



# Final report

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## Australian Agrifood Data Exchange Phase 2: Experiment 1- Compliance

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## **Abstract**

Compliance and certification underpin the premium clean, safe, and sustainable brand messaging of the Australian Sheep Meat and Wool Industries. Managing evidence to support multiple compliance programmes can require significant producer time and effort. Part of the Australian Agrifood Data Exchange programme, this experiment explored the technical feasibility, issues, and business benefits that a standardised, permissioned, and timely electronic data interchange could bring to compliance activities.

Using a co-design process and stakeholder interviews, a range of potential benefits were identified, and quantified where possible. A technology solution was implemented using the Pure Farming agricultural data integration platform and was demonstrated to the experiment working group and a wide group of industry stakeholders.

The research demonstrated significant opportunities for producers and compliance programmes to gain efficiencies through electronic collection of structured and unstructured evidence, and its permissioned reuse across multiple compliance programmes. Data collected in this way could also be leveraged in supply chains for further product or market differentiation.

Implementation of a data exchange to address compliance activities in the agri-food sector should address data governance and controls, standardised data specifications, and support for producers to adopt and gain the predicted benefits.

## Executive summary

### Background

Compliance and certification underpin the premium clean, safe, and sustainable brand messaging of the Australian Sheep Meat and Wool Industries in both domestic and international markets. The sectors have invested in and continue to support mechanisms and technology that enable producers to keep high quality records to prove compliance.

Collecting and managing evidence to support compliance can be a significant undertaking for producers, and participation in multiple sector or market-focused compliance and certification programmes can bring substantial time costs to producers, particularly where evidence is paper-based or manually collected. Assurance and compliance programmes and their auditors also recognise that substantial efficiencies could be achieved in their processes, and in the supply chain, if underpinning data and other forms of evidence could be collected and used in a secure, controlled, and more automated way.

The Australian AgriFood Data Exchange programme of work is exploring the potential for standardised, permissioned, and timely reuse of electronic data across the agri-food value chain to support multiple use cases, including compliance activities.

### Objectives of this research

This research was one of four experiments carried out to assess the technical feasibility, issues and concerns, and business benefits of an AgriFood data exchange. It seeks to address the cumulative burden of compliance for producers through to processors operating in the Victoria and NSW sheep sector (meat and wool). The results of the research will be used to identify practical solutions for sheep producers, industry compliance bodies and the supply chain, while informing the later phases of the Australian AgriFood Data Exchange programme.

Key success criteria to be addressed included:

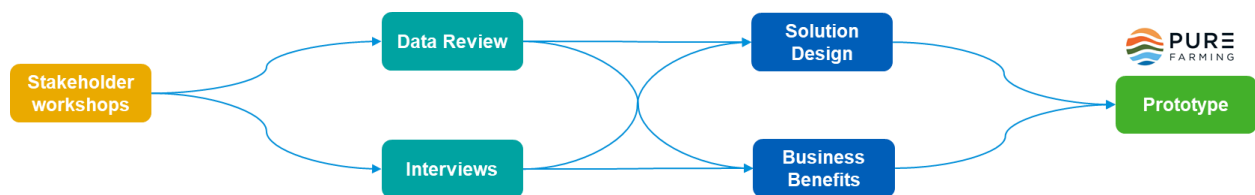
Criteria	Beneficiaries	Result
Reduced time spent entering compliance data	Producers	Demonstrated how data collection could be simplified, data could be reused, and duplication removed.
Increased accuracy of compliance to different Quality Assurance (QA) systems	Certification bodies, agents, data partners	Demonstrated how data from farm software could be delivered as evidence to aligned on-farm assurance requirements.
New ideas from the experiment that are likely to benefit producers, regulators, industry bodies and stakeholders along the supply chain	Producers, industry bodies, supply chain	Captured a range of potential benefits through interviews and co-design process. Demonstrated how captured data could be reused in the supply chain.
Efficient auditing through more accurate and complete data	Auditors, certification bodies, producers	Demonstrated how data could be leveraged to support more effective audits, including permissioned data for hybrid and remote audits.

## Methodology

Figure 1 illustrates the methodology applied to this project. Co-design workshops with members of the Australian AgriFood Data Exchange working group for the experiment were used to identify the problems faced by producers and industry stakeholders, and to express these as hypotheses for exploration. A range of potential solution approaches were identified and prioritised for investigation.

Producers and industry participants contributed data to a secure data room that was used during the project. The Rezare Systems team carried out a detailed analysis of this data, exploring its potential for re-use and its alignment with the requirements of the in-scope industry compliance programmes.

In parallel, interviews were carried out with a range of producers, industry compliance programme operators and auditors, supply chain organisations and advisors. Interviews focused on understanding the compliance needs and frustrations, the opportunities and barriers to change, and quantifying benefits that a data exchange could bring for the stakeholders.



**Figure 1: Methodology applied in the project**

A demonstration solution for the experiment was designed and implemented, making use of the Pure Farming Integration Platform-as-a-Service (iPaaS), and Map of Agriculture Group's existing compliance evidence application, AgAssure. In parallel, collaborative work was undertaken to research and quantify potential benefits for stakeholders that were identified during the co-design workshop and interviews.

## Key findings

The experiment activities and the industry demonstration day showed that it was technically feasible to apply a data exchange platform such as Pure Farming, along with data-exchange-aware applications such as AgAssure, to address the compliance needs of producers, auditors, and compliance bodies.

Interviews confirmed that there is general support from producers, auditors, processors, and retailers for the adoption of structured and unstructured digital evidence for compliance and certification. Additionally, interviews with producers and auditors showed that applications which collect data on-farm can streamline producer record-keeping, preparation for audits and the auditing process itself.

A successful data exchange solution that reduces the effort for producers relies on a level of alignment or collaboration between schemes, particularly alignment of requirements to allow reuse of digital evidence. This lowers the cost of compliance for both producers and schemes, while still retaining individual scheme differentiation and integrity.

Data collected on-farm or from industry systems can be leveraged to support deeper analysis and to validate provenance and credence claims. Enriching on-farm data with additional data sources (such as wool and carcase performance data) can provide additional compliance insights, allowing greater targeting of resources to improve overall compliance.

Producer control of data and the ability to permission data for specific purposes is essential to support reuse of data for multiple purposes. A data exchange, such as that demonstrated through Pure Farming, can allow producers to control their data through a familiar user experience, increasing trust and collaboration.

### **Benefits to industry**

The research undertaken in this project brings the following benefits to industry:

- Producers stand to benefit from time savings and a reduction in duplication of work, in collecting data, preparing for audits, and on-farm time during the audit process. Producers may also be able to participate in additional compliance programmes (associated with higher returns) as the marginal effort in participation is reduced.
- Compliance bodies and auditors benefit from improved accuracy and timeliness of compliance evidence, including the ability to use data analysis to adjust sampling and prioritise auditing, and availability of data for review prior to carrying out on-farm audits.
- Advisors, tool developers, and supply chain organisations may be able to reuse data originally collected for compliance purposes to support advice, additional value, or product differentiation, providing permission to use that data has been granted by producers.
- All participants benefit from standardised and cleansed data, familiar and consistent processes for requesting and controlling access to data, and increased trust between parties.

### **Future research and recommendations**

The analysis carried out during this research demonstrated potential benefits that could be achieved by using data exchange technologies to support sheep compliance. Similar benefits are likely to accrue in compliance programmes for other parts of the Australian agricultural sector.

The following recommendations should be considered for future work:

- Compliance and audit bodies should collaborate to align the common requirements that appear in more than one programme, so that it is easier for producers to re-use evidence that demonstrates compliance with those requirements. Programmes can still retain their own audit integrity and differentiation above the common requirements.
- Effective operation of a data exchange, and integration with a range of applications, data sources and data consumers, relies on the development of consistent common data specifications and governance expectations. These components lower integration cost and risk. The work of developing data specifications should be prioritised and should leverage existing international data specifications where appropriate.
- A data exchange is just one part of creating efficient, effective compliance and certification schemes and is not a silver bullet. Building producer trust in the governance, security, use and value of a data exchange is a long-term endeavour and will not be achieved without consideration to long term adoption and change management.

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## 1. Background

Compliance and certification underpin the premium clean, green, and safe brand messaging of the Australian Sheep Meat and Wool Industries in both domestic and international markets. The sectors have invested in and continue to support mechanisms and technology that enable producers to keep high quality records to prove compliance.

However, compliance and certification systems have evolved organically over the years and variations in systems, state law, standards and governance have meant that it has become difficult to access and interoperate compliance data between stakeholders within and across industries. This has resulted in datasets being replicated by organisations and frequently requiring producers to enter the same information into many systems, impacting data quality, productivity, and profitability.

It is widely agreed that the producer must retain control of most of the data that they supply to compliance organisations (this is often termed “ownership”), but the industry lacks clearly defined mechanisms for providing permission for third-party access. While some of the data collected is structured, much of the data required to prove compliance is also unstructured, requiring images, PDFs, and spreadsheets to be stored and shared.

There is significant potential benefit for producers and supply chains in bringing compliance datasets together, to create a single source of truth with permission mechanisms that empower data owners to share their compliance data with third parties.

As well as potential time saving productivity gains for producers, compliance organisations will experience improvements in data quality and improved access to data to support audit activities.

A permissioned data exchange system will give producers confidence and an efficient way to share their compliance data with other third parties, opening possibilities for Agritech providers to enhance their services, contribute to research or provide data to the government to guide policy.

### 1.1 Purpose of Australian AgriFood Data Exchange

The Australian AgriFood Data Exchange seeks to provide a digital platform that enables:

- i. The permissioned exchange of data between AgriFood industry participants
- ii. Timely access to information that supports decision making for the AgriFood value chain
- iii. Standardisation and consistency of industry data assets
- iv. The capacity to adapt, incorporating new use cases for data exchange that deliver value and support resilience of AgriFood value chain participants
- v. Increased transparency of AgriFood industry data to support multiple use cases (e.g., regulatory compliance, collaboration between public & private data sets)
- vi. A mechanism to connect disparate data sources.

The program is expected to be completed over the coming several years and comprise multiple phases.

### 1.2 Requirements of experiments

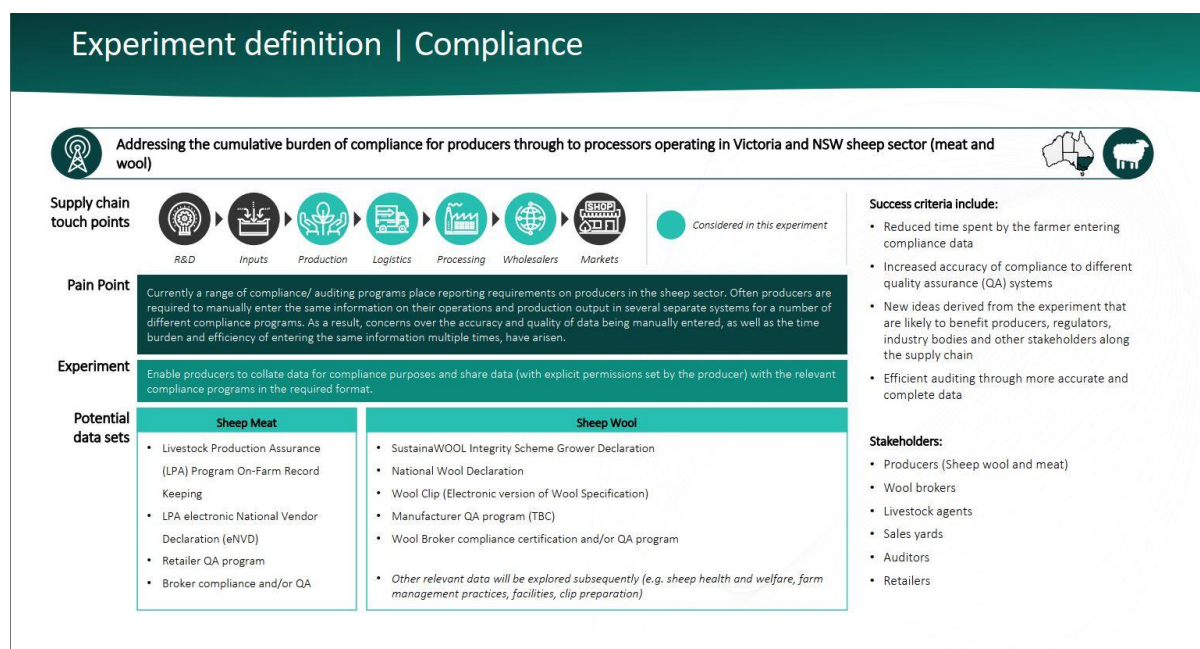
Technology vendors have been engaged to implement four experiments – also known as proof of concepts – that support each of the prioritised use cases that have been identified. The experiments



are designed to test the viability and feasibility of the prioritised use cases, which will ultimately help inform a business case to support the operational and funding requirements for a Minimum Viable Product.

Rezare Systems Pty Limited has been engaged to undertake Experiment #1, *Addressing the cumulative burden of compliance for producers through to processors operating in Victoria and NSW sheep sector (meat and wool)*.

The compliance experiment was defined in a slide at the vendor kick-off (see Figure 2).



**Figure 2 Experiment #1 definition**

The pain point for Experiment #1 was defined as:

Currently a range of compliance/auditing programs place reporting requirements on producers in the sheep sector. Often producers are required to manually enter the same information on their operations and production output in several separate systems for a number of different compliance programs. As a result, concerns over the accuracy and quality of data being manually entered, as well as the time burden and efficiency of entering the same information multiple times, have arisen.

The experiment was to:

Enable producers to collate data for compliance purposes and share data (with explicit permissions set by the producer) with the relevant compliance programs in the required format.

The solutions for all the experiments were required to meet the requirements:

- The delivered solution must be scalable and extensible should there be a requirement to build it out by incorporating more scope in future.
- The delivered solution should be built with the right foundations so that in future it could be operationalised in the field.

- iii. The platform/ solution must have ability to ingest specific data, ideally demonstrate structured and unstructured data ingestion capabilities.
- iv. The solution should be architected using established architecture framework(s) to ensure it can be extended and integrated in future as required.
- v. The solution will be built for technical and business users alike. Thus, it should have an intuitive and interactive front-end designed around the user. The future data exchange will host and exchange sensitive data including government, PII (Personally Identifiable Information) and confidential data. Thus, the solution must meet appropriate security and privacy data standards.

In addition, for Experiment #1 the following specific requirements and success criteria were specified to be demonstrated:

- permissioned exchange of data from one central source to multiple other auditing systems
- efficiency in the auditing process, e.g., reduced time spent by farmers entering compliance data for multiple audits
- increased accuracy of compliance to different QA systems
- optionally any new insights from the consolidated dataset that could be fed back to benefit producers, regulators, industry bodies and other stakeholders along the supply chain.

Stakeholders directly involved in the experiment included producers, auditors, agribusiness, and program administrators (industry and commercial).

## 2. Objectives

This project had the following objectives:

- a. To demonstrate an effective data exchange for compliance and certification such that:
  - Producers need only provide the same evidence once across multiple schemes.
  - Producers have complete control over the data that they originate and who has access, for how long and to what.
  - The solution can ingest structured and unstructured data.
  - The solution is scalable and extensible.
  - The solution could be operationalised in the field.
- b. To identify the business benefits achievable through the data exchange for compliance and certification.
- c. To recommend considerations and learning outcomes that will support successful implementation and adoption.
- d. To deliver a final report outlining the project's achievements.

The project achieved these objectives. The project received significant support and valuable feedback from the experiment working group and from the interview subjects.

### 3. Methodology

The methodology adopted by Rezare Systems consisted of several components, some of which were addressed in parallel as shown in Figure 3.

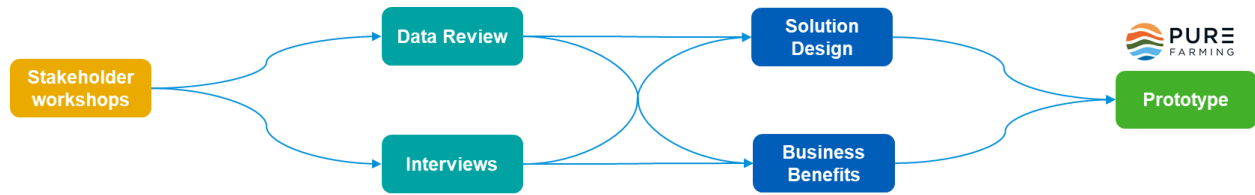


Figure 3 The methodology flow of the project

#### 3.1 Co-design workshops

Two co-design workshops with stakeholders and loosely based on the Design Thinking process<sup>1</sup> were held on 14 and 17 December 2021. The workshops were to identify opportunities to be addressed in the experiment and to explore potential solutions.

The workshop went through a series of steps including:

- Identifying the participants in the compliance process.
- Brainstorming limitations, challenges, and opportunities.
- Capturing ideas on what success would look like to understand what might be demonstrated at the end of the experiment.
- Identifying hypotheses or problem statements that the participants wanted to see addressed rather than jumping straight to a solution (because doing that may not address the right problem).
- Identifying risks and concerns for the success of the experiment and the wider vision.
- Capturing the types of evidence required for red meat and wool quality assurance.
- Brainstorming potential solutions and then voting on the solutions that would be good ideas to explore in the experiment.

#### 3.2 Data review

Some examples of farm compliance data and evidence was provided in the data room by members of the Working Party and by producers. Additional documents detailing the requirements of the compliance schemes from the points of view of producers and auditors were sourced from the schemes' websites.

The sample data files and the requirements of schemes were analysed to gain an understanding of the schemes, to identify common requirements and to provide sample data for the demonstration.

<sup>1</sup> Design Thinking – defined in Harvard Business Review, June 2008, by Tim Brown ([https://new-ideo-com.s3.amazonaws.com/assets/files/pdfs/IDEO\\_HBR\\_DT\\_08.pdf](https://new-ideo-com.s3.amazonaws.com/assets/files/pdfs/IDEO_HBR_DT_08.pdf), retrieved April 2022)

### 3.3 Interviews

Interviews were conducted with a range of stakeholders including producers, auditors, administrators of compliance schemes, agribusinesses, and processors. The interviews typically asked:

- The compliance programs they conduct, or they are enrolled in and the steps they take to maintain compliance in their business.
- The evidence that is required to maintain compliance and the challenges in providing the evidence.
- The duplication of questions and associated evidence required across compliance programs and the opportunities for streamlining the evidence.
- The use of farm management software and the barriers to providing compliance information digitally.

### 3.4 Solution design

A solution was designed based on the outcome of the stakeholder workshops, the initial data analysis and interviews, and drawing on the experience of Rezare Systems. The technical solution has two components – an example of an agricultural data exchange to ingest permissioned data from on-farm and industry sources; and an application to support compliance.

### 3.5 Business benefits framework

Prompted by information from the data review and the interviews, the business benefits arising from the project were investigated.

### 3.6 Prototype

The solution defined in the design stage was developed using Pure Farming as an example of an agricultural data exchange. It was outside of the scope of the project to hook Pure Farming into existing farm management software. This was emulated using data from the Data Room that had been sourced from a farm management software system. Animal treatment data was chosen as the example of data ingestion to be shown in the demonstration to stakeholders.

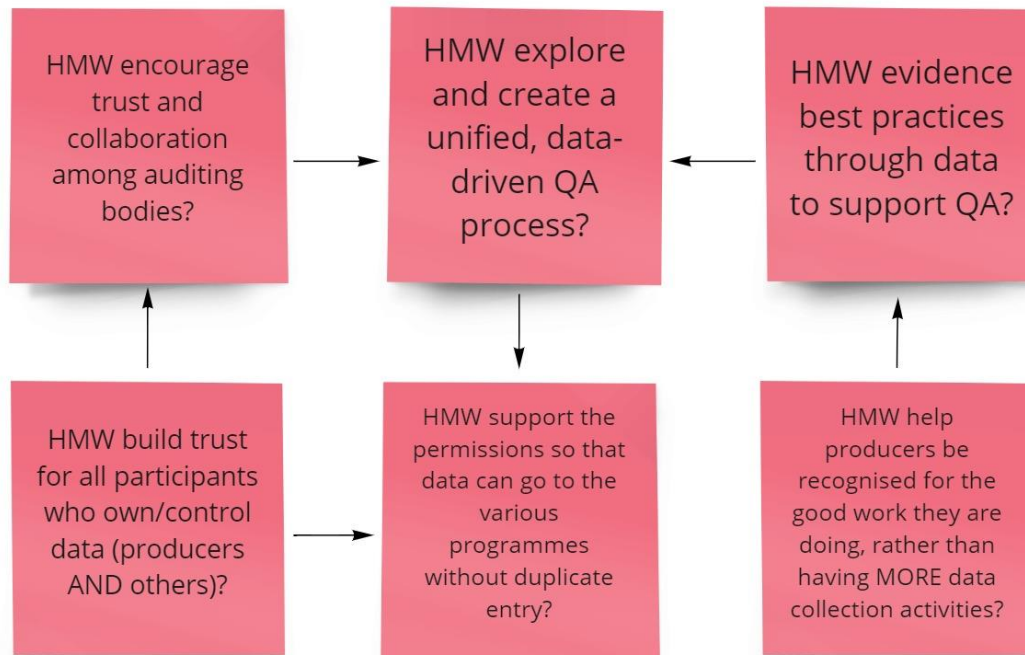
AgAssure was used as an example of compliance software ingesting both structured data through the data exchange and unstructured data uploaded by the farmer. AgAssure was configured to support several compliance schemes including Livestock Production Assurance (LPA) and SustainaWOOL.

## 4. Results

### 4.1 Co-design workshops

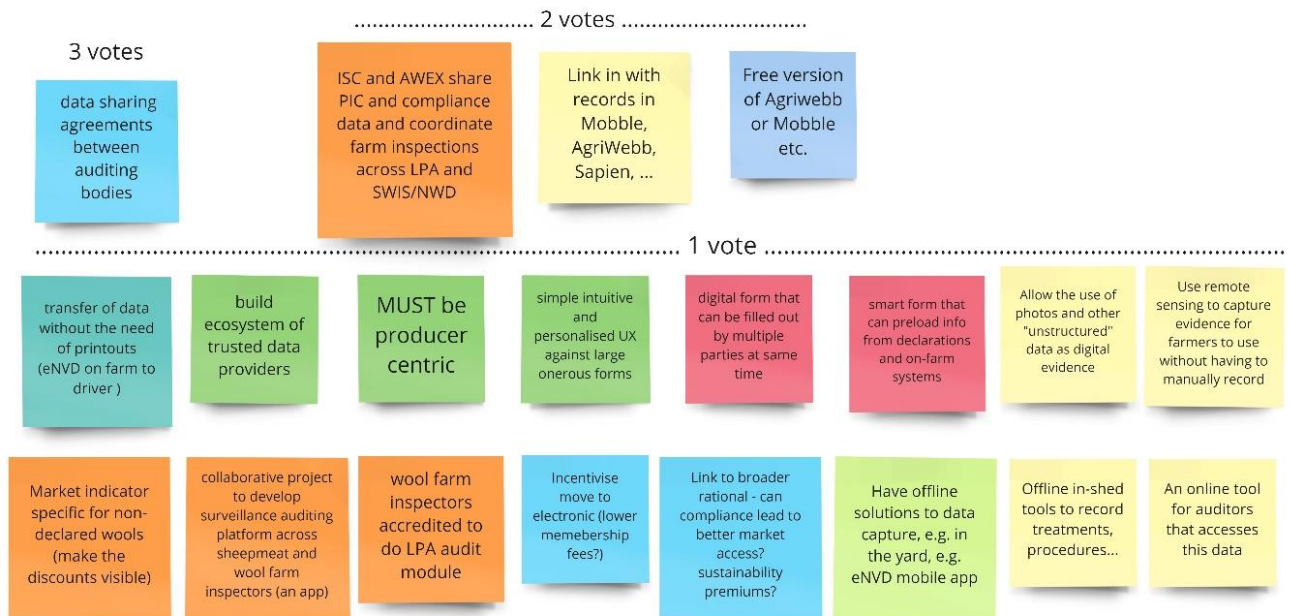
The co-design workshop was held over two days. There were 13 participants from 7 organisations including the delivery team.

A key outcome from the workshop was a set of hypotheses or problem statements as shown in Figure 4. Note that HMW in the figure means ‘How might we’.



**Figure 4 Hypotheses or problem statements defined in the co-design workshop**

The participants brainstormed potential solutions to these hypotheses then voted on good ideas to explore in the experiment as identified in Figure 5.



**Figure 5 Preferred potential solutions to explore in the experiment**

Some of the proposed solutions exceeded the contracted scope or defined timeline of the experiment. These were considered in preparation for interviews and in development of the business benefits framework but were excluded from the solution design and demonstration.

It was agreed that the key outcomes the experiment should demonstrate were:

- Alignment of requirements to avoid duplication
- Ability for data to be captured once and re-used.
- Permissions or controls to support trust and re-use
- Potential for data to support and enrich compliance evidence.

## **4.2 Data Review**

The data files and evidence provided for the experiment in the data room were primarily from three producers. The bulk of this data was unstructured, primarily in the form of scanned documents. There were some CSV files that had been exported from Farm Management Software. The files included:

- multiple National Vendor Declarations, mostly for movements off the property and nearly all were manually completed forms.
- multiple wool classer specifications mostly with the National Wool Declaration (NWD).
- chemical training certificates.
- LPA accreditation course certificates
- applications and a renewal document for SustainaWOOL.
- exported animal treatment records
- exported lists of NLIS movements
- exported livestock supplementary feed records
- exported mob joining and marking records
- exported mob shearing records
- exported livestock sales
- exported livestock treatment records
- exported chemical inventory
- a farm maintenance task list
- a comprehensive crop planning report
- a wool clip bale and test results.

In addition, we received some photographs of shearing shed environments, chemical storage, wool bales, trees and grass cover and scans of pages from a farm diary and a wool book.

There was insufficient data available from any one producer on which to base the demonstration. The data and evidence from the three farms were aggregated into a single dataset for a fictitious farm to provide a more realistic representation of some of the data a farm may generate. This was sufficient for the purpose of demonstrating the solution. The data used in the demonstration was anonymised to preserve the privacy of the producers involved.

The specifications of the sheep meat and wool industry schemes, particularly the auditor checklists and guides were downloaded and analysed. The data fields for the schemes Livestock Production Assurance (LPA), National Vendor Declaration (NVD), SustainaWOOL, National Wool Declaration (NWD) and Wool Specification were mapped to identify areas of commonality.

The sample data and the specifications from the schemes provided insights for the solution.

### 4.3 Interviews

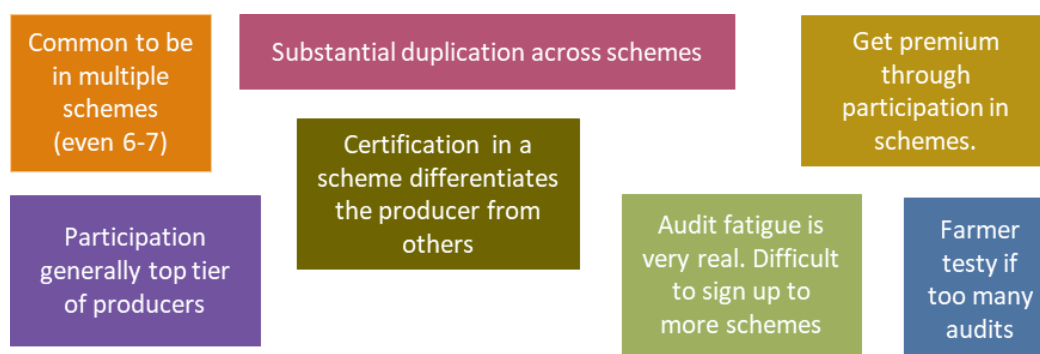
Interviews were conducted with a range of stakeholders including producers, auditors, administrators of compliance schemes, agribusiness, and two processors. Most of the interviews were conducted online through Microsoft Teams. This provided positive interaction between the interviewers and the subjects and allowed the interviews to be recorded so that points could be checked. Two of the subjects had inadequate connectivity and the interviews were conducted by telephone.

It should be noted that it was not possible to arrange interviews with smaller producers. However, one of the auditors that was interviewed also ran a farm and he was interviewed from the point of view of both his roles. It does mean that the producer views expressed are predominantly those of larger corporate producers.

Interviews were conducted with 5 producer representatives from 4 organisations, 5 auditors from 2 schemes, 1 scheme administrator, 1 consultant, 1 wool business specialist, 2 processors. One retailer was interviewed anonymously.

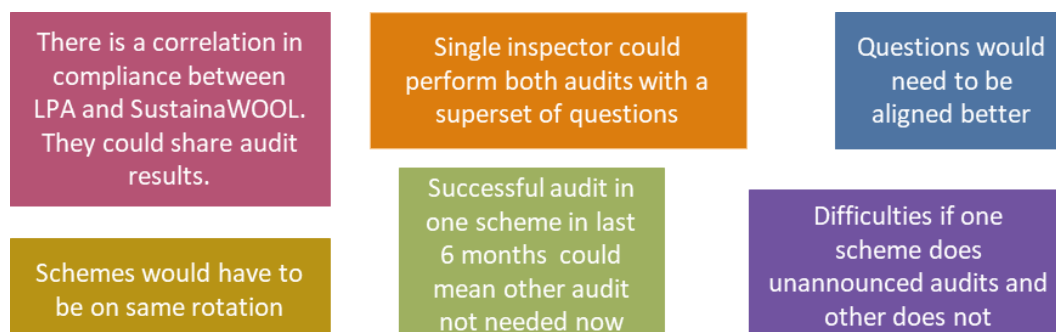
The following identifies some of the **key** comments made and other information captured during the interviews.

Several interview participants commented on participation in schemes and particularly in more than one scheme (see Figure 6).



**Figure 6 Participation in schemes**

There was discussion, particularly with auditors and administrators of schemes, about co-operation between schemes (Figure 7).



**Figure 7 Co-operation between schemes**

Figure 8 identifies the key documentation that is required as evidence by the schemes. Much of this is common to several schemes.



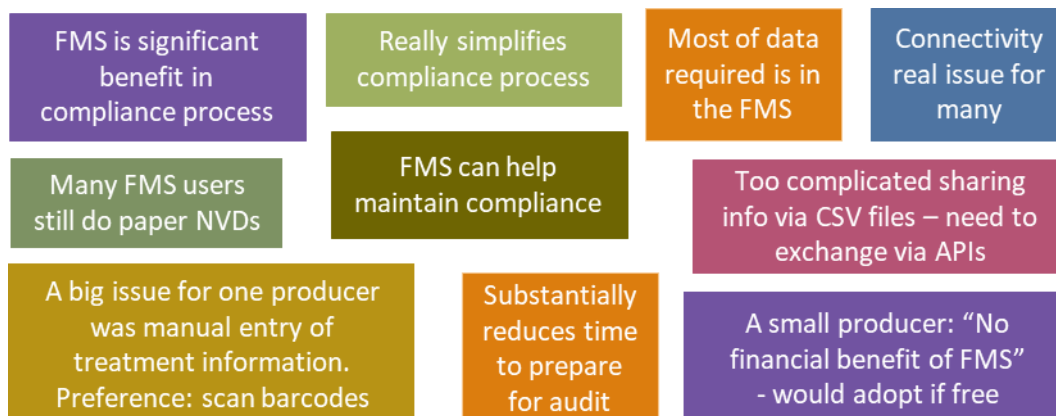
**Figure 8 Key documentation**

Auditors and scheme administrators commented on the concept of performing remote audits (Figure 9).



**Figure 9 Remote audits**

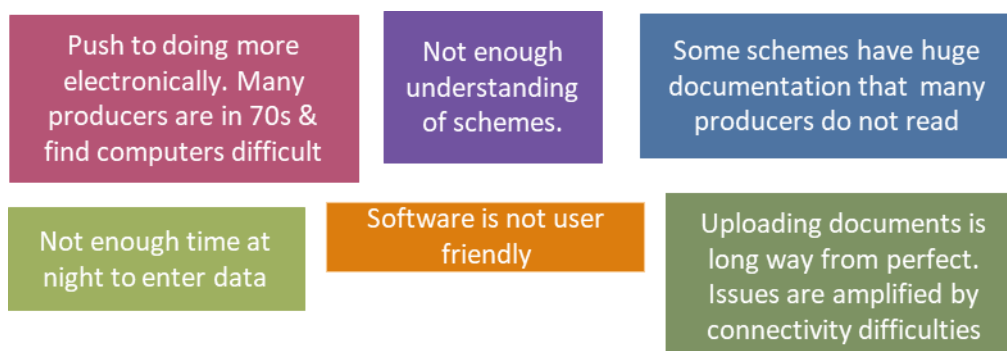
Auditors and corporate producers commented on the considerable benefits to the compliance process of using farm management software (FMS) (see Figure 10). The FMS can help with compliance. The farmer can follow the history of a mob such as checking the paddocks a mob with worms has been in. Paddock history tells which mobs have been through. The software can prevent moving a mob to a paddock within a withholding period because of spraying. A mob can be checked to see if it is within a withholding period.



**Figure 10 Farm management software**

Interview participants identified the key challenges shown in Figure 11.





**Figure 11 Key challenges**

Staff from the schemes provided statistics on audit volumes.

**Table 1: Audit volumes for compliance schemes**

Scheme	Performed by	Number of audits	Notes
LPA	AUS-MEAT	2,000 random, 3,000 targeted	35 auditors
NWD	AWEX	225 inspections	5 auditors
SustainaWOOL		150 inspections	
Processor Farm Assurance	Independent auditor	Commercially sensitive	

## 4.4 Business benefits

The Rezare Systems team unpacked the benefits of the development of an Agrifood Data Exchange to the various Wool and Red Meat supply chain organisations via structured stakeholder interviews (see section 4.3). Whilst the team focused on the benefits to producers (corporate and owner operator), benefits to other supply chain organisations were explored. These included: consultants, brokers (wool) and processors (red meat). The benefits are shown in detail in section 7, the Appendix – Business Benefits Matrix. The key benefits can be summarised as follows:

### 4.4.1 Collect evidence once

Producers are required to provide the same evidence to multiple organisations and to multiple schemes. To date, this has placed a significant administrative burden on producers. There are potential benefits to implementing a data exchange that enables producers to capture evidence once and then to provide third parties permission to access their data. Rezare heard during the industry interviews that:

- Utilising digital evidence could reduce the cost of compliance for producers. Interviewees reported that they spend significant time preparing for each audit. Producers who maintain good records in a farm management system reported spending up to 4 hours preparing, while those that use traditional approaches spend much more time preparing compliance evidence. Time that they would much rather spend out in the paddock improving their product rather than in the office.

- Evidence provided by producers to different schemes for compliance does not significantly change year on year. Producers saw significant benefit in capturing evidence as part of day-to-day farm operations in farm management and compliance systems.
- Storing evidence digitally, for example captured as photographs of paper documents and forms or directly from on-farm devices could reduce overall document management effort. This could improve evidence retention, findability and also could improve data quality.
- A data exchange platform could enable producers to easily share their evidence with more than one scheme or with other interested parties in the supply chain. A data exchange could also provide the governance, standards and security that would give producers certainty that their data was used in the way they intended.

The data provided for the project demonstrated that there is significant overlap of the core evidence required between schemes. This was confirmed during the producer and auditor (industry and commercial) interviews. Interviewees confirmed that:

- Producers could benefit from utilising a data exchange platform to reuse and selectively share their digital evidence. This could enable producers to collect evidence once throughout the year during normal farm operations and share it with schemes and auditors reducing the friction and time required to prove compliance. It could also increase data quality and security. Evidence would not need to be manually re-supplied from different sources and could be quality checked at time of collection by electronic systems.
- Reducing the time taken to comply could improve scheme participation enabling producers to obtain better prices for their products. For example, participation in the SustainaWOOL program results in 1.5-2.8% higher prices compared to other non-mulesed wool. Equating to approximately \$68 (~2.8%) more per bale. A statistically significant number of wool producers are currently not part of the SustainaWOOL scheme.

The research also showed that there is value in scaling these benefits across the supply chain. For example, a producer could leverage a data exchange to choose to share compliance evidence with processors, retailers, and other interested supply chain organisations. This would enable processors and retailers to validate brand messaging, proving compliance to market requirements as well as providing the provenance consumers are demanding for animal health and welfare and biosecurity claims. Processors and retailers could also provide producers and schemes with carcase performance and market data to further identify and mitigate non-compliance.

An international scheme administrator that had already implemented an industry data exchange system was also interviewed. They reported that while producers do see benefit from providing evidence digitally and sharing through a data exchange the benefits do take time to materialise. This may be due to the time taken by producers and auditors to build trust in the system. Also materially, the evidence required to prove compliance doesn't change, so time savings are accumulated year on year as data is captured and then reused.

#### **4.4.2 Connect and control data**

A data exchange could provide significant benefits by enabling participants to connect and control access to their data to third parties. Through the project activities, it was found that for wool and red meat producers a data exchange offers similar benefits. For example, producers and auditors reported that a data exchange for compliance and certification could enable data to be connected from

different farm technology and industry systems while providing the benefit of a standard user interface. This could give producers more control over where evidence is used and for what purpose. It could also give scheme administrators the ability to leverage and access compliance data across schemes for increased industry benefit, especially as data is often replicated between schemes. This ability to control data could increase producer trust while providing certainty over what evidence is being shared and with whom. Certainty of where data is used, for what purpose and under what terms was a key concern of the producers that were interviewed.

Interviewees stated that a data exchange could benefit producers by providing improved security of producer data. Utilising standard, least privilege access control mechanisms (such as OAuth) and aligning third parties to data exchange governance best practice could provide benefit by improving security of producer evidence and compliance data. A permissioned data exchange could also reduce the amount of data duplication across systems. Post implementation, producers and scheme operators would be able to use the platform to avoid sharing data via email, storing it on different devices or providing large amounts of unnecessary evidence to third parties. This could provide the benefit of increased data security. The ABS claims that Agriculture businesses are the 6th most likely to experience a cyber security incident and the Australian Cyber Security Centre estimates the average cost to business of a cyber-attack to be approximately \$276,000 per incident. The implementation of a data exchange could provide the industry benefit of helping to mitigate these risks.

#### **4.4.3 Robust inspections**

The core activity of identifying and mitigating non-compliance is achieved through the scheme audit activities planned by the scheme administrators. They are then carried out by scheme, independent and contracted auditors. Interviewees stated that on-farm audits were disruptive and time-consuming for producers, auditors, and schemes. There are also multiple opportunities where a data exchange for compliance and certification could provide benefit to the audit system. The high value benefits to inspections enabled:

- **Improvements in the targeting of on-farm audits** - Farm audits currently cost approximately \$500 plus travel per visit. The industry currently undertakes approximately 5,000 audits per year for LPA, 250 for the National Wool Declaration and 150 for SustainaWOOL. This equates to an approximate \$2.7M annual spend. A 25% reduction in these costs would equate to \$675,000 in industry savings each year. These benefits could be realised using a compliance data exchange within and between programs (industry and commercial) to statistically plan audit activities and to target non-compliance more effectively within regions and across state boundaries.
- **Reduced impact on farm operations** - Auditors stated that the ability to review evidence ahead of inspection, enabled by a data exchange system, would reduce or optimise the amount of time they would need to spend on-farm with producers. This would limit disruption while maximising the value of the time spent. A data exchange could benefit auditors by allowing them to request evidence ahead of a farm inspection, enabling more remote audits to take place. Producers could benefit through the reduced impact to their operations.
- **Auditors to focus on evidence gaps and to support producers with their non-compliance** - Auditors and producers stated that reviewing evidence ahead of inspection would also allow time spent on-farm to be used more effectively. Allowing them to focus on non-compliance and providing producers with remediation support.

- **Auditors to assess compliance for more than one scheme during an on-site audit.** As producers are members of multiple schemes, a data exchange could reduce the impact on them by enabling auditors to undertake multiple audits in a single visit. Compliance data could then be shared back collectively to the various schemes. Commercial schemes visit producers more frequently than industry schemes. A data exchange could benefit industry schemes by enabling access to commercial scheme evidence and non-compliance data giving additional insights to and further improving the targeting of audits. This could be achieved simply by the producer allowing the industry scheme access to evidence they have uploaded for the industry scheme.
- **Administration time reduced and faster feedback to producers** - Schemes and auditors stated that a data exchange could enable process automation allowing auditors to provide producers with timely/rapid feedback saving time and administration resources and resolving non-compliance issues faster.

Commercial scheme operators were keen to scale these benefits across the supply chain into their schemes, improving their scheme performance and reducing the impact of compliance on their producers. Retailers stated how robust scheme inspections are imperative to proving their product claims. These claims are made to satisfy their customer demands on provenance and animal health and welfare issues. They were also keen to further explore how the benefits offered by an industry data exchange could be brought into their operations.

#### **4.4.4 Smart use of connected data**

There are many opportunities to innovate with compliance evidence. Producers could benefit from providing controlled access through a standard interface to their data to the growing Agritech ecosystem of tools and decision support services as well as with emerging industry research.

- Schemes, auditors, and producers stated that additional analysis of on-farm evidence or industry compliance data could provide benefits for producers.
- Benefitting from the analysis of compliance data derived from the evidence supplied by producers, scheme operators stated that they would be able to identify and address trends in non-compliance and to statistically target emerging issues before they became a significant burden.
- Analysis of evidence shared through a data exchange platform could allow producers to benefit from scheme benchmarking activities. Benchmarking could enable producers to optimise their production while also minimising and avoiding non-compliance, reducing costs, and improving product quality.
- Processors and Government stakeholders stated that on-farm data could be used with producer permission, to provide relevant stakeholders with insights into animal health and welfare compliance to support market access. Conversely, animal carcass and auction performance data could also be provided through a data exchange to further provide insights into animal health and welfare non-compliance providing a net benefit to the producer.

#### **4.4.5 Data can be shared across the supply chain**

A data exchange platform could also benefit producers by providing them with opportunities to enhance existing digital services. This would enable them to tightly control access to their data. As was

demonstrated in the Rezare proof of concept solution design, making controlled sharing of evidence simple for both producers and service providers through a standard user experience and protocols could improve trust, improve the quality of Agritech services and improve producer access to advice, productivity tools and services.

These enablers provided by a data exchange could be scaled across the supply chain. Data shared through a permissioned data exchange could have the benefit of enabling the tools and services that are available to producers to be further enhanced by service providers. Processors, brokers, and retailers stated that by having access to compliance evidence they could improve the quality and the accuracy of their interactions with producers. For example, resolving data errors in wool catalogues or cattle auction records benefits producers by ensuring they do not get unnecessarily penalised for inaccurate data about their product. Producers also stated that they saw significant benefit in having controlled, standard mechanisms to share relevant data with other supply chain organisations so that they could prove and be recognised for the great work that they do.

Overall, all stakeholders' interviews reported potential benefits to their operations from access to a secure, permissioned data exchange system.

## 4.5 Solution Design

The solution proposed by Rezare is presented in Figure 12. The pipeline through the centre represents the data exchange technologies. In the Rezare solution, their product Pure Farming is an example of a permissioned data exchange. The connections into the data exchange are the providers and/or the consumers of the data. Rezare's tool AgAssure is an example of a compliance tool that captures both structured and unstructured data that may then be re-used by multiple schemes. AgAssure is a real software tool that is used internationally. It is also a proxy for other apps that could be plugged into the data exchange.

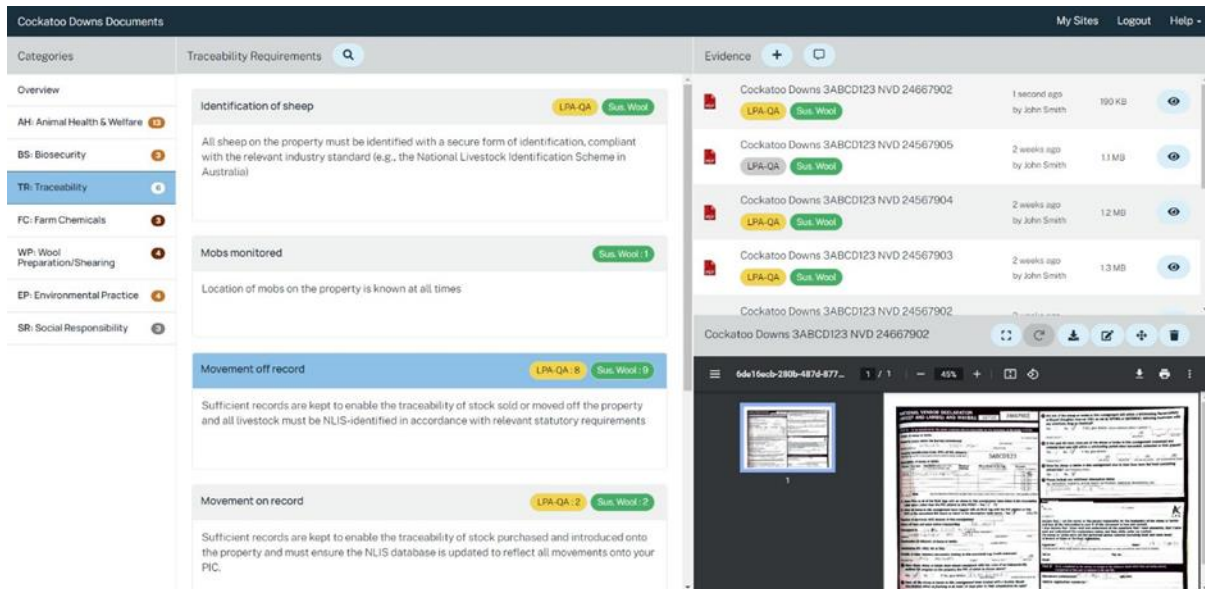


**Figure 12 Generalised architecture of data exchange solution**

Examples of the other providers and consumers in Figure 12 could include: Farm management software (such as AgriWebb, AgLive, Mobble, MaiaGrazing, Sapien Technology, Phoenix, HerdBoss, Practical Systems, iPaddock, and AgWorld), industry systems (MyMLA and eNVD), assurance programmes (such as LPA or SustainaWOOL), and supply chain partners (processors, retailers, and brand owners).

### 4.5.1 Re-use of evidence

AgAssure is an example of a compliance tool that supports the re-use of evidence that farmers need to show auditors or inspectors. It is a farmer and auditor platform that supports digital and hybrid audits. AgAssure is configured so that evidence is tagged for specific compliance schemes and markets. While evidence can be re-used, separate schemes still retain their own integrity.



**Figure 13** Example of a full page from AgAssure

Figure 13 shows an example of the farmer's view of a full page from AgAssure. The requirements of the schemes that have been configured have been grouped into categories in the left-hand panel (expanded in Figure 14). The middle panel (see also Figure 14) lists the requirements in the selected category, in this case Traceability. Each requirement has a title and a description, and they have been tagged by the schemes they apply to. In the example the yellow tags are for LPA QA and the green tags for SustainaWOOL. Equally there could be tags for markets. If the farmer sells wool through Elders and meat to a supermarket, the farmer could tag requirements for them.

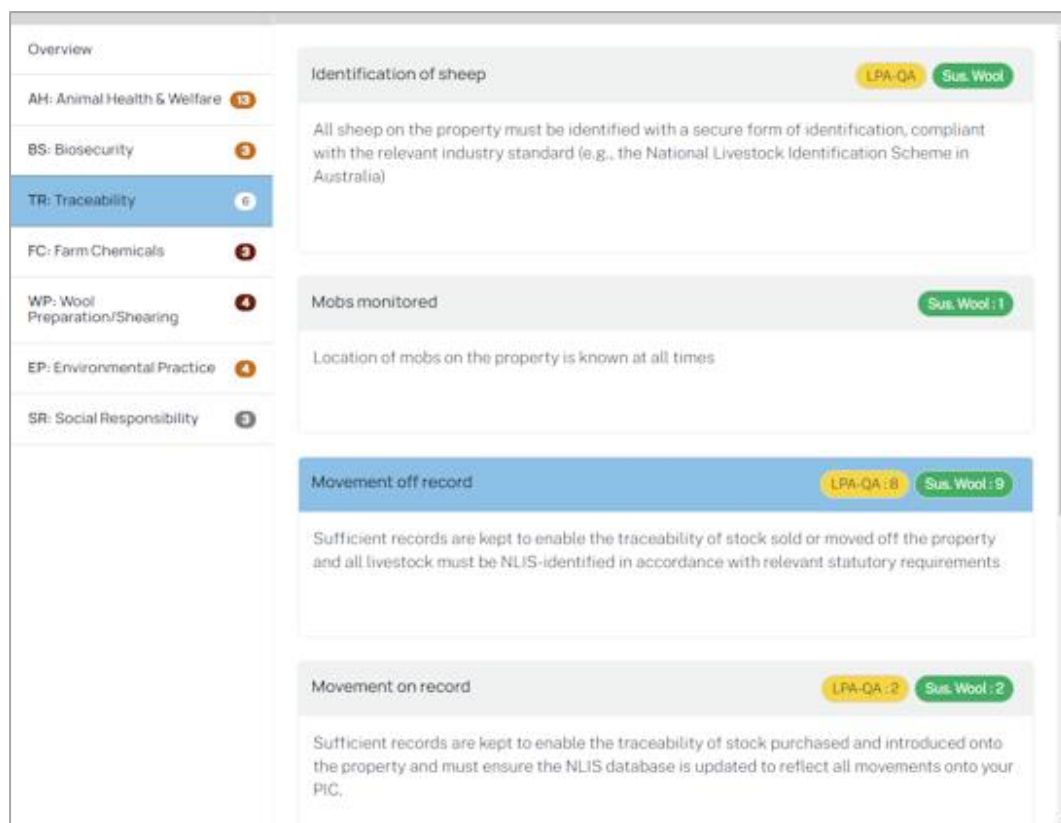


Figure 14 The left-hand and middle panels of AgAssure

The *Movement off record* requirement has been selected, so the top right-hand panel shows the documents that have been uploaded to this requirement (expanded in Figure 15). Note that for the second document listed, the farmer has chosen to make it unavailable to the LPA QA scheme for some reason. The tag is shown as grey. This demonstrates how the farmer has fine-grained control over who can view any document.

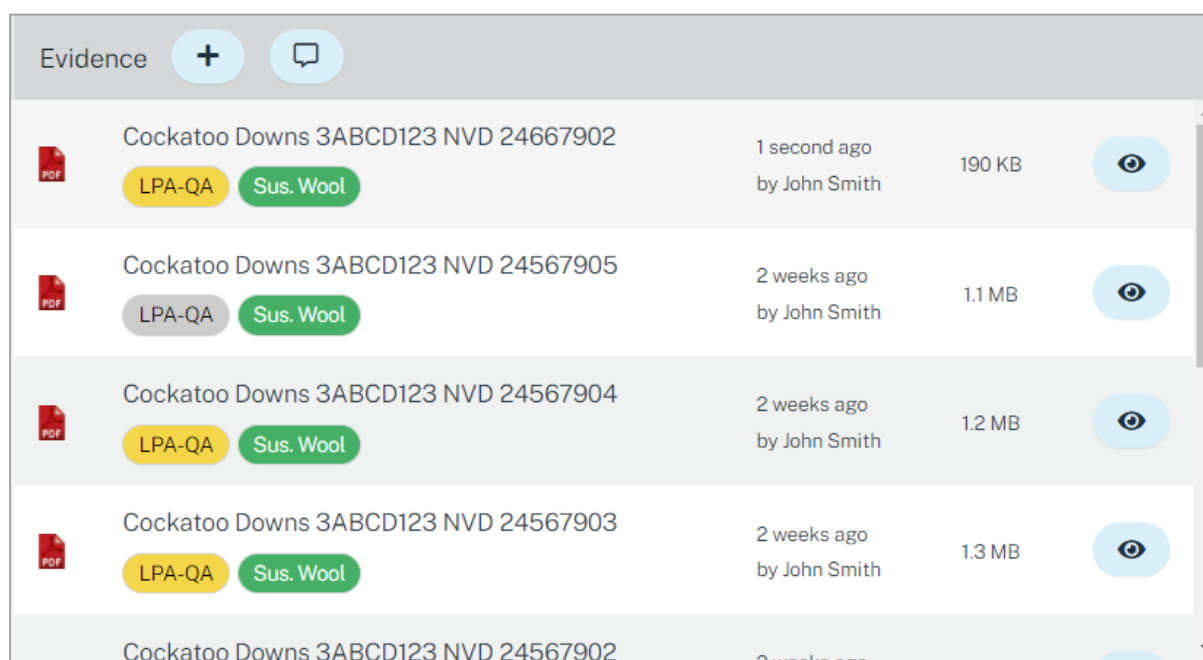
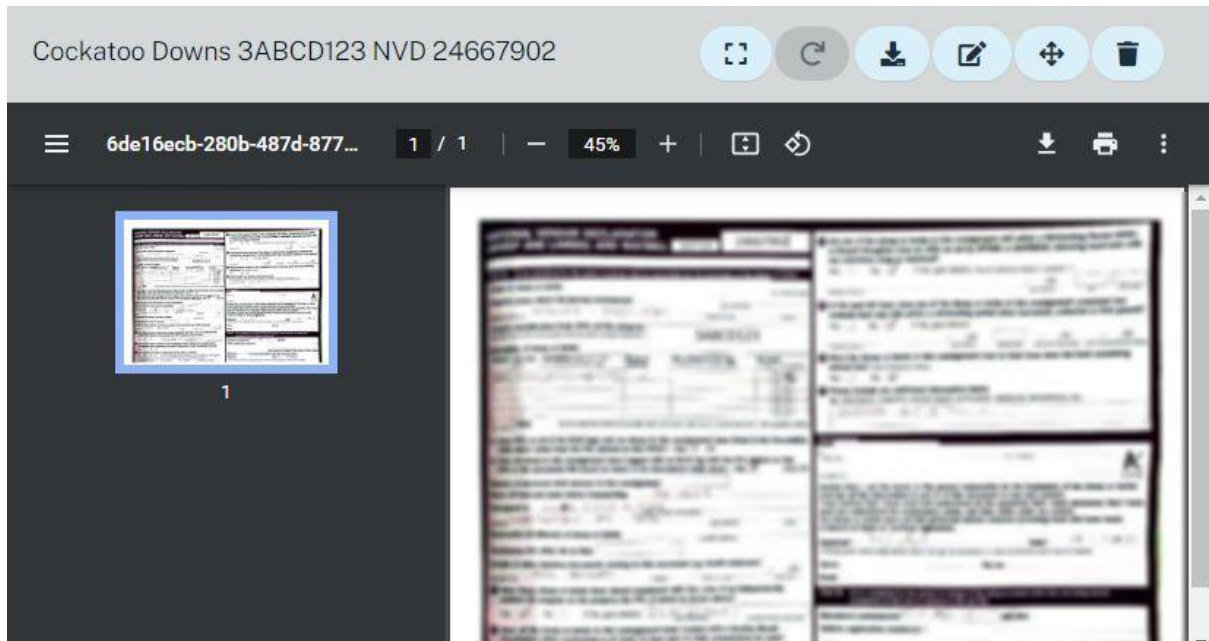


Figure 15 The upper-right panel of AgAssure

The top document has been selected and the document, a hand-written NVD, is shown in the lower right-hand panel (see Figure 16). The NVD has been obfuscated for privacy reasons.



**Figure 16** The lower-right panel of AgAssure

The user can choose to view the document in *Full screen*.

Note that although the screenshots from AgAssure above are from a desktop, AgAssure is responsive and can also be run from a mobile. Figure 17 shows the same information as in Figure 13, two pages from the mobile view: the traceability requirements and the evidence for the *Movement off record* requirement.



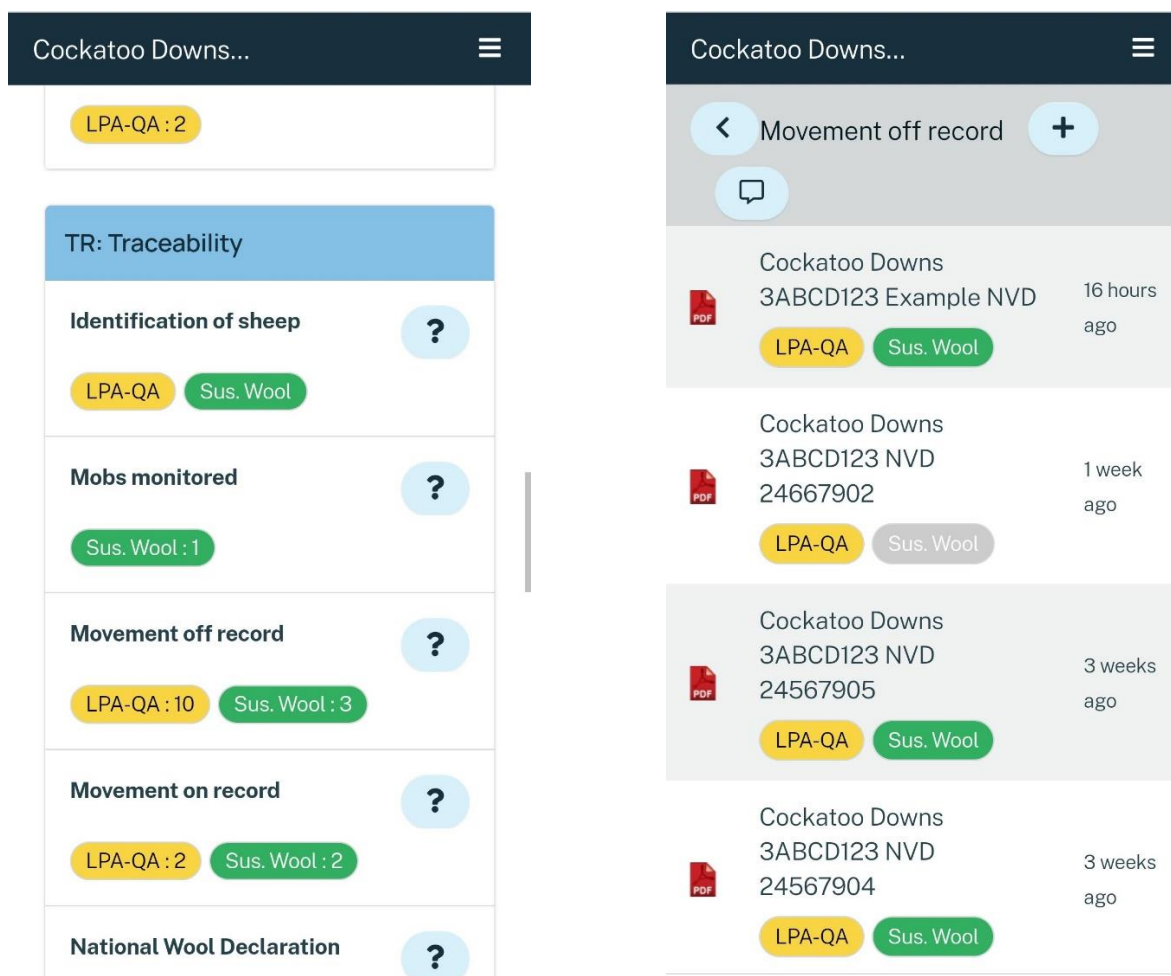


Figure 17 AgAssure mobile pages

#### 4.5.2 Capture of evidence

Farmers can capture a wide variety of compliance evidence including structured data such as Excel workbooks and unstructured data such as photographs and PDFs. Figure 18 shows a photograph captured in AgAssure as evidence of wool bale branding.

Figure 18 A photograph captured in AgAssure

### 4.5.3 Auditor access to evidence

The auditing team can have access to the evidence that the farmer has provided to them through AgAssure. The scheme administrator can assign (or unassign) an auditor to a farm (see Figure 19). Only the assigned auditor can view the evidence uploaded for the scheme for a farm.

Name	Reference	Memberships	Currently Assigned To	Assign	Unassign
Cannonvalue Mulataga	4ABCD123	Sus. Wool	Unassigned	Assign	Unassign
Cockatoo Downs	3ABCD123	Sus. Wool	Harry Potter	Reassign	Unassign
Creek Franklin	6ABCD123	Sus. Wool	Harry Potter	Reassign	Unassign
Eldorado	NJ250614	Sus. Wool	Unassigned	Assign	Unassign

Figure 19 Assign assessors to farms

The view of the evidence in AgAssure as seen by the auditor (Figure 20) is essentially the same as the farmer's view except the auditor can only see the evidence that is tagged for their specific scheme.

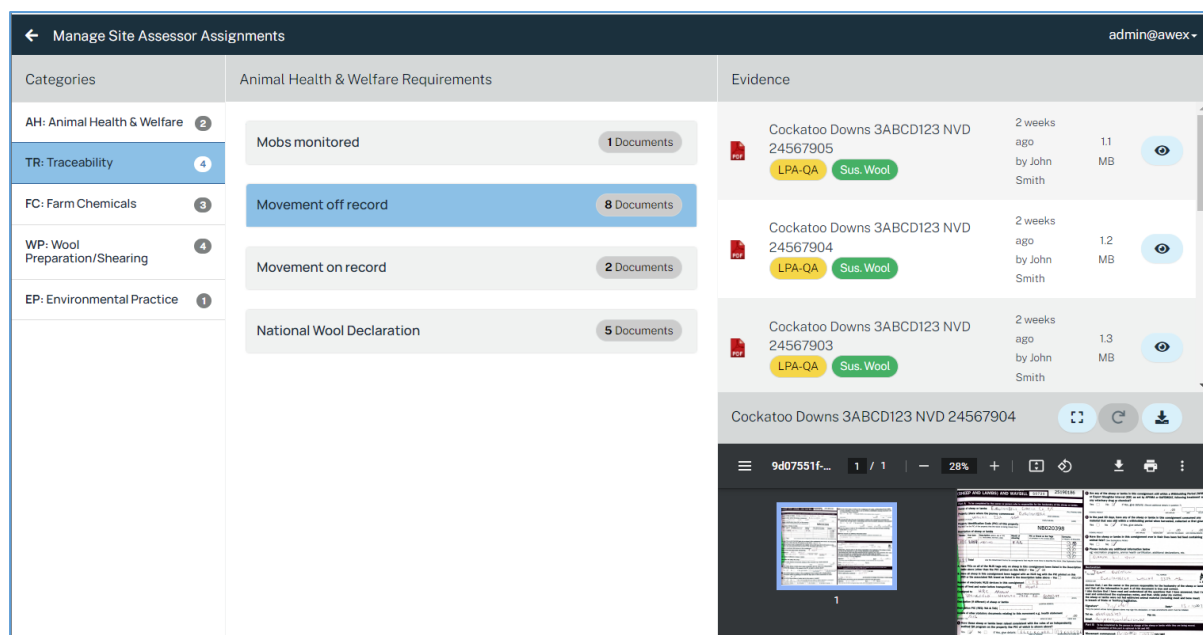


Figure 20 Auditor's view of evidence in AgAssure

#### 4.5.4 Permissioned data connections

Rezare uses Pure Farming to connect data and deliver it to AgAssure. Figure 21 shows the potential sources of data that may be ingested through Pure Farming and the steps applied to deliver the data to a consumer. Technically Pure Farming is known as an Integration Platform as a Service (iPaaS).



Figure 21 Pure Farming functionality

The steps identified in this section describe the features and functionality of Pure Farming and the interaction with AgAssure.

From within AgAssure the farmer can choose to automatically pull data relating to his/her farm from a 3<sup>rd</sup> party data source to populate his records in AgAssure (see Figure 22). Connecting data from other systems enables data to be pulled through automatically rather than manually downloading and uploading the associated evidence.

Cockatoo Downs Documents

My Sites Logout Help ▾

**Overview**

- AH: Animal Health & Welfare 13
- BS: Biosecurity 3
- TR: Traceability 6
- FC: Farm Chemicals 3
- WP: Wool Preparation/Shearing 4
- EP: Environmental

**Completion Summary** [Connected Data](#) [Printable Checklist](#)

The table below summarises how many requirements in each category contain at least 1 document, broken down by the associated memberships. It is not possible to confirm that ALL required documents have been uploaded.

Please note that although we recommend uploading relevant documents for all requirements and memberships, you do not have to do this. However, you must be able to show evidence at the time of the audit as required by the standards.

Category	Requirements with documents
AH: Animal Health & Welfare	LPA-QA : 4 of 6 Sus. Wool : 2 of 9

Figure 22 Connect a data source from within AgAssure

The user's web browser redirects to Pure Farming and the user can see some data sources that will provide relevant data (Figure 23).

PURE FARMING

**REQUESTS**

- Pending requests 2
- Past requests

**My Settings**

- My Settings
- Account Settings
- Agreements
- Log out

**Connect Data**

AgAssure  
Permission your data for assurance  
John Smith  
22/03/2022

0/6 data types connected [More information](#)

**Let's connect some data sources.**  
Connect required data types by selecting from the data sources below.

**my mla My MLA**  
Data type coverage: ●●●●●○  
Provides Livestock numbers, tags and details, and movement records with sources and destinations.

**AgriWebb AgriWebb**  
Data type coverage: ●●●●●○  
Provides livestock numbers, treatments, paddock activities and agrochemical records.

**Connect a different data source**

[I've finished connecting data sources](#)

Figure 23 Selecting data sources to be connected

The top panel shows the number of data types that have been connected. In this example the next panel shows that MyMLA could provide 3 data types, namely livestock numbers, tags and details and movement records with sources and destinations. AgriWebb also could provide 3 data types - livestock numbers, paddock activities and agrochemical records. Note that the data from these sources was limited in this demonstration to data provided in the data room and does not represent the actual capabilities of the software products.

The farmer could choose to connect one or both data sources. If MyMLA was chosen, the farmer would have to provide their credentials for that system.

**Figure 24 The farmer must login to My MLA and will see the records that would be accessed**

Figure 24 shows the login to My MLA and the records that Pure Farming would like to access. This connects the My MLA data source with AgAssure. A similar process would be followed to connect other data sources. At the end of the configuration process the user is redirected back to AgAssure.


The farmer has complete control of their data. Through the secure process outlined above, they determine which sources they wish to connect to the platform, and they can withdraw their permission at any time. Data can be stored in the platform as is the case with AgAssure or in other cases it is simply brokered through the platform.

Applications connect to the data exchange through APIs or other data feeds. Once the connection has been configured, data can flow between the applications as it becomes available.

Note that many of the datasets listed in section 4.2 as “Exported ....” may be good candidates to be connected through the data exchange for automatic updating.

#### 4.5.5 Leverage of data

The compliance tools may leverage the data to provide analysis and richer compliance than could otherwise be achieved from the raw data. For instance, rather than simply presenting a list of the data, AgAssure can draw the attention of the farmer and the auditor to issues and anomalies in the data. In Figure 25 the amber cells highlight that some required data are missing (batch numbers, expiry dates and dose rate). The red cell indicates a treatment where the product was applied after it had expired.



## Full Treatment Records – Cockatoo Downs

Treatment Date	Livestock description & location	Tag no. or Mob / Herd	Number of Livestock	Product Trade Name	Batch Number	Product Expiration Date	Dose, Dipping jetting Rate	Treated by	Withholding Period	Export Slaughter Interval	Adverse Reactions	Broken Needle Still in Animal
31 Mar 21	Sheep	Purple tag lambs	2807	Rametin	V17463/1	02 Jun 23	13.0 ml/head	Terry Jones	07 Apr 21	31 Mar 21	No	No
31 Mar 21	Sheep	Purple tag lambs	2807	Glanvac 6s			1.0 ml/head	Terry Jones	31 Mar 21	31 Mar 21	No	No
31 Mar 21	Sheep	Purple tag lambs	2807	Coopers Nilzan LV Oral Drench	V17676/1	02 Oct 23	5.0 ml/head	Terry Jones	14 Apr 21	14 Apr 21	No	No
31 Mar 21	Sheep	Purple tag lambs	2424	Glanvac 6s			1.0 ml/head	Terry Jones	31 Mar 21	31 Mar 21	No	No
31 Mar 21	Sheep	Purple tag lambs	2424	Coopers Nilzan LV Oral Drench	V17676/1	02 Oct 23	5.0 ml/head	Terry Jones	14 Apr 21	14 Apr 21	No	No
30 Sep 20	Sheep	Green tag ewes	289	Triguard Triple Combination Drench For Sheep	B48722A	22 Apr 20		Terry Jones	14 Oct 20	28 Oct 20	No	No

Figure 25 Issues in a livestock treatment list highlighted

A product usage summary (Figure 26) that also includes a chart of monthly number of treatments by stock class could also be generated from the same data. This could readily identify any anomalies to the auditor.

Product Usage Summary – Cockatoo Downs				
Product Name	Total Used on Farm	Total Used - Sheep Enterprise	Total Animal Treatments - Sheep Enterprise	Average Dose Administered - Sheep Enterprise
Avenge	877.2 litres	877.2 litres	12,514	70 ml/head
Avenge GA	226.4 litres	226.4 litres	3,774	60 ml/head
Avomec Dual Broad Spectrum Drench For Sheep With Barbers Pole Long Action	206.8 litres	206.8 litres	29,632	7 ml/head
Buccalgesic	1.5 litres	1.5 litres	1,475	1 ml/head
Coopers Blowfly And Lice Jetting Fluid	16.0 litres	16.0 litres	4,446	4 ml/head

Figure 26 A product usage summary generated from the treatment records

Figure 27, which is sourced from AgAssure in the United Kingdom, shows yet another way in which data can be leveraged to provide more insights for the farmer and the auditor. This compares antibiotic usage on the farm benchmarked against the farmer's peers (who would have also permissioned their data to be used in this way).

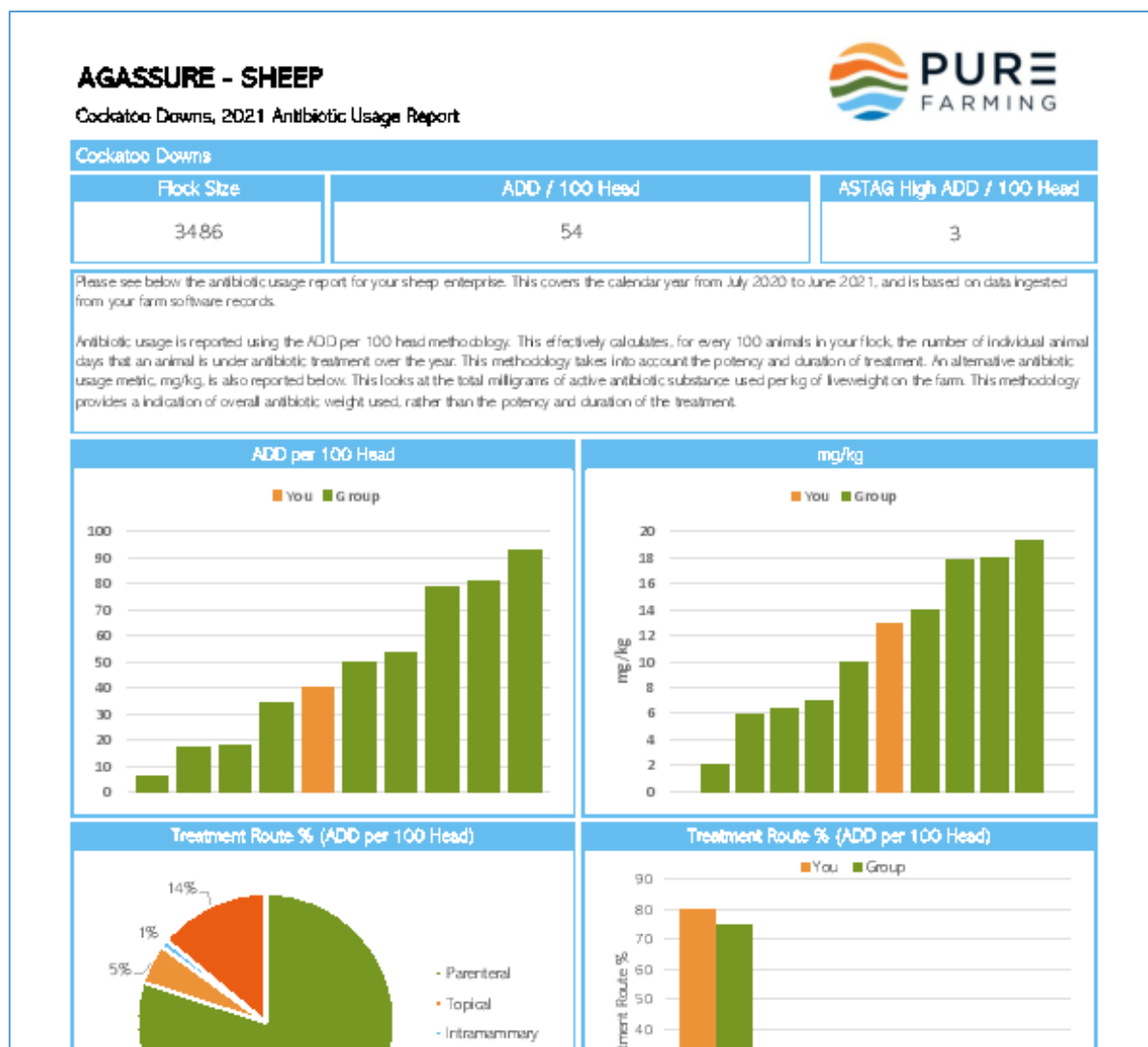


Figure 27 Antibiotic usage report

## 5. Conclusion

The project work carried out by Rezare Systems, subcontractor More than Machines, and with the oversight of the experiment steering group demonstrated that there is significant demand from producers, processor assurance schemes, and other supply chain participants for solutions that streamline the compliance and auditing process.

There has been a perception that substantial data is collected by producers that should be reused across multiple compliance programmes. The data room analysis reinforced that there is indeed potential for reuse of data, but that evidence to support compliance activities is much broader than the data points typically collected through forms or even farm software. Compliance evidence can include photographs, videos, scans, and data elements from a variety of sources.

Interviews and analysis identified key benefits to producers and the industry from use of digital and data exchange technologies to support compliance activities, including:

- Time, cost, and organisational savings from collecting compliance evidence once and being able to reuse this for multiple compliance processes.
- Reduced marginal cost to participate in additional assurance programmes that have the potential to increase product returns.
- Greater trust between producers, compliance bodies, and supply chain partners by empowering producers with control over data about their enterprises.
- Significant efficiencies in preparation, scheduling, and operation of inspections and audits by using a framework that allows audit bodies and auditors advanced access to evidence, enabling risk-based prioritisation, greater focus on valuable areas, and cost savings in time and travel.
- More sophisticated analysis of on-farm data to support insights for producers and compliance organisations.
- Ability for producers to grant permission for data originally collected for compliance to be reused by their supply chain customers or partners in product differentiation and market positioning.

Rezare Systems also demonstrated that data exchange technologies such as those envisaged for the Australian Agrifood Data Exchange are near to market. The Pure Farming Integration Platform as a Service (IPaaS) provides a framework for:

- Ingestion of data from multiple sources
- Standardisation and translation of data to align with industry-standard data schemas
- Producer control of data, incorporating federated identity, requests, grants, and revocation of access to data
- Delivery of data to applications through secure application programming interfaces (APIs).

## 5.1 Key findings

The project team demonstrated that it is possible to develop compliance tooling (such as the AgAssure white-label product that was demonstrated) on a data exchange (such as the Pure Farming IPaaS), that could address the needs of the Australian Wool and Red Meat industries, as defined in the Data Exchange Experiment problem statement.

Through the methodology of co-design, stakeholder interviews, review of the supplied project data, and subsequent solution development, the project team found that:

- There is general support from producers, auditors, processors, and retailers for the adoption of digital evidence (structured and unstructured) for compliance and certification.
- A successful data exchange solution for compliance and certification requires collaboration between schemes as well as between producers and schemes.
- There is frequent duplication of evidence required by the different schemes.
- Producer/program collaboration through a data exchange could save time and lower the cost of compliance through the re-use of digital compliance evidence between years and schemes while still retaining individual scheme integrity.



- It is possible for producers to leverage agritech across their business to incrementally capture a wide variety of compliance data digitally during day-to-day operational activities, reducing the overall burden of record keeping and potentially increasing data quality meaning more time in the paddock and less time in the office.
- On farm or industry data can support deeper analysis and validate provenance claims.
- Enriching on farm data with additional data sources such as animal carcass performance can provide additional compliance insights, allowing greater targeting of resources to improve overall compliance.
- Permissioned access to evidence data could optimise inspections making them less disruptive and more valuable to producers and auditors.
- A data exchange platform could allow producers to retain control of their data and give permission for specific uses through a familiar user experience increasing trust and collaboration.
- The implementation of a data exchange could increase overall data quality meaning that mistakes are reduced, and producers get the best price for their products.
- A data exchange would require the development of data specifications and governance that could lower integration risk and increase security.
- A data exchange is just one part of creating efficient, effective compliance and certification schemes and is not a silver bullet.
- Building producer trust in the governance, security, use and value of a data exchange is a long-term endeavour and will not be achieved without consideration to long term adoption and change management.

## 5.2 Benefits to industry

Potential benefits to industry were identified and quantified using a benefit framework (section 4.4) that demonstrated the potential for digital compliance tools and a permissioned data exchange to:

- Reduce the cost of compliance and administration costs when compared to the current state
- Significantly optimise the process and costs of on-farm audits, with potential to improve their efficacy and outcomes
- Increase both data quality and the variety of data that can be used as evidence
- Improve the identification of non-compliance
- Improve data governance and transparency about the use of producer data, and support improved data management practices across the sector
- Deliver additional opportunities for producers to maintain or increase revenue and profitability

To achieve these benefits, some collaboration or alignment of the requirements for compliance schemes will be necessary, and producers will need to be supported to adopt the new technologies. Evidence from overseas programmes indicates that producer uptake can be considerable if benefits can be clearly seen, and appropriate support is available.

## 6. Future research and recommendations

The analysis carried out during this research demonstrated potential benefits that could be achieved by using data exchange technologies to support sheep compliance. Similar benefits are likely to accrue in compliance programmes for other parts of the Australian agricultural sector.

For example, similar compliance activities are carried out for a variety of other livestock, arable, tree and vine crop systems. In many sectors, industry-level producer compliance programmes operate alongside specific compliance and audit programmes for customers, brand owners, or markets, and in some cases environmental stewardship or carbon programmes are also likely to apply. All of these programmes would be candidates for similar processes and technologies to those demonstrated for sheep.

The following recommendations should be considered for future work:

- Compliance and audit bodies should collaborate to **align common requirements** that appear in more than one programme, so that it is easier for producers to re-use evidence that demonstrates compliance with those requirements. Programmes can still retain their own audit integrity and differentiation above the common requirements.
- Effective operation of a data exchange, and integration with a range of applications, data sources and data consumers, relies on the development of consistent **common data specifications** and **shared governance expectations**. These components lower integration cost and risk. The work of developing data specifications should be prioritised and should leverage existing international data specifications where appropriate.
- A data exchange is just one part of creating efficient, effective compliance and certification schemes and is not a silver bullet. Building producer trust in the governance, security, use and value of a data exchange is a long-term endeavour and will not be achieved without consideration to long term **adoption and change management**.

Some of the potential benefits identified during interviews with producers and other stakeholders (and reinforced by feedback from the demonstration) accrue from adoption of digital tools, rather than specifically from data exchange technologies. In addition to future R&D and investment in the Australian Agrifood Data Exchange, organisations involved in the sheep meat and wool supply chains should consider further design and proof-of-concept studies into the digitisation of data collection and visualisation using modern technologies. Such work could leverage a data exchange but could also provide quality data in a form that could be permissioned through a data exchange in future.

## 7. Appendix – Business Benefits Matrix

#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
1	Reduction in cost of compliance to producers	Pre-populate data in the submission process.	The amount of time taken to supply data pre/post implementation	Reduced overhead of providing data into compliance programs could reduce preparation time from 3 to 4 days to 30 minutes for some producers. (Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.)	<p>The benefit could be scaled to include commercial (industry) compliance programs.</p> <p>Reducing the time taken to supply compliance evidence is relevant to all other agricultural sectors where evidence is required to maintain compliance with industry programs. These include but are not limited to Fish, Grains, Horticulture, Viticulture etc.</p> <p>Scaling may not return immediate cost savings to producers. An equivalent program in the UK experienced an increase in the initial cost of compliance to producers while they transitioned to a digital solution. (UK Red Tractor Program)</p> <p>Connectivity in regions is still a challenge for automated evidence collection which could impact scaling. (NBN <a href="https://nff.org.au/wp-content/uploads/2021/11/20463_NBN_AG-Thought-Leadership-Paper_V9_Digital94.pdf">https://nff.org.au/wp-content/uploads/2021/11/20463_NBN_AG-Thought-Leadership-Paper_V9_Digital94.pdf</a> Connecting Australian Agriculture, NBNCO 2021, <a href="https://www.awe.gov.au/sites/default/files/sitecollectiondocuments/abares/ict-use-australian-agriculture.pdf">https://www.awe.gov.au/sites/default/files/sitecollectiondocuments/abares/ict-use-australian-agriculture.pdf</a>, Information and communication technology use in Australian agriculture, ABARES, 2018)</p> <p>The Business cases for agtech adoption are still developing and broad industry capability is low, scaling the benefit would require investment in industry digital capability. (Agricultural workforce digital capability framework: CRDC, 2019, <a href="https://www.crdc.com.au/sites/default/files/Agricultural%20workforce%20digital%20capability%20framework_Report_Final%20deliverable.pdf">https://www.crdc.com.au/sites/default/files/Agricultural%20workforce%20digital%20capability%20framework_Report_Final%20deliverable.pdf</a>)</p> <p>Program liability may prevent auditors from utilising data pre-populated through other program activities limiting the ability to scale and realise benefits. (Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.)</p>	<p>Red Tractor UK Program</p> <p>Agricultural workforce digital capability framework: CRDC, 2019, <a href="https://www.crdc.com.au/sites/default/files/Agricultural%20workforce%20digital%20capability%20framework_Report_Final%20deliverable.pdf">https://www.crdc.com.au/sites/default/files/Agricultural%20workforce%20digital%20capability%20framework_Report_Final%20deliverable.pdf</a></p> <p>Digitally-enabled technologies and business models have a significant positive impact on industry productivity, which is particularly significant for Australia given the widening competitiveness gap to other developed economies over the past decade, driven largely by declining productivity (McKinsey, 2017).</p> <p>Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.</p>

#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
		Implement time of entry error-checking in the submission pipeline.	Reduction in the number of data errors pre/post implementation.	Time required for remediation by producers, auditors and administrators will be reduced over the current status quo.  Increase in the quality of evidence collected over the current status quo.	To develop methods to improve data collection practices, it is necessary to first identify barriers to consistent data collection. This will increase in complexity as the data exchange expands across all supply chain nodes.	
		Utilise Optical Character Recognition (OCR) technology to capture scanned/photographed content of paper-based forms.	Volume of unstructured scanned/handwritten data converted into structured data as evidence pre/post implementation	Enabling producers to submit evidence as photographs (unstructured data) taken from mobile devices may reduce the time taken to submit compliance information and increase the volume of evidence collected.	Costs associated with developing high quality OCR/Image recognition may be prohibitive to scale across all the supply chain compliance programs. Core data and cloud provider solutions may be targeted to mitigate this (however the generic nature of cloud offers may not provide the required accuracy). (Best OCR by Text Extraction Accuracy in 2022, AIMultiple, <a href="https://research.aimultiple.com/ocr-accuracy/">https://research.aimultiple.com/ocr-accuracy/</a> )  Forms and Templates used for entry of evidence (such as NVD,NWD) may need to be redesigned to ensure effectiveness. This cost may be prohibitive.  The time to transition away from NVD, NWD books currently in use may be long.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Integration with farm management systems in use to promote data capture through day to day farm operations.	Number of producers utilising farm management software to capture data during day-to-day farm operations pre/post implementation	Utilising farm management software to collect compliance evidence can reduce the number of errors in compliance evidence by collecting data at time of creation. By collecting data at time of creation and storing it in evidence is	Very few growers use farm management software like AgriWebb. (Agriwebb Website, <a href="http://www.agriwebb.com">http://www.agriwebb.com</a> 11,500 producers served globally. Agriwebb State Of the Farmer Survey, Agriwebb 2022 <a href="https://fs.hubspotusercontent00.net/hubfs/20515857/Content%20Offers/AgriWebb%20State%20of%20the%20Global%20Farmer%20Report.pdf">https://fs.hubspotusercontent00.net/hubfs/20515857/Content%20Offers/AgriWebb%20State%20of%20the%20Global%20Farmer%20Report.pdf</a> - 440 respondents in Australian/Oceania region, AUSTRADE Agriwebb Case Study, 2020, <a href="https://www.austrade.gov.au/ArticleDocuments/2833/Agriwebb-Australian-agtech-empowering-global-farmers.pdf.aspx">https://www.austrade.gov.au/ArticleDocuments/2833/Agriwebb-Australian-agtech-empowering-global-farmers.pdf.aspx</a> - "Today, AgriWebb software aids in the management of over 10 million animals across 4,000 farms worldwide.")  Adoption could be scaled by incentivising FMS providers to provide free tiers to their software. FMS adoption is increasing across sectors  Availability of the data exchange may encourage FMS developers to enter new sectors. Providing additional industry value and	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.  Agriwebb State Of the Farmer Survey, Agriwebb 2022 <a href="https://fs.hubspotusercontent00.net/hubfs/20515857/Content%20Offers/AgriWebb%20State%20of%20the%20Global%20Farmer%20Report.pdf">https://fs.hubspotusercontent00.net/hubfs/20515857/Content%20Offers/AgriWebb%20State%20of%20the%20Global%20Farmer%20Report.pdf</a>  AUSTRADE Agriwebb Case Study, 2020, <a href="https://www.austrade.gov.au/ArticleDocuments/2833/Agriwebb-Australian-agtech-empowering-global-farmers.pdf.aspx">https://www.austrade.gov.au/ArticleDocuments/2833/Agriwebb-Australian-agtech-empowering-global-farmers.pdf.aspx</a>

#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
					scaling the Agritech sector.  Small owner operators don't see the value in the ongoing FMS licence fees, large Commercial organisations that need to aggregate data are adopting FMS technology.  Concerns about business continuity if data is stored digitally.	
	Collect data from devices and sensors as part of day-to-day farm operations to improve data quality and volume of captured evidence.	Volume of data collected using calibrated sensors pre/post implementation	Collecting evidence digitally via on farm devices and sensors could reduce the time taken to comply by enabling producers to collect evidence during day-to-day farm operations.	Evidence captured via on-farm devices and sensors could be scaled to other sectors. While the types of evidence collected would differ, the mechanisms required to capture, exchange, govern and control data access would be the same.  Remote sensing may negate the need for collection of on-farm data  This benefit could be scaled to enable real time remote audit of data streamed from on-farm operations.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.	
	Develop a core evidence set and per programme modules to reduce duplication of data required to be submitted across programs.	Core evidence data set identified and implemented. Reduction in data/evidence resubmission pre/post implementation.	Many sources of evidence are relevant between years and to multiple compliance programs, creating core (master) data sets may reduce the time to comply and quality of available compliance data against the status quo.	A data exchange mechanism that provided a common source of truth for core data would be valuable to other industries where more than one program is collecting the same evidence from producers. We heard during our interviews that this could be as simple as ensuring that all producer contact details were consistent across industry programs.  Ensuring that all programs utilise a single source of truth for common data would also enable resources to be focused to ensure the integrity and security of the data as well as ensuring all PII data was governed to appropriate standards.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.	
	Leverage third party data sets to enrich producer captured data reducing the number of data points required to be manually captured.	Volume of data supplied by third parties pre/post for example satellite imagery, climate data etc.	Enriching producer evidence with third party data sets through an exchange could improve the quality and volume of data available to producers and schemes to monitor and mitigate non-compliance.	Volume of data required may be cost prohibitive at scale.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.	

#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
2	Reduction in administration costs compared to status quo					
		Provide industry auditors with tablet devices to access and capture information on farm - reducing time pre, during and post audit. i.e. Re-keying notes post visit, reducing review time required pre audit and increasing data quality of captured evidence on-farm.	Reduction in time required to submit an audit report pre/post implementation. Increase in the quality of data pre/post implementation.	Providing auditors with digital devices to capture notes and evidence could reduce the amount of rekeying of evidence that is required post audit. This could reduce the time taken to provide feedback producers enabling non compliance to be mitigated more effectively. It could also reduce scheme costs and increase data quality by removing double handling of data. We heard from commercial scheme operators that they had implemented this via their audit partners and had seen productivity gains.	Capturing data directly via digital devices could be scaled across programs and industries.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		RPA (Robotic Process Automation) opportunities to automate business processes over status quo.	Number of administration processes automated (audit identification, producer communications, non-conformance alerts etc) pre/post exchange implementation.	Reduced burden on scheme operators, faster identification and mitigation of non-compliance.	Core RPA technologies leveraging permissioned evidence from a data exchange could be scaled across the supply chain and also across industries. Core learnings from the implementation of such systems could also provide significant value to other industries digital strategies.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Improved collaboration between programs over status quo.	Number of programs collaborating to optimise program administration pre/post implementation.	Reduction in duplication between programs, Improved identification of non compliance, Reduced costs of administration	Access to evidence could be scaled to all schemes based on producer permission	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.

#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
		Collaborative audits between programs.	Number of programs collaboratively undertaking on-farm audits to reduce the impact of participation on producers pre/post implementation.		Program liability may prevent auditors from utilising data provided through other program audit activities limiting the ability to scale and realise benefits. Much of the core data provided may scale across sectors, for example information regarding farm operations, health and safety, chemical storage etc would be applicable to other industries. Many producers are multi commodity (animals, grain etc) so the cross over is substantial.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Data sharing between programs.	Number of programs collaborating and exchanging data pre/post implementation.	Data sharing (of compliance data) could reduce non compliance compared to the status quo - no economic data could be found	This could be scaled into a national resource	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Use historic data to plan farm visit logistics.	Increase in the use of analytics in use to assess risk, logistics etc. to plan on-farm audits pre/post implementation.	Reduced non compliance compared to the status quo - no economic data could be found	This could be scaled to include other industries	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Desktop audits and benchmarking	Increase in the number of audits undertaken remotely with no impact to producers pre/post implementation.	Benchmarking could improve levels of non-compliance by providing producers additional performance insights. Scheme administrators will be able to benchmark across regions and states to better target resources to reduce non-compliance.	Benchmarking could be valuable to organisations across supply chains, regions, states and nationally. A data exchange could support the scaling of the required data and enable producers to control access to their data and to manage their participation.	Benchmarking Returned 2.5% on assets for MLA Business Edge Participants. <a href="https://www.mla.com.au/news-and-events/industry-news/archived/2017/the-value-of-benchmarking-your-livestock-business/">https://www.mla.com.au/news-and-events/industry-news/archived/2017/the-value-of-benchmarking-your-livestock-business/</a>  MSA Benchmarking - <a href="https://www.mla.com.au/news-and-events/industry-news/archived/2017/msa-benchmarking-improves-feedback-for-producers/">https://www.mla.com.au/news-and-events/industry-news/archived/2017/msa-benchmarking-improves-feedback-for-producers/</a>
		Identify farms to audit based on calculated risk scores and benchmarks taken from collected data.	Risk calculations in place and in use to identify farms for audit and compare farm/region performance.	Improved audit efficiency Reduced scheme administration costs	The technology could be scaled into other programs and industries. Could be scaled to provide a levy payer risk rating when aligned with other production data to allow MLA/AWI to better target resources.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.

#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
		Adherence to data exchange specifications	Number of source systems providing data in alignment with exchange requirements.	Fewer data silos, improved evidence quality, increased opportunities for reuse of evidence.	Specifications would need to be developed for each data type. Once defined they could be reused for different purposes enabling further use of the data exchange outside of the compliance and certification use cases.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Identification of common compliance challenges	Benchmarking and analytic in place to identify common compliance challenges experienced by producers. Challenge reporting in place. Number of initiatives underway to address common challenges experienced in providing evidence to prove compliance.	Scheme resources could be better targeted to address non-compliance, On-farm audits could be optimised to mitigate non-compliance within regions.	Benchmarking could be trialled by state and then scaled to region, shire. Considerations regarding personally identifiable information (Pii) would need to be made.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
3	Decrease in number of on-farm audits					
		Utilise exchange to enable remote audits reducing impact on farm operations and reducing costs to both producers and program administrators.	<p>Increase in the volume of remote audits enabled/conducted pre/post implementation.</p> <p>Change in the number of non-compliance notifications issued either increasing or minimising the status quo. As the quality of data and time available to</p>	Remote audit capability will reduce the number of on farm audits however remotely auditing evidence also provides the opportunity to make time spent on farm more useful to producers. For example auditors may take more time out of the farm office, helping producers to comply, focusing on unreported non-compliance, preempting potential future issues etc. And adding more value to the auditor/producer interactions.	Remote auditing is scaleable to other Red Meat supply chain compliance programs and remote inspections are already being trialed on Processor sites by AMPC.	<p><a href="https://www.youtube.com/watch?v=h7yl7xKlyA">https://www.youtube.com/watch?v=h7yl7xKlyA</a> - AMPC Remote Verification Project Webinar.</p> <p><a href="https://www.integritysystems.com.au/about/news-events/news/2021/option-for-remote-audits-now-available/">https://www.integritysystems.com.au/about/news-events/news/2021/option-for-remote-audits-now-available/</a></p>



#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
			auditors increases changes in the number of notifications will be observed.			
	Train/enable auditors to inspect evidence for multiple programs in a single on-farm visit, reducing the impact on farm operations and program administration costs.	Increase in the number of auditors trained to perform multiple on-farm audits pre/post implementation.	There are 79,000 organisations enrolled in LPA. There are 11,000 Sustainawool members, the majority of whom are also in LPA. The evidence required for Sustainawool is very similar to that required by LPA. Producers could use LPA evidence to also comply with Sustainawool. Removing the need for additional administration/audits (Audit cost per visit ~\$500 plus travel).  Correlation in compliance between LPA and SustainaWool. Share audit results. If had a successful audit in last 6 months, don't need the other audit (but this is AWEX view not AUS-MEAT view.)	Wine sector could adopt similar model for spray diary compliance (multiple wine producer audits etc). Other industry compliance programs follow similar models.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.	
	Utilise commercial compliance program data to identify issues in regions to target audit effort (commercial programs require more frequent on-farm audits).	Commercial compliance program data available to industry programs and used to identify compliance challenges in regions.	Could improve the quality and frequency of evidence available to schemes to monitor compliance.	The data exchange would enable this to be scaled across schemes with producer permission.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.	
	Implement real-time video streaming to enable multiple auditors to take part	Number of tele-audits conducted pre/post implementation.	Reduced audit and administration costs for scheme operators, reduced impact on farm operations	Could be scaled across state jurisdictions to enable auditors from different states to perform audits where travel was previously prohibitive. Could scale into processor audits, other supply chain nodes and other food safety initiatives.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.	

#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
		in a farm audit remotely.		for producers, ability to target auditor/scheme expertise by enabling auditors to join interviews from a broad range of geographies.		
4	Increase in data quality					
	Alignment to ISO 8000 data standards.	Volume of data stored aligning to ISO 8000 data standards pre/post. Reduction in remediation effort post implementation.	Reduced costs for scheme operators. Access to high quality compliance evidence data and increased evidence consistency/quality for auditors.	Aligning to ISO standards will enable data to be scaled		ISO 8000 <a href="https://www.iso.org/obp/ui/#iso:std:iso:8000:-61:en">https://www.iso.org/obp/ui/#iso:std:iso:8000:-61:en</a>
	Adherence to industry data exchange format.	Volume of data stored aligning to the exchange data format pre/post. Reduction in remediation effort post implementation.	Reduced costs for scheme operators. Improved access to high quality compliance evidence data for auditors.	Industry data exchange formats could be scaled to enable data movement between supply chain organisations, regions, states and internationally.		Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
	Comparison and updating of data across source systems.	Volume of data compared between source systems pre/post. Reduction in remediation effort post implementation.	Reduced costs for scheme operators. Access to high quality compliance evidence data.	With producer permission, schemes could scale to collate evidence from all producers who are prepared to provide permission to access their data.		Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
	Data updated real time from FMS as part of farm operations.	Volume of data received into the exchange system from Farm management source systems pre/post.	Reduced costs for scheme operators. Access to high quality compliance evidence data.	Aligning to data exchange formats could enable FMS organisations to integrate with a data exchange. A permissioned data exchange could enable producers to provide data to third parties through standard interfaces.  These interfaces could be scaled to control data across industries and develop an API Economy within Australian agricultural industries.		AIIA Growing Globally Competitive Industries, 2021 <a href="https://35hddx2cwawgt701l2sq0v5c-wpengine.netdna-ssl.com/wp-content/uploads/2021/08/AIIA-Growing-Globally-Competitive-Industries.pdf">https://35hddx2cwawgt701l2sq0v5c-wpengine.netdna-ssl.com/wp-content/uploads/2021/08/AIIA-Growing-Globally-Competitive-Industries.pdf</a>

#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
		Transition to individual animal management.	Number of animals under individual management pre/post implementation. Increase in the number of producers considering transition to individual animal management. Reduction in remediation effort post implementation.	High resolution compliance. Finely targeted non-compliance could reduce costs to producers. Auditors would have access to compliance evidence on a per animal basis. Non compliance could be addressed by scheme operators at the individual animal level. This could reduce the overall cost of compliance for producers as well as support market claims and consumer demand for animal health and welfare information allowing for price premiums.	Individual animal management is still developing within the red meat industry and outside of Victoria is not well adopted by Sheep producers. However individual animal management can be scaled across the animal industries and the data made available could gain value from an industry data exchange.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Creation of master data sets merged from exchanged data.	Number of master data sets available to compliance organisations pre/post implementation.	Master data sets could improve data quality and reduce costs for scheme operators. Master data sets could also reduce time to comply by producers reducing the overall cost of compliance.	Master data specifications could be adopted by commercial schemes to improve interoperability with industry systems, reducing audit burden, impact on farm and time to comply experienced by producers.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Utilisation of AI/ML to cleanse data and identify data anomalies.	Number of AI/ML technologies use to cleanse data in production pre/post implementation. Reduction in remediation effort post implementation.	Improved identification of non-compliance against the status quo.	While specific models to identify non-compliance would need to be developed for each use case, the mechanisms, specifications and protocols that provided by a data exchange could provide a standard interface against which industry AI/ML could be developed and scaled.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Gamification of data.	Reduction in remediation effort post implementation. Number of producers engaged in	Improved compliance. Reduced time taken to address non-compliance. Improved identification of non-compliance during audit.	Could be scaled at the supply chain for example into processors to increase meat processing efficiency. There is also potential to scale at regional, state and national levels to provide insights into levels of compliance and reduce non compliance.	Sean Starling, 2020 - <a href="https://www.linkedin.com/pulse/gamification-increase-meat-processing-efficiency-attract-starling/">https://www.linkedin.com/pulse/gamification-increase-meat-processing-efficiency-attract-starling/</a>  AMPC - Remote Training Webinar, 2020 <a href="https://www.ampc.com.au/news-">https://www.ampc.com.au/news-</a>

#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
			reviewing/cleansing data post implementation.			<a href="#">events/events/gamification-remote-operations-and-training</a>
5	<b>Increase in the variety of available data</b>					
	Capture of structured and unstructured evidence (photos, video, text, etc.) in addition to the status quo.	Volume/Quality of structured data captured pre/post	Increased volumes of evidence data could enable improved insights for scheme operators, support audit activities and allow resources to be better targeted to support producers and mitigate non-compliance.	Could be scaled by schemes to capture evidence that is not already captured digitally. For example, photographs of chemical labels, shed conditions, bale stamps etc.		Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
	Adoption of on farm technology (walk over weighers, cameras, scanning wands, mobile devices etc).	Volume and Quality of unstructured data (i.e images) captured and used as evidence pre/post implementation. Volume of sensor data used as evidence pre/post implementation. Time taken to source compliance evidence pre/post implementation.	Decreased time to comply, Reduced impact on farm operations	Data could be scaled across the supply chain, regions and states with producer permission to allow for benchmarking and other analytic activities.		Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
6	<b>Improvement in identification of non compliance</b>					
	Adoption of farm, regional and national analytics to identify non-compliance and enable pre-emptive support to producers.	Reduction in repeat non-compliance pre/post implementation.	Reduction in non-compliance	Specific models may not be scalable across industries however the mechanisms, standards and protocols provided by an industry data exchange could provide a valuable foundation for Machine Learning (ML) model development. The permission models implemented by an industry data exchange could provide standard interfaces to data required to train models.		Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.

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		Share non compliance between administrators/auditors	Reduction in repeat non-compliance pre/post implementation.	Reduction in non-compliance	A data exchange could be scaled to provide permissioned data to stakeholders from across industry supply chains and industry compliance organisations.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
7	Improvement in data governance compared to status quo					
		Adoption of exchange data governance model	Number of source systems adopting the exchange data governance requirements. Increase in industry trust for exchanging data with compliance organisations.	Increased trust and clarity from producers could improve scheme participation and reduce non-compliance.	Data exchange governance mechanisms could be scaled to enable data exchange across industries	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
8	Increased/mainained producer profits					
		Data exchange data control mechanisms enabling permissioned sharing of data enabling producers to participate in more programs.	Increase in the average number of enrolled programs pre/post implementation.	There are currently 26,000 wool growers in Australia. 11,000 are currently enrolled in the Sustainawool green program. Producers in Sustainawool attain 1.5-2.8 higher prices (2.8 for Green). This equates to ~\$68 more than equivalent non-mulesed wool not in the Sustainawool program. There is significant potential opportunity to increase participation.	Reduction in friction to provide evidence would scale to other programs in the Sheep/Cattle supply chain. For example making participation in processor brand market schemes more accessible.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Permissioned data exchange control mechanisms using standard permission and user identification	Increase in the average number of producers participating in supply chains - for example providing	Withholding periods etc. Reduction in discounting due to non compliance. Producers get paid the maximum price for the product that they produce	Could be scaled across industries to ensure price premiums are achieved by producers participating in schemes.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.

#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
		mechanisms (e.g. OAuth)	wool into premium fashion supply chains. Number of non-compliance notices sent to producer pre/post implementation.			
9	Improvement in data management compared to status quo					
		Move from paper to digital record keeping.	Volume of paper based record keeping pre/post implementation.	Reduced time to comply by producers	Digital record keeping could be scaled across red meat and wool supply chains	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Paper based records captured using OCR/Image Analytics.	Volume of evidence captured and processed using OCR technology pre/post implementation.	Reduced time to comply by producers	Digital record keeping could be scaled across red meat and wool supply chains	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
		Move to objective capture of evidence reducing subjective error rates.	Volume of evidence captured using sensors and other unstructured data sources pre/post implementation.	Reduced time to comply by producers	Digital record keeping could be scaled across red meat and wool supply chains	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
10	Improvement in data security compared to status quo					
		Alignment to ISO/IEC 27000 Information security management systems standards. (ISO, <a href="https://www.iso.org/standard/73906.html">https://www.iso.org/standard/73906.html</a> )	Data security audit risks reduced pre/post implementation. Increase in data owner trust pre/post. Reduction/mainten	Agriculture Businesses 6th most likely to have a cyber security incident. (Characteristics of an Australian Business, ABS, 2020, <a href="https://www.abs.gov.au/statistics/industry/technology-and-innovation/characteristics-australian-business/2019-20">https://www.abs.gov.au/statistics/industry/technology-and-innovation/characteristics-australian-business/2019-20</a> ).	Security best practices and governance developed for the data exchange could be scaled across supply chains and industries improving overall sector cyber security.	Characteristics of an Australian Business, ABS, 2020, <a href="https://www.abs.gov.au/statistics/industry/technology-and-innovation/characteristics-australian-business/2019-20">https://www.abs.gov.au/statistics/industry/technology-and-innovation/characteristics-australian-business/2019-20</a> .  Precision Agric 22, 1019–1044 (2021).

#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
			<p>ance of status quo (if none) in data breach notifications pre/post notifications.</p>	<p>and-  <a href="https://doi.org/10.1007/s11119-020-09760-0">innovation/characteristics-australian-business/2019-20</a>.  Common attacks are data breaches, ransomware, phishing, scam emails, and malware. In 2020, ransomware stopped Australian wool sales and, for Lion Dairy &amp; Drinks, milk deliveries. In May, a cyberattack on global meat processor, JBS, halted 47 JBS facilities across Australia. REvil, the Russian group behind the attack, has said they'll continue to target the agricultural sector and its supply chains.</p> <p>Producers are not aware of the impact of cyber security breaches - Ofori, M., El-Gayar, O. Drivers and challenges of precision agriculture: a social media perspective. Precision Agric 22, 1019–1044 (2021).  <a href="https://doi.org/10.1007/s11119-020-09760-0">https://doi.org/10.1007/s11119-020-09760-0</a></p> <p>Average cost of a cyber attack - \$276,323  <a href="https://www.infrastructure.gov.au/sites/default/files/Cost%20of%20cybercrime_INFOGRAPHIC_WEB_published_08102015.pdf">https://www.infrastructure.gov.au/sites/default/files/Cost%20of%20cybercrime_INFOGRAPHIC_WEB_published_08102015.pdf</a></p>		<p><a href="https://doi.org/10.1007/s11119-020-09760-0">https://doi.org/10.1007/s11119-020-09760-0</a></p> <p>Average cost of a cyber attack - \$276,323  <a href="https://www.infrastructure.gov.au/sites/default/files/Cost%20of%20cybercrime_INFOGRAPHIC_WEB_published_08102015.pdf">https://www.infrastructure.gov.au/sites/default/files/Cost%20of%20cybercrime_INFOGRAPHIC_WEB_published_08102015.pdf</a></p>

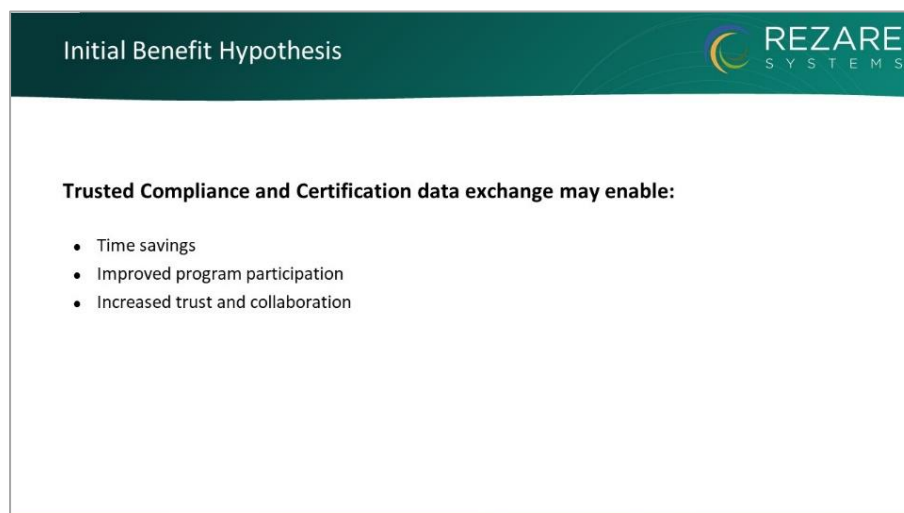
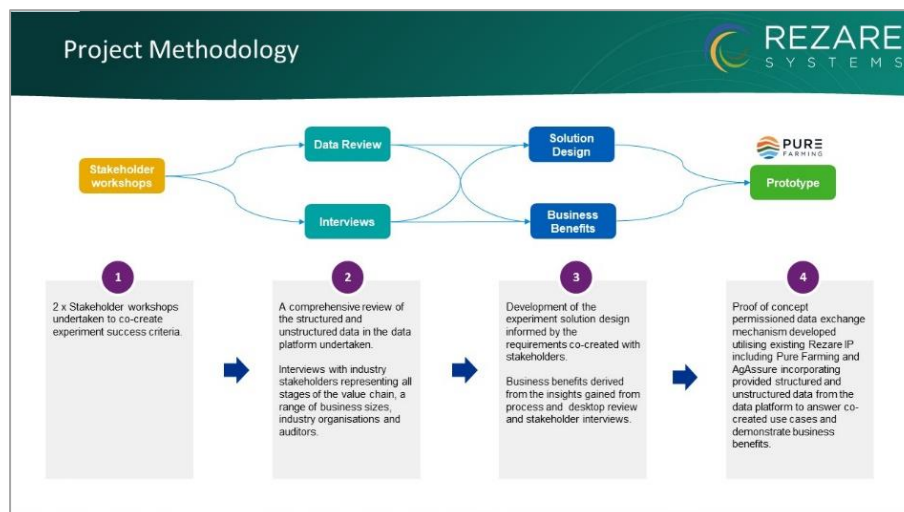
#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
11	Improvements to data interoperability compared to status quo					
		APIs with data specifications defined for provision of data to the exchange.	Number of systems integrated with the exchange. Continuous reduction in time to integrate with the exchange. Availability of high quality developer documentation and examples. Availability of specifications.	Development of an Agricultural API economy could enable producers provide permissioned access to their evidence to third parties enhancing the quality of digital services and developing an agricultural digital economy.	Data exchange specifications, governance etc could be scaled across industries.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.
12	Improvement in data insights compared to status quo					
	Utilise exchange data to undertake benchmarking.	Number of supply chain organisations leveraging value from benchmarking pre/post implementation.	See benchmarking above	See benchmarking above	See benchmarking above	See benchmarking above
	Utilise exchange data to provide dashboards and insights to producers to proactively improve their compliance.	Number of dashboards available and in use by producers pre/post implementation. Reported Dashboard Net Promoter Score for available dashboards.	See benchmarking above	See benchmarking above	See benchmarking above	See benchmarking above
13	Improvement in advanced					

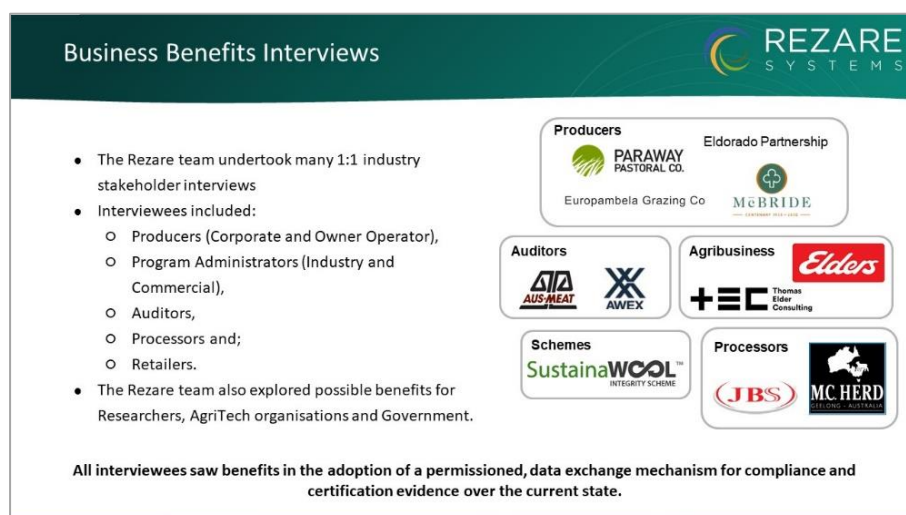
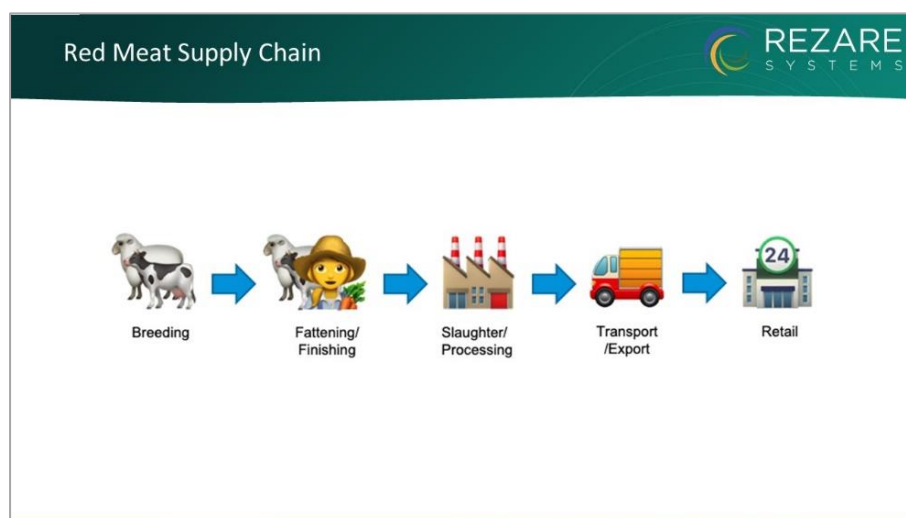
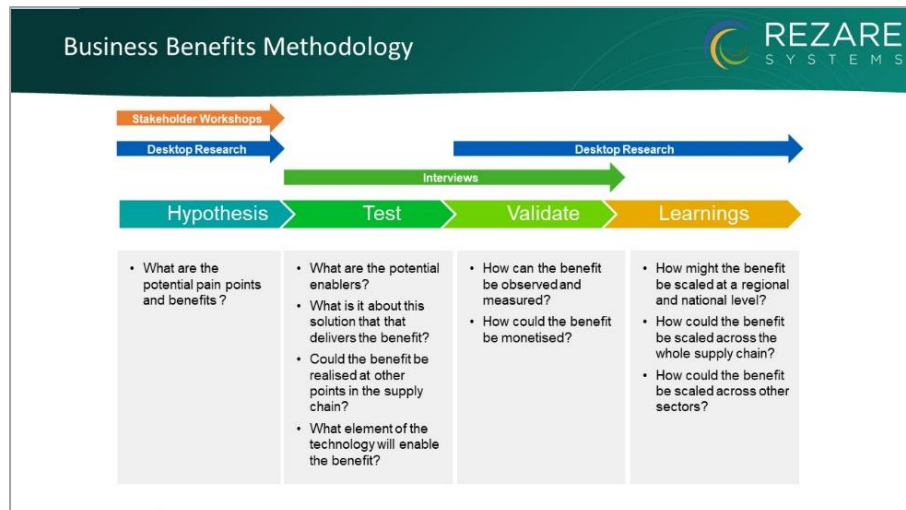


#	Hypothesis	Realisation Mechanism	Measurement	Productivity Impact	Scaling	Sources
	<b>analytic benefits compared to status quo</b>					
		Development and introduction of advanced Artificial Intelligence (AI)/Machine learning (ML) models to predict industry outcomes, identify risk and optimise auditing.	Number of AI/ML models in use to identify compliance challenges pre/post implementation.	Reduction in non-compliance	Ability to react quickly to farmer feedback is essential.	CSIRO Data 61, National AI Roadmap, Hajkowicz SA1+, Karimi S1, Wark T1, Chen C1, Evans M1, Rens N3, Dawson D1, Charlton A2, Brennan T2, Moffatt C2, Srikumar S2, Tong KJ2 (2019) Artificial intelligence: Solving problems, growing the economy and improving our quality of life. CSIRO Data61, Australia: <a href="https://data61.csiro.au/en/Our-Research/Our-Work/AI-Roadmap">https://data61.csiro.au/en/Our-Research/Our-Work/AI-Roadmap</a>
16	<b>Increased recognition of doing good work compared to status quo.</b>					
		Data provided to the data exchange to prove product provenance	Compliance data used to prove product provenance pre/post implementation.	Maintenance of market access	The data made available through the data exchange could be scaled to provide whole of life traceability for Sheep and Cattle.	Rezare Australian Agriculture Data Exchange - Compliance Experiment Interviews.

## 8. Appendix – Demo Day Slides

The following are the slides presented on Demo Day.





## Interview outcomes



### Following the interviews and desktop research we:

- Identified ~20 distinct benefits
- Identified realisation and measurement mechanisms for each
- Were in many cases, able to quantify the potential benefit of each by drawing on past industry research and input from our interview participants.

We will highlight a selection of the benefits throughout the solution demonstration.

## Solution Approach



### Our solution will demonstrate how:

- Compliance requirements can be aligned to support re-use of evidence  
While separate schemes still retain their own integrity
- Farmers can capture a wide variety of compliance “evidence” digitally.
- A data exchange or integration platform supports transfer of data between farmer tools and other systems
- Farmers can retain control of their data and permission it for specific uses
- Data can be leveraged to provide analysis and richer compliance than could otherwise be achieved

## Technology Architecture



## Components – Pure Farming

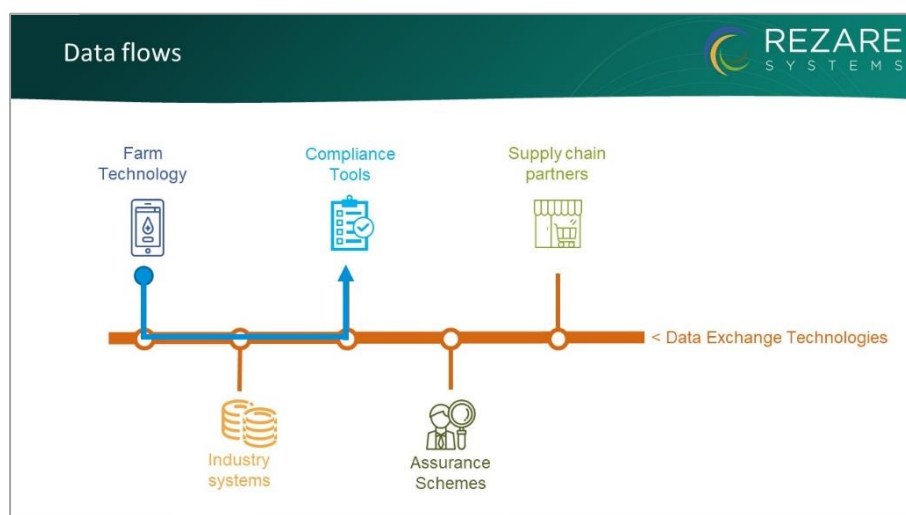
**PURE FARMING**

- Example data exchange technology
- Integration Platform as a Service (iPaaS)
- Producer control of data
  - Connecting data to the platform
  - Giving or withdrawing permission for use
- Applications connect through APIs or other data feeds
- Data can be stored in the platform (least privilege) or brokered through

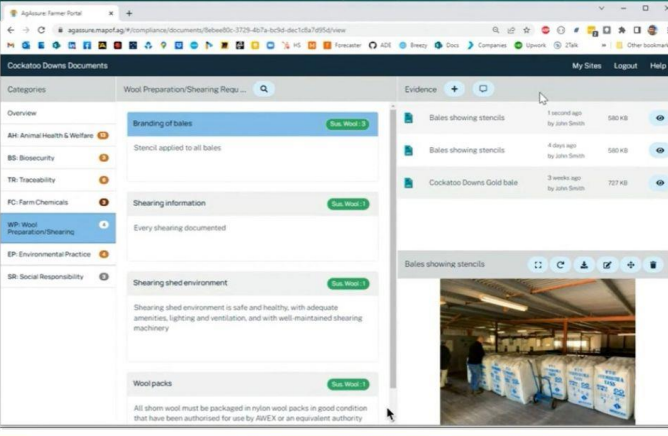
## Components – AgAssure evidence portal

**AgAssure**

- Farmer and auditor platform that supports digital and hybrid audits
- Alignment of requirements so evidence can be re-used
- Tagging evidence for specific compliance schemes and markets
- A variety of evidence: structured data, photos, PDFs

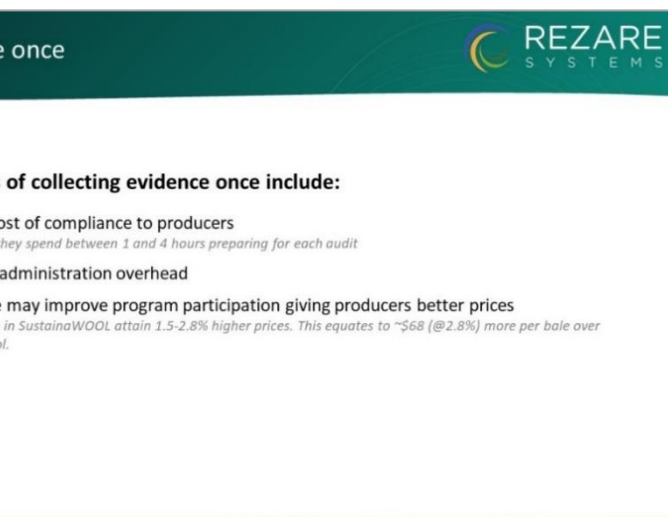


### Demo: Collect evidence once



- Load evidence once, reuse for multiple schemes
- Support a wide variety of evidence
- Coordinate so that common requirements are aligned
- Producers control how their evidence is used.

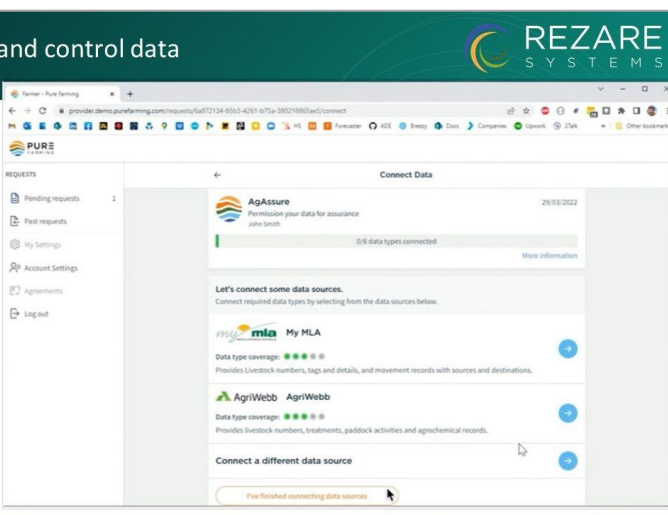
### Collect evidence once



**Potential benefits of collecting evidence once include:**

- Reduction in the cost of compliance to producers  
*Producers told us that they spend between 1 and 4 hours preparing for each audit*
- Reduced program administration overhead
- Providing evidence may improve program participation giving producers better prices  
*For example, producers in SustainaWOOL attain 1.5-2.8% higher prices. This equates to ~\$68 (@2.8%) more per bale over other non-mulesed wool.*

### Demo: Connect and control data



- Connect data from farm technology and industry systems
- Producers control where their data is used and for what purpose.
- Integration platform provides, secure, least-privilege transfer of data



## Connect and control data



## Potential benefits over the status quo include:

- Improved trust. Greater certainty for producers as to what is shared, who has access to evidence and where it is being used increases participation  
*Certainty of where data is used, for what purpose and under what terms was a key concern of producers we spoke to*
- Improvements in data security  
*Agriculture businesses 6th most likely to have a cyber security incident, ABS, 2020*  
*Average cost to business of a cyberattack, \$276,323, Australian Cyber Security Centre, 2021*

## Demo: Smart use of connected data



- On-farm or industry data can support deeper analysis
- On-farm data can provide insights into animal health and welfare compliance
- Inspections can move to risk focus

AgScience Farmer Portal

agscienceportal.ag/n/compliance/documents/rebae80c-3729-4b7a-bc8d-dac1cfa7d5d/view

Cockatoo Downs Documents

GENERATED Treatment List (Cockatoo Downs)

1 / 30 124%

Full Treatment Records – Cockatoo Downs

PURE FARMING

Treatment Date	Location, description & location	Tag no. or Mark / Brand	Number of Livestock	Product Trade Name	Batch Number	Product Expiration Date	Dose, Dipping, milking Rate	Treated by	Withholding Period	Export Intentional	Adverse Reactions	System Header Data or Attached
31 Mar 21	Sheep	Purple tag lambs	2807	Ruminex	V5746/S/1	02 Jun 21	15.0 ml/head	Terry Jones	07 Apr 21	31 Mar 21	No	No
31 Mar 21	Sheep	Purple tag lambs	2807	Glanvec DS			1.0 ml/head	Terry Jones	31 Mar 21	31 Mar 21	No	No
31 Mar 21	Sheep	Purple tag lambs	2807	Cargens Nilazen LV Oral Drench	V5747/S/1	02 Oct 21	5.0 ml/head	Terry Jones	14 Apr 21	14 Apr 21	No	No
31 Mar 21	Sheep	Purple tag lambs	2807	Selavon LA	59732/2	31 Oct 22	1.0 ml/head	Terry Jones	31 Mar 21	31 Mar 21	No	No
31 Mar 21	Sheep	Purple tag lambs	2424	Selavon LA	59732/2	31 Oct 22	1.0 ml/head	Terry Jones	31 Mar 21	31 Mar 21	No	No
31 Mar 21	Sheep	Purple tag lambs	2424	Ruminex	V5746/S/1	02 Jun 21	15.0 ml/head	Terry Jones	07 Apr 21	31 Mar 21	No	No

## Smart use of connected data



## Potential benefits over the status quo include:

- Improvements to feedback through benchmarking and insights  
*Benchmarking returned 2.5% higher return on assets for MLA Business EDGE participants*
- Evidence enriched by third party applications and data sources  
*Connected data supplied by and to Agtech products such as farm management systems increases value proposition of AgTech growing the Australian Agtech ecosystem (AIIA, 2021)*
- Evidence can be used (with producer permission) to support biosecurity and animal welfare ensuring market access  
*CSIRO researchers predict Australian Agrifood exports will earn \$49 billion this financial year (CSIRO, Trusted Agrifood Exports Mission)*

### Demo: Robust inspections

REZARE SYSTEMS

- Scheme inspections can still operate independently
- Permission data to inspectors as required
- Inspectors may review data at desk or on farm

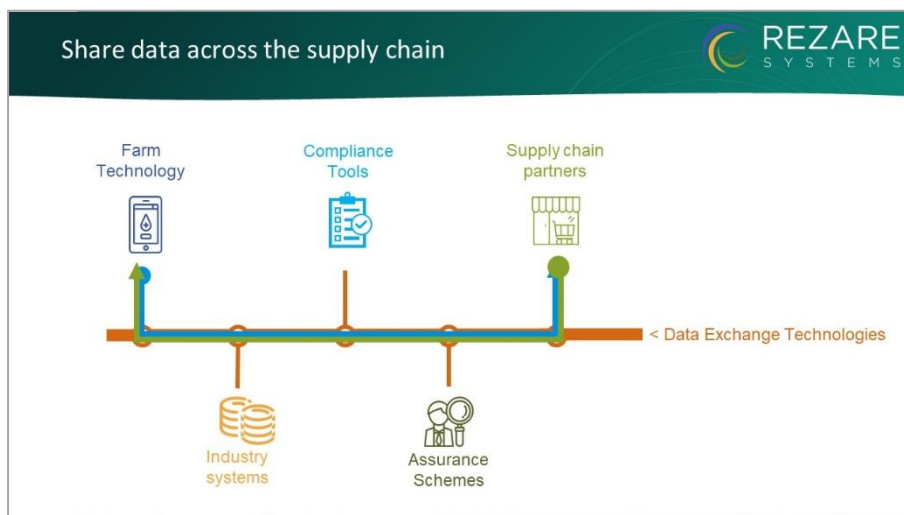
Name	Reference	Memberships	Currently Assigned To
Cannonvale Mulataga	44BCD123	Sub-Week	Unassigned
Cockatoo Downs	34BCD123	Sub-Week	Harry Potter
Creek Franklin	64BCD123	Sub-Week	Ron Weasley
Eldorado	N125084	Sub-Week	Unassigned
Europambela	N8020386	Sub-Week	Unassigned
Telopea Downs Farm	3WVAT048	Sub-Week	Harry Potter

### Robust inspections

REZARE SYSTEMS

**Potential benefits over the status quo include:**

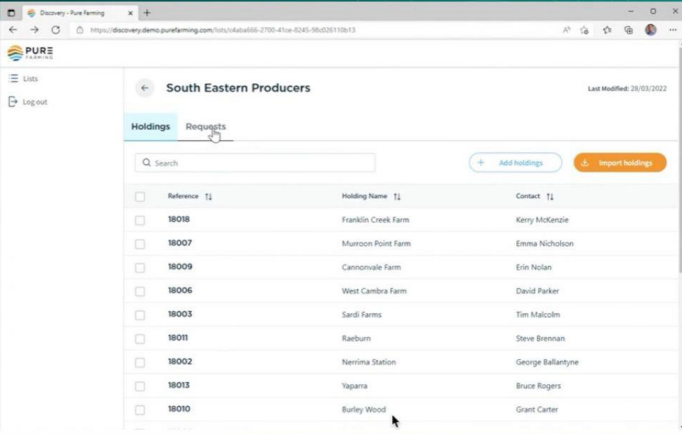
- Improvements in the targeting of on-farm audits**  
Farm audits cost ~\$500 plus travel per visit (5000 LPA, 225 NWD, 150 SustainaWOOL Audits = ~\$2.7M annual spend. A 25% reduction = ~\$675,000)
- Reduced impact on farm operations**  
Auditors told us that reviewing evidence ahead of inspection would reduce the amount of time they would need to spend on-farm with producers.
- Auditors can focus on evidence gaps and supporting producers with their non-compliance**  
Auditors and producers told us that reviewing evidence ahead of inspection would also allow more time to focus on non-compliance and providing producers with remediation support.
- Administration time reduced and faster feedback to producers**  
Auditors told us that a data exchange would enable process automation allowing auditors to provide producers with immediate feedback saving time and administration resources and resolving non-compliance issues faster.






### Demo: Share data across the supply chain

- Process for supply chains to engage with producers
- Differentiate product in international markets
- Producers still control use of their data
- Builds trust and supports deeper relationships



Reference	Holding Name	Contact
18018	Franklin Creek Farm	Kerry McKenzie
18007	Murron Point Farm	Emma Nicholson
18009	Cannonvale Farm	Erin Nolan
18006	West Cambra Farm	David Parker
18003	Sardi Farms	Tim Malcolm
18011	Raeburn	Steve Brennan
18002	Nerrima Station	George Ballantyne
18013	Yaparra	Bruce Rogers
18010	Burley Wood	Grant Carter


### Share data across the supply chain



**Potential benefits over the status quo include:**

- Easy access to services**  
*Making controlled sharing of evidence simple for both Producers and Service Providers through standard protocols will increase access to advice, productivity tools and services.*
- Tools and services for producers can be enhanced**  
*Processors, Brokers and Retailers told us that by having access to evidence they could improve the quality and accuracy of their interactions with producers.*
- Producers can be recognised for the great work that they do**  
*Producers told us that they see benefit to their social licence in sharing relevant evidence with other relevant supply chain participants.*

### Summary



**We have demonstrated how:**

- Compliance requirements can be aligned to **save time** and reduce the cost of compliance through the re-use of evidence while separate schemes still retain their own integrity
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Questions