for pork. This Stakeholder Workshop was held on 7 and 8 March 2018.

Sub project *2017/2235 - Development and implementation of an accredited training program in animal health data collection (H4W)* aimed to develop and implement an accredited training program in animal health data collection to ensure consistency in data capture. The sub-project prepared suitable training materials and a training strategy for a new unit of competency for inclusion in the AMP Australian Meat Industry Training Package, entitled '*Collect, monitor and*

analyse animal health data'. Suitable training and assessment materials were developed, and a series of pilots and 'Train the Trainer' workshops were run in October 2018 to facilitate the implementation of the new training unit. Those abattoirs taking part in pilot trials took part in the training workshops to ensure appropriate levels of training and competency were set before the pilot trials began. These training workshops were held around the country to ensure maximum participation and consultation with the processing industry.

Sub-project *2018/0064 - Health 4 Wealth (H4W): Red meat pilot trials* aimed to validated and assessed the data standards to ensure it would work in commercial space.

An additional training package aimed at addressing consistency of application of the *Australian National Standard for the Development, Collection and Reporting of Animal Health Data through the Supply Chain* was commissioned under sub-project *2021/0032 – Support training materials for meat inspectors and Quality Assurance Officers collecting post mortem disease and condition data (H4W).* This sub-project designed an e-learning modules covering animal health disease and defect conditions for pork, sheep and beef.

vi. Business Information Storage and Analysis Activities

The aim of this Activity was to develop a platform to support industry-level modelling and analysis capable of collating and validating information from multiple sources.

The information platform developed was to provide a cost-effective mechanism for the collation and pilot of data from multiple sources and platforms. The platform was to be developed to allow data modelling and analysis at industry and national/regional levels.

vii. Software Activities

This Activity was to develop the software systems to support a national uniform reporting system across pork, sheepmeat and beef processing establishments.

Frameworks, definitions and modules were to be developed for commercial software providers to integrate data collection processes into their existing software systems. Software models were to be developed based on the recommendations arising from Activity 4 to underpin the objectives of the peri-mortem data collection system. The involvement of processing establishments was considered essential to ensure there were no gaps in the commercial systems being used within processing plants for data collection.

In subproject *2017/2251 - H4W Pilot Studies Design Workshop* a pilot trial planning workshop involving project partners, the Expert Panel and a software system provider was held in May 2018 to plan the project pilot trials. Consensus was reached on numerous aspects of the pilot studies to support the software activities required for the pilot trials to be successful.

The red meat pilot trials (subproject *2018/0064 - Health 4 Wealth (H4W): Red meat pilot trials)* worked with processor kill floor systems providers to integrate the *Australian National Standard for the Development, Collection and Reporting of Animal Health Data through the Supply Chain* into their system to enable processor to capture and report animal health disease and defect data in a consistent way. This included four commercial software vendors

As part of the pork pilot trials (subproject *2018/0034 - Health4Wealth - pilot trials for the pork industry (H4W))* Marel was subcontracted to develop an Innova module specifically for the

collection of offal/viscera and carcase data. Marel's module was developed to match the offal/viscera data with the carcase data, whether by slaughter sequence or using a RFID reader.

viii. Pilot Study Activities

This Activity was to use the results of Activities 4 and 5 to select the best model for the national uniform feedback system.

Several pilot studies were to be conducted in pig, sheepmeat, goats and beef processing establishments to capture and collect peri-mortem data during processing and transfer this data through the feedback tools/mechanisms developed. The pilot studies were intended to run for nine months, with review after three months and identified system enhancements incorporated prior to broader roll-out.

An ex-post benefit cost analysis to quantify the benefits to all stakeholders (producers, processors and regulators) resulting from the implementation of the national peri-mortem data collection system was to be conducted using the information arising from the pilot trials. The benefits identified were intended to support ongoing implementation of the national peri-mortem data collection system by the majority of Australian meat processors.

Pilot trials activities were conducted across 10 abattoirs covering the beef, sheep, goat and pork supply chains through two sub projects.

Sub project *2018/0064 - Health 4 Wealth: Red Meat Pilot Trials* was initiated to undertake the pilot studies for the red meat supply chain. Trials were conducted at eight red meat abattoirs. The purpose of the pilot trials was to enhance the utilisation and sharing of animal health disease and defect data for the benefit of the red meat supply chain. The pilot trials tested the capture and collection of animal health disease and defect data during processing and provided feedback to producers. The eight pilot trials covered different species (beef, sheep and goats); software systems; meat inspection services; data capture systems; and feedback mechanism either through Livestock Data Link (LDL) or alterative feedback system chosen by the participating company. The pilot trials were located through New South Wales, Queensland and Victoria providing a strong representation of the supply chain.

The objectives of the trials included:

- Demonstrate that individual and lot-based animal health data can be effectively and efficiently transferred to producers.
- Demonstrate that animal health data can be correlated to an individual animal where individual identification is present.
- Provide animal health and disease inspection information to red meat producers to assist them in making better informed decisions regarding on-farm practices to improve livestock/carcase performance.
- Provide learnings and recommendation that could be incorporated in the wider Health 4 Wealth project.
- Provide recommendations and learnings to be incorporated in the NLIS and LDL project plan.

Sub project *2018/0034 – Health 4 Wealth- pilot trials for the pork industry and producer engagement and case studies* was initiated to undertake the pilot studies for the pork supply chain.

The objectives of the trials originally included:

- Trial the standardised process of recording animal health conditions in a minimum of six pork abattoirs
- Update stakeholder response and impediments to the introduction of a national feedback system
- Deliver three-four producer presentations as producer engagement for the Health 4 Wealth project
- Write anonymous case studies of how the feedback of animal health data has or can have an improvement on herd health and hence, producer profitability

Unfortunately, due to COVID impacts on travel restrictions and access to abattoirs, pilot trials were only able to be completed at two pork abattoirs located in Victoria and South Australia. At both abattoirs multiple visits and meeting were held with key staff (QA staff, IT staff, the Production Manager, the Finance Controller, the On-Plant Vet, AAOs and meat inspectors) to set up the trials. Presentations were made to all the meat inspectors and AAOs on the project background, benefits of a national animal health feedback system and the list of standardised conditions. In both pilots the plants had to adjust and align their disease data collection with the agree disease conditions. Both plants provided (one abattoir manually and one abattoir automated) daily data reports to SARDI for analysis. Abattoir data report templates for the abattoir and for the producer/farmer were developed by SARDI. The reports included prevalence data over time for different animal health conditions and anonymous comparisons with other farms for the same condition. Feedback was then sought on these reports.

3 Project Outcomes

3.1 Project level achievements

The expected high-level outcomes of the Health 4 Wealth Project were:

- A business case for a peri-mortem data capture and reporting system that meets the needs of relevant stakeholders across the beef, goatmeat, pork and sheepmeat supply chains and that considers all of the risks and rewards arising from such a system.
- Standards and software modules that can be used to collect and consistently report the causes and prevalence of disease-related carcase (total and partial) and offal condemnations during ante- and post-mortem inspections, together with associated pathology, to producers by processors. Work was to be conducted to correlate certain disease/parasite conditions with meat yield and offal recoveries in terms of both quantity and quality. Business rules were to be developed that detail the type and extent of condemnation information collected by processors that will be made available to key stakeholders, including regulatory agencies (both Federal and State), producers and their veterinarians.
- Pilot trials that identified the challenges or barriers to implementing the standards and software modules and that recommend solutions before rollout of a national feedback system.
- A national extension and adoption strategy that would allow agreed outputs to be integrated into Australia's livestock production, meat inspection and verification systems. The cross-sector implementation of common reporting frameworks will maximise the efficiencies of on-farm production through animal health data capture, analysis, reporting and extension. In addition, the national extension and adoption strategy will include elements to help producers manage disease to reduce carcase loss.
- Data from the post-mortem reporting system that can be used to support on-going risk assessments of inspection procedures for gross pathology of animal conditions.

The key deliverables expected from the Health 4 Wealth Project are summarised in Figure 1.

Embedded behind and within these deliverables were a series of project initiation, project management and communications activities as shown in Figure 2.

Figure 1. Key deliverables from the project

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Figure 2. Project structure

i. Project Initiation Activities:

The initial aims of the project initiation were met. At the start of the project these were undertaken as expected. The outcomes achieved were:

- the engagement of a project manager,
- the development of a project steering committee,
- the execution of agreements between the partner organisations, and
- the yearly breakdown of cash and in-kind contributions.

In addition to this, further activities were achieved to benefit the project:

- the development of a management committee was established to ensure continual traction was gained on the project and to allow for linkage between the sub-projects being undertaken.
- an Expert Panel was also established to provide technical expertise and advice to support the key objectives of the project. Panel members represented AHA, MINTRAC, DAWE and a private consultant. Panel members participated in steering committee meetings, reviewed drafts and final reports, provided technical insight and knowledge where needed, and completed specific research and activities when deemed necessary in consultation with the committee.

Challenges arose throughout the project which impacted the delivery at times however overall, these were overcome. Examples of these challenges are:

- the project manager resigned in 2018 however the committee decided that the secretariat services would be provided by APL at cost and sub project management was to be contracted to individuals and or companies on as needed basis.
- the initial partner organisation agreements required amendments to allow for the partner organisations to undertake parts of the project management.

Detailed evaluation with supporting evidence is available in the attached Evaluation Plan (Attachment 2). Overall, the outcomes and achievements of the Project Initiation Activities were delivered successfully.

ii. Project Planning and Management Activities

The initial aims of the project planning and management activities were met. The outcomes achieved were the development of:

- an Operational plan which set out the human and financial resources required,
- a Risk Management plan
- a Communications and Extension plan
- a Monitoring and Evaluation plan

In addition to this, further activities were achieved to benefit the project:

- Sub-project *2017/2251 – H4W Pilot Studies Design Workshop* was held on 15 May 2018 and attended by project partners and the project expert panel. The workshop stimulated robust discussion and debate amongst the workshop participants and

was successful in providing guidance to the Health 4 Wealth Project Management Committee in the design of the pilot trials.

Challenges arose throughout the project which impacted the delivery at times however overall, these were overcome. Examples of these challenges are:

- the change in project management and staff shortages resulted in limited secretariate resources, with plans not being updated as often as initially expected however this did not affect the delivery of the overall project.
- the travel and social gathering restriction and processing plant entry restrictions due to the COVID pandemic also resulted in limitations for the pilot trials, extension and engagement activities.

All milestone reports were completed and submitted. The project was affected by staffing issues at APL, AMPC and MLA, and COVID restrictions. As such an extension was sought and graciously provided by the DAWE for 13 months.

Detailed evaluation with supporting evidence is available in the attached Evaluation Plan (Attachment 2). Overall, the outcomes and achievements of the Project Planning and Management Activities were delivered successfully.

iii. Communication and Extension Activities

The initial aims of the communication and extension activities were met in part and within the limitations of the COVID pandemic restrictions. The outcomes achieved in full were:

- the consultation with production veterinarians;
- information and extension activities with inspection and quality assurance personnel;
- the promotion of project activities and outcomes;
- the publishing of research findings; and
- the development of a national animal health and disease extension and adoption strategy.

The outcomes achieved in-part were:

- the delivery of producer workshops in association with processing establishment involved in field pilot studies; and
- the demonstration and promotion to processing establishments.

In addition to these initial activities, further activities were achieved to benefit the project:

- A communication plan was developed to support the project with key messaging.
- Communication and collaboration with international veterinarians occurred.

Communication and collaboration are the key to this project, as its reach through the supply chain and within processing establishments is extensive. Communication and extension activities occurred throughout all sub-projects conducted. Communication occurred with all levels of staff within abattoirs; management, quality assurance staff, production teams, information technology staff, livestock teams, meat inspectors (both government and third party provided), on-plant veterinarians, as well as producers (including feed lotters), large animal

veterinarians, training providers, information technology service providers including processing software system providers and industry experts including international counterparts.

Collaboration with international experts especially has been productive through the project with one sector supporting both the pork and red meat sectors with their expertise and lessons learnt for example the visit by Dr Derk Oorberg organised by APL. Details information about the communication and extension outcomes are covered in section 5 of this report.

The main challenge that occurred for the communication and extension activities was the travel and social gathering restriction and processing plant entry restrictions due to the COVID pandemic. These restrictions resulted in limitations for the pilot trial, and traditional extension and engagement activities such as face-to-face meeting, ability to run producer workshops and demonstration days. These challenges are the reason for the partial completion of two expected activities. Alternative methods of communication and extension were used with some success (webinars, surveys, interviews, podcasts) and some less than successful results (the online collaboration event 'jam'). An additional challenge in using these alternative methods is the lack of reliable and strong connectivity in regional and rural Australia which strongly affects both processors and producers.

Detailed evaluation with supporting evidence is available in the attached Evaluation Plan (Attachment 2). Overall, the outcomes and achievements of the Project Communication and Extension Activities were delivered successfully.

iv. Business Case Activities

The initial aims of the business case activities were met in part. The outcomes achieved were the:

- development of a business case for a peri-mortem data capture and delivery system
- identification of business requirements, their value and effects across the relevant industry sectors

Sub-project *2016/2202 - Enhancing supply chain profitability through reporting and utilisation of peri mortem information by livestock producers -business case development* investigated components of business requirements and made a number of observations and recommendations:

- the biggest barrier to increasing supply chain value in the sheep and pork industry was the lack of data capture. The report estimated that a 10% increase in the amount of data captured would be worth $605,334 for the sheep industry and $493,641 per annum for the pork industry on a per annum basis
- the biggest barrier to increase supply chain value in the beef industry is the transfer of suitable information. The report found that there could be a 20-fold increase in the value realised worth $728,201/annum at processing (not including farm gate gain) if current information was transferred to producers in a meaningful way. It was suggested that the biggest uplift would occur if feedlots were prioritised over the extensive sector given the former's greater level of integration and systems in place to manage and exploit the data received
- all system components needed to be suitably operative within the supply chain for value to be realised. Therefore, it was important to focus activities within specific supply chains. Payback for investments in data capture systems for sheep and pork

abattoirs were calculated as was investment in suitable information transfer systems for beef abattoirs

- that priority be given to a cross species project to work with the Department of Agriculture, Water and the Environment to increase efficiency and better utilise information from full carcase condemnations and ante-mortem inspection. It was noted that the current loss due to full carcase condemnations amounted to $29.6 million in export abattoirs. It was also noted that it was expected that such utilisation would become a market access requirement at some point of time in the future

Sub-project *2020/0021 – An ex-post benefit cost analysis of the validation studies completed in pork, sheep, beef and goat supply chains (H4W)* at a high level, concluded that there was very significant potential value of a national rollout for the industry as a whole, including producers and processors. In this regard, it was estimated that the value from a National Roll Out would exceed the costs by over three times. This finding was relevant for the cattle, sheep and pig industries.

The activity that was partially achieved was the development of design principles, covering data ownership, security and structure principles. This activity was not required in the completion of the project as the Software Activities were not achieved as expected. However draft business rules were discussed as part of the pilot trials and processors who used the MLA - LDL feedback system had and have a data licence in place which cover data sharing and how the data is use.

In addition to this, further activities were achieved to benefit the project:

APL Project *2017/2262 - Assessment of value from reporting peri-mortem data collected at abattoirs* further attempted to identify benefits from collection and reporting of animal health data via examination of data collected from existing programs. While no obvious effect from previous notification was observed, it was noted by the authors that there were considerable inadequacies in the source data. The majority of these would require rectification if a successful data collection and feedback system was to be established under this project.

Whilst the business case activities identify clear financial advantages to the supply chain as a whole, the benefits to the individual segments of the supply chain are not as defined or clear. This means that the adoption of the project will be challenging given that the project is highly dependent on the processing sector initiating an outlay through the collection of data for the benefit only to be realised through action by the producer sector. This reliance and trust in the supply chain will be a challenge.

Detailed evaluation with supporting evidence is available in the attached Evaluation Plan (Attachment 2). Overall, the outcomes and achievements of the Business Case Activities required for the project as it evolved were delivered successfully.

v. <u>Standards Activities</u>

The initial aims of the standards activities were met. The outcomes achieved were the:

- development of species-specific standards for ante- and post-mortem processor data collection
- establishment of competency standards for data collection across processing plants
- business rules developed and available.

The draft *Australia National Standard for the Development, Collection and Reporting of Animal Health Disease and Defect data through the Supply Chain* has been developed. The standard

provides language for the animal health disease and defect data as well as codification of the data collected. The codification within the standard provides the avenue and rules for data transfer. This standard includes species specification of animal health diseases and defects and covers the identification of data at varying points in the supply chain including ante- and post-mortem.

Extensive consultation around these standards was conducted through, sub-project *2017/2205 - Collection, utilisation and sharing of post-mortem animal health data in the red meat supply chain* and sub-project *2017/004 - Development of standards for ante/post-mortem processor data collection and reporting for the pork industry.*

Sub-project *2017/2205 - Collection, utilisation and sharing of post-mortem animal health data in the red meat supply chain* was undertaken to assess red meat industry views on the collection and feedback of relevant animal health and defects data. Results indicated strong industry support for the development of a national data collection standard and creation of a national data base to hold relevant information for the benefit of industry.

Sub-project *2017/004 - Development of standards for ante/post-mortem processor data collection and reporting for the pork industry* focussed on the development of a core list of disease conditions and engaging with stakeholders on the topic of the introduction of a national standardised feedback system for the Australian pork industry. A pork industry Stakeholder Workshop was held on 7 and 8 of March 2018, where there was broad agreement for a standardised language across the broader pork industry. An agreed list of conditions and impact or consequence data was developed as the minimum base data for collection in all seven pork abattoirs.

Competency standards for data collection across processing plants were established through the development of two training packages, sub-project *2017/2235 - Development and implementation of an accredited training program in animal health data collection (H4W)* and sub-project *2021/0032 – Support training materials for meat inspectors and Quality Assurance Officers collecting post mortem disease and condition data (H4W).*

In addition, sub-project *2018/0064 - Health 4 Wealth (H4W): Red meat pilot trials* validated and assessed the draft national data standards to ensure it would work in the commercial space. These trials picked up issues that needed to be addressed. The red meat pilot trials also did embed the draft national data standards into kill floor systems so companies could continue to collect and report this information. As well as enabling these software systems to be used by other processors who use that kill floor system.

Draft business rules around data sharing and access were developed during the pilot trials. However draft business rules were discussed as part of the pilot trials and processors who used the MLA - LDL feedback system had and have a data licence in place which cover data sharing and how the data is use. At this stage this is the extent of data sharing and access and as such the Project Partners are aware that further emphasis will have to be paid to this requirement in future extension and adoption of the project.

Detailed evaluation with supporting evidence is available in the attached Evaluation Plan (Attachment 2). Overall, the outcomes and achievements of the Standards Activities were delivered successfully.

vi. Business Information Storage and Analysis Activities

The initial aims of the business information storage and analysis activities were not met. The expected outcome was the development of an information platform capable of collating and validating data from multiple sources. Through the execution of the project with the challenges of the COVID pandemic restrictions the pilot trials did not establish enough data to warrant the development of an information platform capable of collating and validating data from multiple sources. In addition, through the delivery of the project consultation with stakeholders identified general support but individual reluctance to share data. In the red meat sector, some processors agreed to utilise Livestock Data Link, an online platform capable of collating and validating data from multiple sources.

Detailed evaluation with supporting evidence is available in the attached Evaluation Plan (Attachment 2). Overall, the outcomes and achievements of the business information storage and analysis Activities were identified as not requiring to be delivered at this time.

vii. Software Activities

The initial aims of the software activities were met. The outcomes achieved were the development of:

- Frameworks, definitions and modules for in-plant data collection provided to commercial software providers for integration into existing systems
- Development of software that is transferable and compatible with currently used industry data collections systems.

The development of the endorsed draft *Australia National Standard for the Development, Collection and Reporting of Animal Health Disease and Defect data through the Supply Chain* including codification of the data collected. This standard also provided the framework and definitions for the data being collected. The National Standard data elements were also developed as XML, CSV and JSON formatted data payload and made available on the website https://www.rmscc.com.au/scis_5.asp to allow industry software providers to build the standard into their software offering.

In addition, as part of the pork pilot trials Marel developed an Innova module specifically for the collection of offal/viscera and carcase data. Marel's module was developed to match the offal/viscera data with the carcase data, whether through slaughter sequence or using a RFID reader.

The project identified that software and system integration was an important requirement of data collection to allow reporting and feedback of animal health disease and defect data to producers. The integration of the standard into the existing systems means that data is provided in a timely manner, ensures align with animal identification and connection to other animal and carcase traits to allow for meaningful data analysis.

Detailed evaluation with supporting evidence is available in the attached Evaluation Plan (Attachment 2). Overall, the outcomes and achievements of the Software Activities were delivered successfully.

viii. Pilot Study Activities

The initial aims of the project Pilot Study activities were partially met. The outcomes achieved were:

- (Nine month) pilot studies in pork, sheepmeat and beef processing establishments
- Identification of the challenges or barriers to implementation of the data capture collection system and recommendation of solutions for each model before the rollout of a national uniform feedback system

Sub project *2018/0064 - Health for Wealth: Red Meat Pilot Trials* was initiated to undertake the pilot studies. Trials were successfully conducted at eight red meat processing plants covering different species (beef, sheep and goats); software systems; meat inspection services; data capture systems and feedback mechanism through either Livestock Data Link (LDL) or alterative feedback system chosen by the participating company. The pilot trials were located through New South Wales, Queensland and Victoria providing a strong representation of the supply chain.

The project demonstrated proof-of-concept that individual carcase animal health disease and defect data could be transferred from beef abattoirs to producers via existing mechanisms. Most beef plants had systems in place and only minor amendments were required to align with the draft *Australian National Standard for the Development, Collection and Reporting of Animal Health Data.* Abattoir software vendors were identified as critical partners to ensure integration occurred at all levels to allow data to be transferred to LDL.

The project could not demonstrate proof of concept that similar information could be provided by small stock abattoirs to producers as none of the small stock processing plants have released animal health information within their supply chain.

Numerous challenges were identified which prevented the establishment of a standardised and comprehensive approach to individual disease-related carcase and offal condemnations and feedback from sheep processors to producers.

For example, at one small stock plant there were significant delays implementing the individual carcase hook tracking system on the slaughter floor. Hook tracking systems that allow recording of animal health disease and defects on an individual carcase level, as well as pre- and post-trim weights, will provide opportunities for more accurate estimates of revenue losses due to disease. Even though the plant did not launch individual animal disease feedback, several producer workshops were conducted. These workshops focused on providing awareness of the NSHMP, the Health 4 Wealth project and the data that will come available through the Health 4 Wealth initiative.

Notwithstanding, this considerable savings were identified in moving from paper to electronic based recording and reporting systems.

In addition, at one pilot plant a case study to develop a severity scoring system for arthritis in lambs occurred. The scoring system was developed which consisted of four categories of arthritis trim (foreshank, hindshank, foreleg and hindleg). The average proportion of carcase loss across all mobs was 4.6% of hot standard carcase weight, which ranged from 1.1% and 20.4%. This equated to a cost of range from $2.95 for a forequarter shank to $18.08 for a hind quarter leg. Provided as feedback to producers, these revenue losses due to disease provide a financial incentive to drive change to reduce risk of disease and improve productivity.

At two other plants the COVID pandemic caused significant disruptions to plant operations and priorities, and restrictions on the project team visiting the sites. This meant the soft launch

component of the project could not be completed. However, the project team will continue to work with plant management to provide animal health disease and defect reports and to their suppliers where possible to assess the value of such feedback

While in the rangeland goat industry individual feedback systems were not considered feasible, it was noted that significant industry benefits would arise from using data for a targeted animal health audit on a regular and annual basis.

Early engagement of meat inspection personal was considered important for success. It was also noted that further engagement with DAWE was required to improve data collection by DAWE employed inspectors

Sub project *2018/0034 – Health 4 Wealth- pilot trials for the pork industry and producer engagement and case studies* was initiated to undertake the pilot studies for the pork supply chain.

Unfortunately, due to COVID impacts on travel restrictions and access to abattoirs, pilot trials were only able to be completed at two pork abattoirs located in Victoria and Queensland. The pilots allow for individual carcase data from >500,000 pigs to be collected. Both plants provided (one abattoir manually and one abattoir automated) daily data reports to SARDI for analysis. Abattoir data report templates for the abattoir and for the producer/farmer were developed by SARDI. The reports included prevalence data over time for different animal health conditions, anonymous comparisons with other farms for the same condition for individual conditions.

Throughout the pilot trials and all other sub-projects the challenges or barriers to implementation of the data capture collection system and recommendation of solutions have been identified these are detailed in the section 6 of this report.

Unfortunately, the review of pilot trials after three months and incorporation of necessary changes did not occur due to the delay in the project because of the travel and social gathering restriction and processing plant entry restrictions due to the COVID pandemic.

Detailed evaluation with supporting evidence is available in the attached Evaluation Plan (Attachment 2). Overall, the outcomes and achievements of the Pilot Study Activities were delivered successfully.

3.2 Contribution to program objectives

The *Enhancing supply chain profitability through reporting and utilization of peri-mortem information by livestock producers* project has been funded under the Rural R&D for Profit Program. The objective of the Rural R&D for Profit Program is to fund collaborative research and development to support continued innovation in Australia's primary industries. This project has addressed the following Rural R&D for Profit Program outcomes:

- **Generating knowledge, technologies, products or processes that benefit primary producers**

  - A business case and a subsequent cost benefit analysis for a peri-mortem data capture and reporting system that meets the needs of relevant stakeholders across the beef, goatmeat, pork and sheepmeat supply chains and that considers all of the risks and rewards arising from such a system has been delivered.
  - Development of a voluntary data standard and software infrastructure that can be used to collect and consistently report the causes and prevalence of disease-related carcase (total and partial) and offal condemnations during ante- and post-mortem inspections. These data standards have been developed to allow the correlation of certain disease/parasite conditions with meat yield and offal recoveries in terms of both quantity and quality. Draft business rules were used during the project that detail the type and extent of condemnation information collected by processors.

- **Strengthening pathways to extend the results of rural R&D, including understanding the barriers to adoption**

  - Pilot studies at 10 processing plants that identified the challenges and barriers to implementing the standards and software, and provided recommendations before rollout of a project nationally
  - A national extension and adoption strategy that provides agreed outputs to be integrated into Australia's livestock production, meat inspection and verification systems. This allows for the cross-sector implementation of common reporting frameworks which in turn will maximise the efficiencies of on-farm production through animal health disease and defect data capture, analysis, reporting and extension.

- **Establishing and fostering industry and research collaborations that form the basis for ongoing innovation and growth of Australian agriculture**

The project has fostered industry and research collaborations between the:

- Cattle, sheep, goatmeat and pork industries
- Australian Meat Processors Corporation, Australian Pork Limited and Meat & Livestock Australia
- Department of Economic Development, Jobs, Transport and Resources, Victoria and the South Australian Research & Development Institute.

The project surpassed its initial aims by establishing and fostering industry and research collaboration beyond these organisations to include 15 additional research and consultancy

companies, public health and livestock veterinarians, processing companies, software providers and training organisations across the cattle, sheep goatmeat and pork industries. This in turn will strengthen the pathways to extend the results of the *Enhancing supply chain profitability through reporting and utilization of peri-mortem information by livestock producers* project as the organisations continue to work together in this area into the future.

4 Collaboration

The key partners in this project were:

- Australian Meat Processor Corporation (Cash),
- Australian Pork Limited (Cash)
- Meat & Livestock Australia (Cash)
- Department of Economic Development, Jobs, Transport and Development Victoria, (In-kind) and
- South Australian Research and Development Institute (In-kind)

Through the development and delivery of the Health 4 Wealth project there have been strong ties formed between these funding partners. Collaborations like these across the meat producing supply chain with associated experts are the key to innovation and the future success of this sector of the agricultural industry.

In addition, through the sub-projects beneficial connections have been built with a number of Industry organisations, researchers and consultants with expertise in the field of veterinary public health and the associated project delivery requirements (training, information technology, communications). These sub-projects and the service providers are available in table 1. These connections have already been leveraged with other industry funded projects including the MLA-led RR&D4P project 'Advanced measurement technologies for globally competitive Australian meat', the National Sheep Health Monitoring Project and Enhanced Abattoir Surveillance Program.

Table 1: Sub-projects and the associated service providers

Project Number	Project Title	Service Provider
2016/2202	Enhancing supply chain efficiency through the utilization of peri-mortem information for major meat production species – business case development (H4W)	Greenleaf Enterprises
2016/2225	Project Manager Role for RR&D4P 'Enhancing supply chain profitability through reporting and utilization of peri-mortem information by livestock producers' (H4W)	Joan Lloyd Consulting Pty Ltd
2016/2238	Design and provision of an online collaboration event ('jam') to support engagement and idea generation for the development of standards for the consistent reporting, recording and analysis of peri-mortem disease information across pork, beef and sheep production systems ('improved Animal Health Feedback Systems') (H4W)	era Innovation
2017/004	Development of standards for ante/post-mortem processor data collection and reporting for the pork industry (H4W)	South Australian Research and Development Institute
2017/2205	Collection, utilisation and sharing of post-mortem animal health data in the red meat supply chain (H4W)	National Meat Industry Training

Project Number	Project Title	Service Provider
		and Advisory Council
2017/2227	Communications Strategy for the Health 4 Wealth Project for RR&D4P 'Enhancing supply chain profitability through reporting and utilization of peri-mortem information by livestock producers' (H4W)	era Innovation
2017/2235	Development and implementation of an accredited training program in animal health data collection (H4W)	National Meat Industry Training and Advisory Council (subcontract Management for Technology Pty Ltd)
2017/2251	H4W Pilot Studies Design Workshop	Joan Lloyd Consulting Pty Ltd
2017/2262	Assessment of value from reporting findings from analysis of sheep health data collected at abattoirs to the sheep supply chain (H4W)	Herd Health Pty Ltd
2018/0034	Health4Wealth - pilot trials for the pork industry (H4W)	South Australian Research and Development Institute (subcontract Marel)
2018/0064	Health 4 Wealth (H4W): Red meat pilot trials	Meat and Livestock Australia
2018/0085	Development of Factsheets for beef and pork conditions detected in abattoir monitoring - H4W	Animal Health Australia
2020/0021	An ex-post benefit cost analysis of the validation studies completed in pork, sheep, beef and goat supply chains (H4W)	Frontier economics
2021/0036	Development and implementation of a national animal health and disease extension and adoption strategy (H4W)	GHD
2021/0032	Support training materials for meat inspectors and Quality Assurance Officers collecting post mortem disease and condition data (H4W)	National Meat Industry Training and Advisory Council
2021/0031	Final Report: Rural R&D for Profit Project – Enhancing supply chain profitability through reporting and utilization of peri-mortem information (H4W)	Food and Veterinary Services Pty Ltd

Through the delivery of these sub-projects, there was significant collaboration built throughout the pork and red meat supply chains, and their associated service providers through consultation activities, workshops, training and the pilot trials. Collaborations occurred with all levels of staff within abattoirs: management, quality assurance staff, production teams,

information technology staff, livestock teams, meat inspectors (both government and third party provided), on-plant veterinarians, as well as producers (including feed lotters), large animal veterinarians, training providers, information technology service providers (including software providers) and industry experts including international counterparts. Collaboration with international experts especially has been productive through the project with one sector supporting both the pork and red meat sectors with their expertise and lessons learnt for example the visit by Dr Derk Oorberg organised by APL.

It is expected that these collaborations will continue especially with the development and utilisation of the *Australian National Standard for the Development, Collection and Reporting of Animal Health Disease and Defect Data through the Supply Chain* as the adoption of this project continues. This is already being seen with the formation of a Technical Working Group under the Australian Meat Industry Language and Standard Committee that are reviewing and updating the standard based on the finding of the pilot trials prior to its endorsement by Industry.

With the cost-benefit analysis demonstrating the benefits to the supply chain as a whole it is expected that further collaboration of this area of work will continue and be the key to adoption as this area of work is a very clear example of the need for supply chain collaboration across livestock industries to provided benefits for all.

5 Extension and adoption activities

5.1 Extension and Adoption Activities Throughout the Project

Over the life of the project, sixteen sub-projects were conducted by thirteen companies. These sub-projects worked with varying areas and levels of the supply chain and its auxiliary support services through consultation activities (discussions and interviews) workshops, training and pilot trials. This has resulted in extension, engagement and general increased awareness of the project which has resulted in either direct adoption or an increase in future adoption. The details of the extension and adoption activities completed by the projects are provided below.

During sub-project *2016/2202 - Enhancing supply chain efficiency through the utilization of peri-mortem information for major meat production species – business case development (H4W),* the sub-project team spoke extensively to the processing industry to establish the business case as to why processors would adopt this project to provide animal health disease and defect data back to producers. The interviews undertaken included veterinarians (from pork, beef and sheep industries), beef processors, sheep and goat processors, leading researchers, beef feedlots, Australian Lot Feeders' Association (ALFA), meat inspection companies, MLA and DAWE. This supported adoption by increasing awareness of the Health 4 Wealth project from the very start and its potential benefits to the entire supply chain.

Sub-project *2016/2238 - Design and provision of an online collaboration event ('jam') to support engagement and idea generation for the development of standards for the consistent reporting, recording and analysis of peri-mortem disease information across pork, beef and sheep production systems ('improved Animal Health Feedback Systems') (H4W)* was an online, interactive, idea led collaboration ('jam session') for stakeholders of the project. The sub-project team invited 164 participants and had a 21% participation rate. Although not providing the degree of engagement and awareness of the Health 4 Wealth project as hoped, this sub-project did provide some helpful insights and future lessons for the project (and sub-project) teams about the type of engagement activities and projects required for efficient and effective engagement and adoption within the meat and livestock industry.

The sub-project team of *2017/004 - Development of standards for ante/post-mortem processor data collection and reporting for the pork industry (H4W)* held a workshop to identify the diseases and defects of significance to the pork industry. This workshop included 30 participants, including export processors, producers, Australian Pig Veterinarians, state and federal regulators and representatives from AHA and APL. The workshop was also attended by two international experts who shared their experiences with pig health feedback systems. This workshop engaged the entire pork industry supply chain increasing awareness of the Health 4 Wealth project from the very start and its potential benefits to the entire supply chain.

During sub-project *2017/2205 - Collection, utilisation and sharing of post-mortem animal health data in the red meat supply chain (H4W),* the sub-project team surveyed 40 red meat and pork processors and interviewed seven large processors of red meat and pork to gain an understanding of the level of awareness and adoption of animal health disease and defect data,

collection, utilisation and sharing. This more traditional method of engagement resulted in a 75% engagement in the survey and 100% engagement in interviews. This sub-project allowed participants to share their views and level of adoption more privately whilst allowing the project team to better understand how they could support future adoption of the Health 4 Wealth project across the industry.

Sub-project *2017/2227 - Communications Strategy for the Health 4 Wealth Project for RR&D4P 'Enhancing supply chain profitability through reporting and utilization of peri-mortem information by livestock producers' (H4W)* refined the communication plan after discussions with stakeholders. This provided for more effective and efficient targeted communication with stakeholders by clearly defining the communication measure and tiering of stakeholders.

The plan focused its communications on Tiers 1-3. Tier 1 stakeholders primarily receive reports, feedback and communications through the Project Dropbox folder supported by email communications where necessary. Tier 1 includes the Project Steering Committee and Project Management Committee who participate in regular meetings and conferences with milestone reports written and reviewed by these committees and an expert panel appointed by the Project Management Committee, before distribution to others in this Tier. Tier 2 stakeholders received information by project partners managing the pilot studies. For Tier 3 stakeholders, AMPC took the lead on communications with processors not participating in the pilot studies.

For Tier 4 stakeholders the Health 4 Wealth's sponsoring Producers Research & Development Corporations took the lead on communications with producers. MLA has primary responsibility for communications with red meat producers and APL for pork producers. All other Tier 4 stakeholders were informed regarding all aspects of the project through the Research & Development Corporations noting that communication will continue beyond completion and implementation of the outcomes of the Heath 4 Wealth project.

Table of the Communication Plan Tiers of Stakeholders

Tier 1	Australian Government Department of Agriculture and Water Resources Rural Research & Development for Profit Program Australian Meat Processor Corporation Australian Pork Limited Meat & Livestock Australia South Australian Research & Development Institute Victorian Government Department of Economic Development, Jobs, Transport and Resources Members of the Project Expert Panel
Tier 2	Processors and producers participating in the pilot studies

Tier 3	Processors not participating in the pilot studies
Tier 4	Producers not participating in the pilot studies DAWE Meat Exports Branch & other inspection providers All other stakeholders not specifically mentioned

The key communications message of the Health 4 Wealth Project was and still is:

Abattoir animal health disease and defect data collection and reporting systems are useful, cost-effective and add value throughout supply chains.

The key communication message was linked to the core tenant that underpins the project, i.e. abattoir animal health disease and defect data collection and reporting systems will improve the profitability of the Australian livestock industries.

The key communications message underpinned all activities of the Health 4 Wealth Project, linked to four key research themes:

i. Abattoir animal health disease and defect data collection and reporting systems reduce the prevalence of disease in animals presented for slaughter.

ii. Abattoir animal health disease and defect data collection and reporting systems accurate to the level of the individual consignment/ farm/ animal, as relevant for the species being slaughtered (cattle, pigs and sheep).

iii. The data collected is relevant to the species being slaughtered (cattle, pigs and sheep) and to different supply chains.

iv. Abattoir animal health disease and defect data collection and reporting systems cost less to implement and run than the potential returns.

Throughout the H4W project this clear and effective messaging was used and will be used going forward will future adoption work.

The sub-project team of *2017/2235 - Development and implementation of an accredited training program in animal health data collection (H4W)* conducted seven workshops around the country on the accredited training program developed '*Collect, monitor and analyse animal health data*'. The workshops engaged 99 participants, amongst whom were university researchers, current meat inspectors, veterinarians, Health 4 Wealth Committee members, registered training organisations and processing trainers, Department of Agriculture, Water and the Environment representatives, processing company Quality Assurance Managers, statisticians, processing company plant managers (small plants), State DPI representatives, experts involved in the NSHMP, experts involved in current animal health disease and defect data collection and reporting programs. This was a key sub-project in ensuring the future adoption of the Health 4 Wealth project was supported by training to ensure consistent collection and reporting of animal health disease and defect data.

During sub-project *2017/2251 - H4W Pilot Studies Design Workshop* ten industry experts from the project steering committee and expert panel attended a day long workshop. The workshop aimed to design and develop the Health 4 Wealth Pilot Studies. Through these discussions, points of similarities and difference in the different livestock supply chains with regard to the collection, recording and feedback of animal health disease and defect data were discussed. Understanding and addressing these points of variation were key to the success of the pilot trials. These points of variation are also key to the variation in approach to the different livestock supply chains that is required during future adoption and extension activities.

The sub-project team of *2018/0034 - Health4Wealth - pilot trials for the pork industry (H4W)* worked closely with three pork processors in Queensland, South Australia and Victoria to integrate the animal health disease and defect data collection and recording into their production systems. The team identified the need for additional collection technology and sub-contracted Marel to develop and install the software. During the sub-project regional extension meetings were organised to engage stakeholders, unfortunately only one of these are run in Mt Gambier prior to the introduction of state and federal COVID restrictions on gatherings and travel. Due to COVID-19 restrictions, with some exceptions, separate on-line presentations largely replaced face-to-face meetings. Individual online presentations on H4W and the collection and reporting of data were delivered by Dr Hamilton to many pig industry stakeholders. In March 2021, Dr Hamilton also met with Mary Carr (Chief Veterinary Officer SA) and Allison Cawley (PIRSA Veterinary Officer, Biosecurity SA) and presented on the Health 4 Wealth Project. SARDI has been in communication with Dr Regina Fogarty and other epidemiological staff at the Agriculture Department of Victoria, discussing access to de-identified animal health disease and defect data (carcase and offal) for epidemiological analysis. Dr Hamilton was asked to present on the Health 4 Wealth project at the 2021 Australian Pig Veterinary conference in September. SARDI has also provided individual raw Health 4 Wealth producer data to a growing number producers at their request (and the processor's permission) for further analysis by their consultant veterinarians.

To continue raising awareness of the project, APL included an article in the Australian Pork Newspaper explaining the '*Increasing revenue through processor feedback*' of the animal health disease and defect data.

During sub-project *2018/0064 - Health 4 Wealth (H4W): Red meat pilot trials,* the sub-project team worked with eight red meat (beef and small stock species) processing plants to pilot the collection, recording and feedback of animal health disease and defect data. The processing plants were located throughout New South Wales, Queensland and Victoria. Three of the beef processing plants ran producer webinars and producer days raising awareness with producers about the benefits of the project and the feedback available to them.

All the beef plants launched reporting systems to producers through either the MLA Livestock Data Link platform or through their own company systems. All beef producers who participated in the animal health disease and defect data collection and reporting, and the associated online feedback surveys indicated that they would use the animal disease report within LDL to track progress towards controlling or eliminating a disease within their herd. Most indicated that, with this information, they would be more likely to consult with an animal health professional for advice on reducing and eradicating disease within their herds. The other two beef plants were vertically integrated companies, where these plants used their own internal feedback

systems to provide animal health disease and defect data to the feedlot part of the business. One of these plants was also interested in exploring LDL to provide feedback to their producer suppliers. The small stock processors also held producer workshops similarly raising awareness of the project, the NSHMP and the feedback available to producers through the NSHMP. These active extension and adoption activities were complemented by

- news article included in Integrity Matters eNewsletter around the launch of beef animal health disease and defect data being available in LDL: Disease and defect feedback available for beef producers
- the development of Processor flyers around the announcement of beef animal health disease & defect feedback being available through LDL. This was through internal supplier communication channels for three supply chains.
- the development of the Livestock Data Link animal disease module animation. This includes reference to industry programs that contributed to the animal health disease and defect data being captured and reported in LDL.

These activities will continue to drive adoption as producers gain the benefits of the project and demand the extension of this project into other processing plants.

Sub-project *2018/0085 - Development of Factsheets for beef and pork conditions detected in abattoir monitoring - H4W* developed a total of eighteen factsheets for pork conditions that were selected for the pilot trials and up to five factsheets for beef conditions (nephritis, liver abscess, liver fluke, hydatids and pneumonia). The factsheets are to be provided by processors to inform and assist producers when a condition is identified in their animals. The factsheets are available at Appendix 1. These factsheets are a critical link into realisation of the benefits of the Health 4 Wealth project. Reporting of animal health disease and defect data to producers without providing an explanation of the data /information they are receiving and the action that they can take to prevent the disease or defect, no mitigation action can be taken. These factsheets will provide key support to primary producers during future adoption of the Health 4 Wealth project. The beef factsheets are available on LDL Solutions to Feedback Library. As part of pilot trials one cattle plant provided their own company feedback system linked into the Solutions to Feedback library to access the beef the factsheets.

During sub-project *2020/0021 - An ex-post benefit cost analysis of the validation studies completed in pork, sheep, beef and goat supply chains (H4W)* the sub-project team discussed the pilot trial benefits and outcomes with the eight red meat processing plants that took part in the trials. This project identified the cost benefit of the project and as such raised the awareness of the financial incentives with these processing plants. In addition, a presentation was given on the outcomes of the sub-project with the project steering committee. The outcomes of the cost benefit analysis provide very clear financial benefits and incentives to the supply chain with adoption of animal health disease and defect data collection, recording and reporting. These financial benefits and incentives will be a key in the future extension and adoption of the project.

The sub-project team of *2021/0032 - Support training materials for meat inspectors and Quality Assurance Officers collecting post mortem disease and condition data (H4W)* have developed an e-learning training program on Health 4 Wealth. The training program covers the collection, recording and reporting of animal health disease and defect data. The main audience for this training program are meat inspectors. This training program raises the awareness of the project

with meat inspectors and will aid in further adoption of the project. If aligned to the *Australian National Standard for the Development, Collection and Reporting of Animal Health Data through the Supply Chain,* the training program will also provide consistency in data collection which will strengthen producer confidence in the animal health disease and defect collection and reporting which will increase adoption of the project by primary producers.

This project occurred during the COVID pandemic and unfortunately due to state and federal restrictions, extension and adoption activities were limited. Industries' understandable focus on the pandemic was paramount to ensuring consistent and continual production of meat during lockdowns and essential worker arrangements. Due to industry restrictions on entry to processing plants extension, engagement and adoption activities were significantly limited. This project is highly complex and requires significant support to be provided to processors, working across their business and service providers, and into their supply chains to producers. Due to travel and public gathering restrictions producer engagement was also limited through traditional activities of producer days, workshops or in person meetings. As much as possible through this period alternative methods of extension and adoption occurred such as video calls, podcasts and webinars, however it should be noted that the lack of reliable connectivity across regional and rural Australia means that these alternative activities are a poor substitute for traditional routes of extension and engagement. Now that COVID restriction are lifting across the country further extension, engagement and adoption activities are expected to continue by the pilot trial processors and the industry organisations involved in the project.

The sub-projects have published reports on the APL website. These reports are accessible to the public and therefore by all companies and researchers working in this area. This means that lessons learnt from the pilot trials are available to expedite future adoption by processing plants and primary producers.

5.2 Recommendations for Further Adoption

In sub-project *2021/0036 - Animal health and disease extension and adoption strategy* the GHD sub-project team and technical experts developed a National Animal Health and Disease extension and adoption strategy. This strategy provides extension and adoption objectives, suggested implementation/actions that could be taken to address the objective, who is responsible and the timeframe that this could occur in. The objectives of the strategy are:

- Equip processing plants with technology that allows efficient capture and database storage of disease-related carcase and offal information for priority diseases and conditions.
- Train meat inspectors to accurately and consistently identify priority disease-related carcase and offal conditions and record the information using suitable technology.
- Establish a secure database(s) that enables authorised individuals and agencies to analyse data for effective decision making, with access limited by agreed governance and privacy rules
- Develop objective extension and adoption information (including tools and calculators)

- Coordinate the resourcing of extension activities, including capacity building of practitioners, based on collaboration between processors, producers and service providers
- Establish and implement monitoring and evaluation systems.

To further adoption it would be advisable to continue engagement with the DAWE, state regulators, meat inspection service providers and the processing industry. There is reasonable uptake of the project at this point given the impact of the COVID pandemic and its associated restrictions. The number of livestock processed that are involved in the project are not insignificant however the livestock industry has a significant number of smaller and domestic processing plants that need additional support for adoption of the project. Ensuring maximum adoption by processors allows consistency in data received by producers which will build confidence in the data supporting them to take action and therefore ensure full value realisation for the project.

6 Lessons learnt

A numbers of lessons were learnt during the project these are detailed in the lessons learnt register in Table 2. Lessons learnt are the knowledge gained from the process of conducting a project. This includes the positives and negatives lessons identified throughout the whole project. This definition of lessons learnt therefore includes the project challenges identified and overcome.

Table 2 Lessons learn register for the overall project and subprojects

Number	Issue Name	Problem/Success	Impact	Recommendation
Overall project				
1	Expert Panel	An expert panel was formed at the beginning of the project to support the project management team. This panel was very beneficial in reviewing and making recommendations of the technical aspects of the project.	Contributed to the success of the project	Consideration to be given to forming an expert panel for future projects of this nature.
2	Industry Consultation	Industry consultation has been very productive throughout the project. It has allowed the project (and sub-project) teams to ensure that practical, real work considerations have been included in the design and implementation of the project to ensure its successful extension and adoption.	Contributed to the success of the project	Industry consultation and engagement is paramount to success in all rural research and development projects.
3	Project management	With such as complex project that crosses 4 livestock species and the entire supply chain and a number of auxiliary services, a project manager is key to the sub-project approach to ensure that there was continual traction gained on the project and to	To ensure maximum efficiencies and benefits were gained through the project.	That a project manager be engaged for the duration of similar projects.

Number	Issue Name	Problem/Success	Impact	Recommendation
		allow for linkage and cross collaboration and learning between the sub-projects being undertaken.		
4	Single IT solution	Any expectation of developing a single system to be used by every abattoir across all species is unrealistic. Individual organizations have the right to use, install, develop and manage any system they choose.	By mandating a single system, innovation and advancement in the area is hampered. Adoption can also be reduced or not occur at all because of this.	The project is to develop the common language and to identify systems that are / could be used for collection and distribution of that data using the common language. The Trials must facilitate and evaluate common systems in use as well as identify opportunities for improvement.
2016/2202 - Enhancing supply chain efficiency through the utilization of peri-mortem information for major meat production species – business case development (H4W)				
5	Value realisation	Without systematically ensuring key system components are implemented (i.e., inspection accuracy, information suitability, data capture, data analysis, information transfer, adoption) value realisation is greatly diminished.	The expected value of $83,222,1766 will not be realised.	That the industry systematically work through the components of the project to ensure full value realisation.
2016/2238 - Design and provision of an online collaboration event ('jam') to support engagement and idea generation for the development of standards for the consistent reporting, recording and analysis of peri-mortem disease information across pork, beef and sheep production systems ('improved Animal Health Feedback Systems') (H4W)				

Number	Issue Name	Problem/Success	Impact	Recommendation
6	Technological engagement uptake by the industry	Although 34 participants took part in the 'jam' session and beneficial discussions and ideas were raised in regard to the H4W project at a 21% participation rate compared to the expect 65% participation rate, this form of technological engagement was not embraced by the livestock and meat industry.	Engagement is key to the success of project adoption.	Further engagement by more traditional and known methods is recommended than was completed through sub-project *2017/2205.*
2017/004 - Development of standards for ante/post-mortem processor data collection and reporting for the pork industry (H4W)				
7	Consistent training of meat inspectors	To ensure consistent data is provided to producers, meat inspectors collecting the data must be provided with consistent training.	Consistent training will result in consistent and reliable data means that the producers can trust the data provided.	Meat inspection training in the collection of the data is run with refresher courses. New and existing meat inspectors should be consistently trained. A manual for inspectors is required to improve consistency in evaluations across inspectors and inspection systems.
8	Standardisation of language	To allow consistent data to be collected, reported, transfers and provided back to producers a standardised and codified language is required.	This is the foundation of the project with all other components of the project being reliant on it.	Work should continue on the national standard to ensure it is maintained up to date, and is practically applicable to stakeholders.

Number	Issue Name	Problem/Success	Impact	Recommendation
9	Keep the collection system simple	To ensure ease of collection, consistency of collection and integration with existing processing data, the collection system should be kept as simple as possible.	Over complication of the front of the system when staff are already time poor will mean that data is not accurately and consistently recorded. Complication in the system that results in the system not allowing for integration will impact the data analysis and potential value gained from the project.	The system for collection should be simple to integrate into the processing plants existing system. The front facing collection aspect of the system should also be simple.
10	Domestic processing adoption	There are approximately 80 export registered processing plants across Australia. In addition to this there are 90 processing plants purely producing for the domestic market. Although these figures do not represent volume, primary producers send their livestock to both and as such it is important that extension and adoption activities are also conducted with domestic processing plants.	To ensure that consistent feedback of data to primary producers to allow them to trust data and ensure that they act on the data it is key that data is continually provided to them no matter which processing plant they send livestock to.	That extension and adoption work is undertaken with the domestic processing plants too.
11	Adoption through individual supply chains	The volume of primary producers in Australia is very high, to ensure engagement with them is maximised, and to ensure champions of the change	The livestock industry and primary producers are known to be slow adopters; initially focusing on individual supply	Initial extension and adoption rates should be focused on individual supply chains.

Number	Issue Name	Problem/Success	Impact	Recommendation
		are identified adoption through individual supply chains should be the initial focus of any extension and adoption activities.	chains will improve and expediate extension and adoption rates.	
12	Deidentified aggregated data would be of value for industry	The animal health disease and defect data has great potential in adding value to the industry. It has the potential to support market access claims, trade negotiations, regulatory change and animal health policy, as well allow for targeted research and extension activities.	Without clear business rules to protect identities and supply chain commercial confidentiality the processing industry will not be willing to share data.	Business rules are required to be developed about the transfer and use of data to ensure data can be used in a deidentified to benefit industry.
2017/2205 - Collection, utilisation and sharing of post-mortem animal health data in the red meat supply chain (H4W)				
13	Limiting the collection of data	There was a general view that the "list" needs to be limited to those diseases/conditions that producers can act upon and achieve some reduction in the incidence of the disease. It was also recommended that only diseases/conditions that do not require routine laboratory testing for confirmation be included. In addition, some plants believe the list should be limited to a few of the most significant diseases (5-8) to make it	The view is aimed at providing targeted information to producers and ease of collection for meat inspectors, however this does not provide the processors with the understanding of value that can be realised and could therefore result in lack of adoption.	If data attributes are to be limited in feedback then this should made clear to producers to prevent disillusionment when the goal posts potentially keeps moving.

Number	Issue Name	Problem/Success	Impact	Recommendation
		easier to have on a touch screen or record on paper. Having said that there are 20 conditions in the NSHMP recording sheets and companies and inspectors seem to have coped.		
14	Practicality of collection (technology verses paper records, chain speed, additional inspector)	The practicalities of animal health data collection in plants may necessitate the use of different technologies and protocols depending on the species, chain speed and inspection arrangements.	The ability to collect animal health disease and defect data	Chain speed and inspector resourcing should be considered in data collection and the method of collection. A time in motion and workspace assessment should be conducted to understand resourcing needed and the type of collection method to be used.
15	Inspection model used	Government meat inspectors are reluctant to collect animal health disease and defect data. Third party and company inspectors are more likely to collect data.	Reliable data collection, and therefore usable data for analysis and feedback.	Strong engagement with meat inspectors is required in general to ensure that they understand the importance of data collection. The DAWE (and meat inspection providers) need to be consulted and engaged with at a higher management level, to ensure reliable data collection address willingness and due to turn over of staff, leave etc.

Number	Issue Name	Problem/Success	Impact	Recommendation
16	Reporting format – regional connectivity	Consideration should be given to the reporting format, a web-based service with login provides the advantage of allowing for linkage to extension material and resources however regional lack of reliable connectivity needs to be considered.	Adoption levels are not as high as expected and the full benefits of the project are not realised.	Traditional paper-based methods of extension and reporting need to be available for some regions.
17	Data sharing	Animal health data should be available to producers (their livestock data) and processors (stock they processed.) The majority of plants are in favour of this data being stored in both a national and company data bases with eighty percent in favour of there being a national data base. Industry is less enthusiastic about other parties sharing this data but more relaxed if the data is aggregated and individual producers cannot be identified.	Data sharing allows for great value and benefits being realised out of the project.	Business rules for data sharing is required and a national database for data sharing, analysis and benchmarking should be established.
2017/2235 - Development and implementation of an accredited training program in animal health data collection (H4W)				
18	Accuracy of data collection	Accuracy of data collection is important to ensure producer confidence in the data reported.	Confidence in the data reported is paramount to the producers acting on the animal health disease and defect data to ensure	Meat inspection training in the collection of the data is run with refresher courses. New and

Number	Issue Name	Problem/Success	Impact	Recommendation
			that the value and benefits of the project are realised.	existing meat inspectors should be consistently trained. Verification of data collection through physical and data analysis is also important to ensure accuracy of data collection.
19	Engagement of processing staff	Data collection occurs in the processing environment where many cogs turn to ensure efficiency of processing and hopefully a profit. Changing functions or add additional tasks can throw off the balance that provides the efficiency and profit to a business.	Misunderstanding and negative view of the data collection function. Data not being collected accurately or consistently.	Engagement should occur with the processing management staff of the slaughter floor, livestock team and plant in general to ensure understanding of the benefits and value of the project to the company.
20	Integration of the data collection and reporting systems.	To ensure accurate and timely reporting and meaningful reporting the data collection and reporting systems need to be integrated. Feedback reports need to be linked to the animal identification and it other attributes such as weight, supply chain, etc.	To allow for meaningful analysis and meaningful reporting that can be acted to ensure that the value of the project can be realised.	Data collection and reporting systems should be integrated.
2017/2262 - Assessment of value from reporting findings from analysis of sheep health data collected at abattoirs to the sheep supply chain (H4W)				

Number	Issue Name	Problem/Success	Impact	Recommendation
21	Multivariant statistical analysis is not beneficial to verify a business case when the foundational components of a system are not in place, despite data being available.	Statistical analysis on data that is not verified can provide false or misleading outcomes, if outcomes can be established. In the case of this project the data that is already exists has to be fully understood to be accurately analysed.	Misleading outcomes can lead to poor adoption.	Careful consideration of data analysis conducted and shared should occur.
2018/0034 - Health4Wealth - pilot trials for the pork industry (H4W)				
22	Avenues for adoption and extension	Due to the COVID pandemic traditional avenues of extension (such as face-to-face meeting and producer days and workshops) need to be reconsidered.	Level of adoption of the project will be reduced and therefore the full value of the project will not be realised.	Even post COVID all available avenues for adoption and extension need to be considered to ensure the greatest adoption of the project as possible.
23	Retail supply chains must be considered	Given that the retailers in Australia are large owners of livestock across Australia any National system must include their supply chains.	This has a potential to reduce the level of action on the data collected with the data never reaching the producers for them to act upon it.	Consideration has to be given to retailer led supply chains including the ownership and sharing of data. Engagement of these supply chains including the retailers is important to ensure fully value realisation of any national system.

Number	Issue Name	Problem/Success	Impact	Recommendation
24	Data sharing	Animal health data should be available to producers (their livestock data) and processors (stock they processed.) The majority of plants are in favour of this data being stored in both a national and company data bases with eighty percent in favour of there being a national data base. Industry is less enthusiastic about other parties sharing this data but more relaxed if the data is aggregated and individual producers cannot be identified.	Data sharing allows for great value and benefits being realised out of the project.	Business rules for data sharing is required and a national database for data sharing, analysis and benchmarking should be established.
25	Number of pilot trials	State and federal travel and gathering restrictions due to the COVID pandemic and company entry restrictions to ensure continual production resulted in reduced pilot trial numbers and length.	Examples to be used for adoption and extension have been reduced	Increased efforts around extension and adoption should occur with a focus on early adopting plants as examples.
26	Correlation and individual identification	Researchers recommend hook tracking of RFID to line up correlation of data entry. This unfortunately has the same volume of advantages as disadvantages as the data accuracy is reduced when the system is automated and meat	Accuracy of data is paramount to confidence in the data and adoption of the project.	Inspection data is maintained manually in correlation with an individual animal.

Number	Issue Name	Problem/Success	Impact	Recommendation
		inspectors are not moving the system on themselves. It also means that there is no positive entry to ascertain the difference between a missed report and a healthy record against an animal.		
27	Producer feedback	Consideration should be given to the reporting format, a web-based service with login provides the advantage of allowing for linkage to extension material and resources however regional lack of reliable connectivity needs to be considered.	Adoption levels are not as high as expected and the full benefits of the project are not realised.	Traditional paper-based methods of extension and reporting need to be available for some regions.
2018/0064 - Health 4 Wealth (H4W): Red meat pilot trials				
28	Consistency of data collection (subjective grades for severity of conditions)	Consistency and accuracy of data collection is important to ensure producer confidence in the data reported.	Confidence in the data reported is paramount to the producers acting on the animal health disease and defect data to ensure that the value and benefits of the project are realised.	Meat inspection training in the collection of the data is run with refresher courses. New and existing meat inspectors should be consistently trained. Training should include the definitions and consistent application of subjective grades for severity of conditions.

Number	Issue Name	Problem/Success	Impact	Recommendation
29	Mapping of data captured against the standard	Variation in mapping of could occur for example generic conditions observed (e.g. Cysts) diagnostic conditions where pathological confirmation of the specific causes are attained (e.g. Hydatid Cysts).	Accuracy of data is paramount to confidence in the data and adoption of the project.	Guidelines for the mapping of data should be developed or mapping should be completed by those with expertise and experience in the development of the standard.
30	Standardisation of data	To allow consistent data to be collected, reported, transfers and provided back to producers a standardised and codified language is required.	This is the foundation of the project with all other components of the project being reliant on it.	Work should continue on the national standard to ensure it is maintained up to date and is practically applicable to stakeholders.
31	Inspection model used	Government meat inspectors are reluctant to collect animal health disease and defect data. Third party and company inspectors are more likely to collect data.	Reliable data collection, and therefore usable data for analysis and feedback.	Strong engagement with meat inspectors is required in general to ensure that they understand the importance of data collection. The DAWE (and meat inspection providers) need to be consulted and engaged with at a higher management level, to ensure reliable data collection address willingness and due to turn over of staff, leave etc.

Number	Issue Name	Problem/Success	Impact	Recommendation
32	Mob based data capture	A mob-based specification for animal health disease and defect data collection in small stock has been developed but not tested.	Adoption impacted	The mob-based specification be piloted in small stock processing plants.
33	Stakeholder engagement in the design of reports.	Stakeholder engagement in the design of the report ensured that the reports were better understood, user friendly and included the information that the user though was important.	With the user (producer or processor) understanding the feedback reports there is increased use of them and therefore increased adoption.	That stakeholders and users are involved in the development and design of feedback report and systems.
2018/0085 - Development of Factsheets for beef and pork conditions detected in abattoir monitoring - H4W				
34	Consideration of supply chain and region	The differentiation between extensive and feedlot producers and northern and southern production variation in the cattle industry should be considered when developing extension material.	Extension material that is not easily understood or relatable will be ignored. This will lead to a lack of adoption	That different supply chains and regions be considered when developing extension material to ensure that it is best suited to the audience.
2020/0021 - An ex-post benefit cost analysis of the validation studies completed in pork, sheep, beef and goat supply chains (H4W)				
35	Standardised application of a meat classification system	Consistency and accuracy of data collection is important to ensure producer confidence in the data reported.	Confidence in the data reported is paramount to the producers acting on the animal health disease and defect data to ensure that the value and benefits of the project are realised.	Verification of data collection through physical and data analysis is also important to ensure accuracy of data collection. Meat inspection training in the collection of the data is run with

Number	Issue Name	Problem/Success	Impact	Recommendation
				refresher courses. New and existing meat inspectors should be consistently trained.
36	Extension activities required to facilitate take up	To realise the value in the project producer action must occur. This requires extension action to occur through a number a routes to ensure maximum uptake and adoption.	Lack of adoption will result in decreased value realisation for the project.	Extension actives continue to be funded to ensure project uptake.
37	Addressing data gaps around the costs and benefits of conditions	Data and information on the linkage of peri-mortem findings to animal diseases and then the cost incurred due to the disease will allow for full understanding of the costs and benefits that the project can address.	Fully realisation of the costs and benefits of the project may be realised.	Further analysis and research is undertaken to understand the linkages between peri-mortem findings and animal diseases and the costs and benefits of addressing them.
38	Development of a monitoring and evaluation system	To ensure that the full extent of costs and the benefits of the project are understand and realised monitoring and evaluation should occur as further adoption work is completed.	Fully value is identified and realised.	Monitoring and Evaluation systems should be included in further adoption and extension projects.

7 Appendix - additional project information

7.1 Project, media and communications material and intellectual property

Throughout the life of the project presentations and articles detailing the project objectives have been made to various audiences and copies of these have been provided to DAWE for clearance. These pieces of communication have included:

- reports and presentations during workshops.
- a news report through SARDI, which was approved by DAWE and has been publicly distributed.
- a news article included in Integrity Matters eNewsletter around the launch of beef disease and defect data available in LDL: Disease and defect feedback available for beef producers (https://www.integritysystems.com.au/about/news--events/now-available-disease-and-defect-feedback-for-beef-producers/?dm_i=4PKF,2A0T,16QONJ,70JQ,1)
- Livestock Data Link animal disease module animation: includes reference to industry programmes that have contributed to disease and defect data being able to be capture and reported in LDL. Please refer to the news article link above for the video. (Please note, that all LDL communication material developed is funded through MLA Annual Investment Plan).
- a news article Increasing revenue through processor feedback: news article in Australian pork newspaper (http://www.porknews.com.au/documents/pasteditions/APN0520.pdf)
- processor flyer around the announcement of beef disease & defect feedback available LDL
- project updates to industry through industry delegates and individual processor meetings.

The project has resulted in 15 sub-project reports which have been published on the APL website. In addition, factsheets for beef (5) and pork conditions (18) detected in abattoir monitoring. To date no research papers or journal articles have been published from this project.

No photos or recordings have been used in these publications.

7.2 Equipment and assets

No equipment or assets were created or acquired during this project.

7.3 Monitoring and evaluation

The final project Evaluation Report is provided separately in Attachment 2. This report is in line with the Monitoring and Evaluation plan submitted in Milestone 2 on the project. The Evaluation Report provides the project's outcomes against the program objective and includes quantitative and qualitative information on outcomes achieved and expected.

7.4 Budget

The Project received $711,668 from the Federal Government, plus another $1,129,905 from a number of Rural Research and Development Corporations, including Australian Pork Limited (APL), Meat and Livestock Australia (MLA) and the Australian Meat Processor Corporation (AMPC). The Department of Economic Development, Jobs, Transport and Resources, Victoria (DEDJTR) and the South Australian Research and Development Institute (SARDI) are also making in-kind contributions to the Project (equivalent to $259,021).

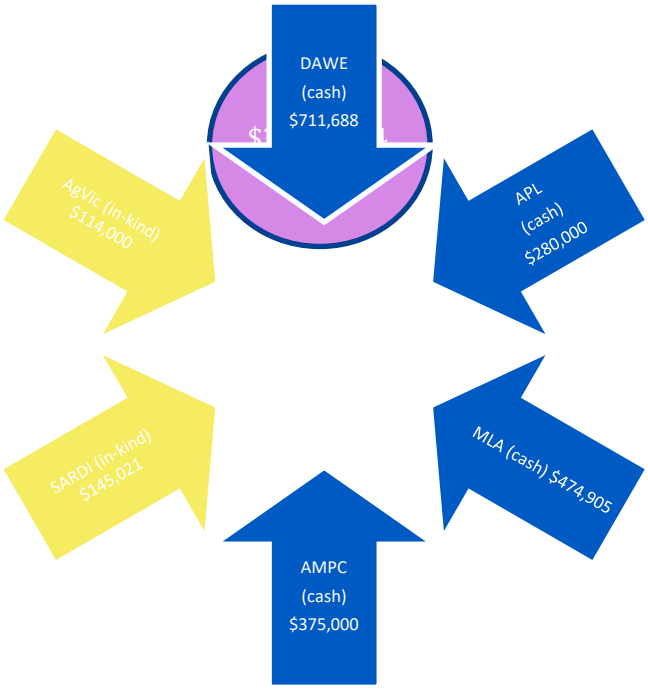

Figure 3. Overall sources of funds

Table 3: Expected project income

	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Department (cash)	$348,717	$72,946	$72,946	$145,892	$71,167	$711,668
APL (cash)	$70,000	$70,000	$70,000	$70,000	$0	$280,000
MLA (cash)	$100,000	$150,000	$120,000	$104,905	$0	$474,905
AMPC (cash)	$75,000	$100,000	$100,000	$100,000	$0	$375,000
SARDI (in-kind)	$34,856	$35,775	$36,714	$37,676	$0	$145,021

DEDJTR (in-kind)	$28,500	$28,500	$28,500	$28,500	$0	$114,000
Total Cash	$593,717	$392,946	$362,946	$420,797	$71,167	$1,841,573
Total in-kind	$63,356	$64,275	$65,214	$66,176	$0	$259,021
Total cash and in-kind	$657,073	$457,221	$428,160	$486,973	$71,167	$2,100,594