



Final report

Livestock Data Services App (LDSA)

Pairtree – Moving Agtech from decision support to decision making

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Abstract

The Livestock Data Services App project tested the unproven theory of whether Business-as-Usual (BAU) data collection could be repurposed and then recognised as evidence for compliance, stewardship and integrity programs.

Pairtree intelligence recognised that by utilising data integrations from a range of on-farm and existing data capture tools, there was a possibility to reduce double handling and manual entry of data required for these programs.

The Project was run on the Wilmot Cattle Companies, Wilmot property and connected a wide range of data sources for the operation to prove out a formatted connected data service. Two initial programs were approached, which included the MLA/ISC's Livestock Production Assurance (LPA) and also an emissions calculator that was researched by Dr Richard Eckard (Sheep/ Beef – Greenhouse Accounting Framework, SB-GAF tool).

The integrations that occurred within this Project included AuctionsPlus, Cibolabs, Farmbot, Farmlab, Maiagrazing, MLA NLRs, MLA NLIS, MLA eNVD, APVMA PubCris and WattWatchers.

Throughout the Project, a concept called Behavioural Practice Evidence (BPE) was developed. The key principles that BPE relied upon to enable the use of BAU data collection is that Farmers will enter data into management services more accurately than once-off compliance tools, as the management data is required for daily management and statutory outcomes (ie: tax, levies and Local Land Services rates in some States).

The end result of the Project yielded four key Integrated outcomes: -

- Customised Homepage for Wilmot Cattle Co.
- Natural Capital Summary pages
- Livestock Production Assurance (LPA) proof-of-concept tool
- Sheep/ Beef – Greenhouse Accounting Framework (SB-GAF) proof-of-concept tool

Whilst these four outcomes are experimental and POC's, they are built on the Pairtree technology and can be used as Alpha tests for greater industry review and insight.

This project has exposed a range of green shoots where previously unattainable data and also integrated solutions were not possible at scale. Pairtree has proven that through Business-as-Usual data collection and Metric focused reporting tools can be developed for integrity and compliance.

The Biosecurity case study has been used to calculate some potential economic opportunities for the industry to return to a normal trading approach. In this case either the farmer would be potentially better off by \$150-\$250/ head of Cattle or Industry better off in the magnitude of Billions by resourcing existing infrastructure and reducing the burden on the farmers. MLA acknowledges further measurement and evaluation is required to validate the above but welcomes the potential opportunity space this study highlights.

Executive summary

Background

This Livestock Data Services App project tested the unproven theory of whether Business-as-Usual (BAU) data collection could be repurposed and then recognised as evidence for compliance, stewardship and integrity programs.

As Agtech adoption increases along with the rising issues of what is the true value proposition of the purchase, this Project aimed to understand the potential value of additionality to the original Agtech provider's value proposition. Thus if data can be integrated and repurposed for evidence and research extension, farmers have an increased reason to continue purchasing solutions that fulfil several requirements for the business.

Objectives

There were two main objectives of this Project firstly, to utilise more Agtech (especially IoT sensors and apps) and secondly, to establish new income revenue options for stewardship.

This was to be achieved through populating the Livestock Production Assurance (LPA) and then also the Natural Capital option of the Sheep/ Beef – Greenhouse Accounting Framework (SB-GAF, researched by Dr Richard Eckard). By using BAU data to fulfil these tools was hoped to increase efficiencies of overhead compliance and also provide greater integrity at an industry level.

Methodology

The approach to this Project was to break the LPA and SB-GAF programs down to a 'metric' level that would qualify as evidence for that component of the Program. Once the metrics were identified, then the required metrics were aligned with existing deployed Agtech and digital ag services to automate the data collection.

Results/key findings

Pairtree successfully proved that BAU data collection can be utilised within the context of compliance, integrity and stewardship outcomes.

Through the engagement of a wide range of industry stakeholders, the Project proved an appetite to continue the approach to streamline compliance and also improve the accuracy of the evidence provided.

Benefits to industry

The key benefits to the industry will be short to medium term, where new compliance and extension programs can be better delivered in a connected approach. Thus saving time for farmers, increasing the accuracy of compliance and increasing value propositions for Agtech.

Future research and recommendations

There are two key projects that can extend from this Project Firstly, a second stage testing of the SB-GAF tool for an industry-level benchmarking and baselining approach. Secondly, a project to understand the value and likely accuracy of Behavioural Practice Evidence (BPE), which is intrinsically linked to BAU data collection.

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1. Background

This partnership project with MLA centred around working with established solution providers that operate services within the Wilmot Cattle Companies, Wilmot property. To then utilise their collective industry knowledge, technical skills and resources to identify components of their services or solutions that can contribute to 'Integrity' and 'Environmental outcomes'. If data can be repurposed from derivations of their original services to recognising additional value through 'Industry Integrity' or 'Environmental Outcomes', data integration will open up new opportunities of efficiency in Australian Agriculture.

The assumption that this Project undertakes is that the 'Business-as-Usual' activities captured by a range of digital solutions should be able to be 'Repurposed to Recognise' other related but currently unconnected outcomes.

This Project was conceived from the MLA 2021 Request for Tender (RFT) - '**MLA RDA summer'21 Adoption drive**', which had four themes that were being individually requested for tender. Pairtree Intelligence approached Wilmot Cattle Co. as a business that had a range of Agtech providers and was seen to be pioneering the environmental stewardship pathway for the Beef Industry to partner with the proposal.

It was decided to approach and tender for two themes of the four themes to provide outcomes for MLA and Levy payers instead of just one. Our group of collaborators saw that the principles of data integration, data convergence, data visualisation and reporting were the utilisation of theme 1, to achieve theme 3.

- **Theme 1** (Digital Agriculture dashboards and internet of Things (IoT)), and
- **Theme 3** (Enabling new sources of revenue for Australian red meat producers (from environmental stewardship))

As this Project was awarded, Wilmot and Impact Ag released the news that Microsoft had committed to a \$500,000 'Practice change agreement' to reward the Wilmot Cattle Co. business for actively accruing more soil carbon. This announcement only further strengthened the remote monitoring requirements to demonstrate pathways for Theme 3.

This Project attempted to ingest and demonstrate two key industry integrity programs:-

- Sheep/ Beef – Greenhouse Accounting Framework (SB-GAF). Through a Natural Capital focused approach and gathering critical elements from the collaborators, this Project delivered a streamlined and touch-free documentation tool for an 'Operations' emissions profile (including Enteric (livestock) and inputs (fuel, fertiliser and electricity).
- Livestock Production Assurance (LPA) – As LPA is the industry's centrepiece for food safety, the Project aligned several data sets that complemented the Livestock Management Software (LMS) components. Utilising dynamic risk and bio-security maps moving to 'risk queries' rather than historic activities highlighted the potential value of Business As Usual (BAU) and Behavioural Practice Evidence (BPE).

Milestone 1 (M1), enabled the collaboration of a wide range of on-farm service providers to contribute to new services that add additional value to their original value proposition. M1 saw the

initial collaboration and discussion of the data exchange principles that are now being delivered as a Version 1 (V1), Minimum Viable Product (MVP) for Milestone 2. [COMPLETE]

Milestone 2 (M2), enabled the delivery of a 'Proof of Concept' (POC) tool that principally had all of the critical data sets ingested (Auctionsplus, Maia, Cibolabs, Farmbot, Farmlab, MLA/ ISC (NLIS and eNVD) integrated into a single point. The POC then enabled both navigation and the proposed page view approach, which is designed only for industry engagement and better understanding of industries appetite for an integration service as presented. Thus, in Milestone 3 (M3), demonstrations to industry partners in the Livestock and Natural Capital spaces enable demonstrations. [COMPLETE]

Milestone 3 (M3), enabled the demonstration of this concept to a select but broad range of industry stakeholders. The focus of the overall Project is to assess the value of 'Business as Usual' (BAU) Data collection for a new compliance collection approach named 'Behavioral Practice Evidence' (BPE). This Milestone started a wider interest in the concept and conversations about the BPE approach and its potential as a pathway into the future. Furthermore, this Milestone will enable the development of a V1 MVP, that can be tested under closer commercial conditions with multiple Livestock Management Software (LMS). [COMPLETE]

2. Objectives

The final Milestone (M4) for this Project was to review and implement the suggested changes from industry Stakeholders and to seek an external assessment of how this work can be further evaluated and implemented in future research.

Two of the three outputs within this Milestone are to be carried out externally to this report and the collaboration that has been proven throughout the Project.

This Milestone included:

' Bug fixes and implementation of consultancy feedback: Identification of changes and amendments incorporated into dashboards, to the final MVP's for the individual programs.'

Outputs:

- Final MVP's for the LPA modules and the Regen Network Methodology Completion of data analysis and final report to include:
- Documented use cases, assessment of productivity gains/cost savings relative to baselines consistent with MLA Producer Adoption MER Framework providing firsthand producer feedback on how their business has evolved as a result of embracing a digital culture and provide comparisons between pre and post project modes of operation.
- Workshop to review project outcomes (including high level desirability consideration for environmental or production credentials and branding) and provide feedback on KPMG Return On investment (ROI) tool and permission for MLA to film a short video on site of producer using project outputs. Case study reviewed and accepted by MLA's Communications team.

The objectives of this Milestone have been met and delivered as four unique MVP's tools for industry to assess.

Key points of feedback for improvement of the service within the previous Milestone were: -

- The viewers and users primarily found the navigation and access to the tools' less than obvious'. This was a minor issue and mostly due to the development process for our team of developers to collaborate on.
- There were several pages that were replicated within the LPA Elements, and some had not been linked as a proper app would have been. These now link back to the same source page to enable auditors to view and access the required data for the Element.
- There were a number of minor bugs and miss directed data feeds that the team reviewed and corrected to make sure that the LPA could handle multiple locations (farms/ PICs) and Organisations (businesses) through the single access point. With our Industry knowledge, a service that couldn't accept and 'switch' between multiple locations and companies would pro-long an audit process rather than further simplify and demonstrate compliance or non-compliance across the board.
- There were suggestions of an investigation into similar and complementary integrity programs (EUCAS, SustainaWool), which haven't been expanded upon within this Milestone or this Project.
- Finally, Privacy was a key consideration before and during the feedback sessions. For farmers to trust and confidently implement an 'Integrity Program' based on BAU and BPE principles, they need to ensure that the data is utilised only for its purpose. Privacy and Permissions based control for farmers is 'Baked' into the Pairtree platform, and the provisioning of these services in the future will be utterly transparent upon signup.

Once the broader development and bug fixes had been completed, these tools were split into four segments and offerings

- **Wilmot Homepage** – In consultation with Stuart Austin, a 'Centralised' management page enabled observation of several critical metrics for his operation. Combining Key Maiagrazing metrics with Farmbot tank heights, Cibolabs pasture layers, MLA's Yearling and Grown Steer Indicator, and the Eastern States Young Cattle Indicator (ECYI) enables a quick assessment of several of the key drivers of the business.

This page has only been built for Wilmot Cattle Co., but it is an outcome that can demonstrate the value of 'Centralising' and 'Converging' data at a single point of access for farm managers and their staff.

- The **Natural Capital section** of the Project has been split into two key options for further development and testing in the future.
 - **The Sheep/ Beef – Greenhouse Accounting Framework tool (GAF)** (researched by Dr Richard Eckard). The SB-GAF tool was a key objective for MLA's CN30 considerations and is a crucial deliverable for this Project. Pairtree has built this tool as a V1 tool that can be tested at a greater scale with other LMS's data applied. Hence, farmers can integrate Maiagrazing or Agriwebb data to complete the Enteric emissions profile. The valuable addition to LMS data is that a broad number of Fuel tank sensors, Energy usage sensors and other input apps like Farm management software can track Lime and fertiliser applications.

The GAF tool has a number of 'Staging' reports and tables, where the assumptions that are gathered from the 'Integrations' can be observed to ensure that the data is correct when it is sent for calculation.

The GAF Reports page is the returned results from the tool's calculations from the data that has been ingested. Farmlab can allow users to access the data and add

additional information and data to sections that do not have an automated data feed. This ensures that the minimum amount of human/ manual entry is carried out for this integrity activity.

Sam Duncan, of Farmlab, suggests that the tool would take 4-5 hours to complete every quarter, it is to follow Dr Eckards approach within his original spreadsheet. This Project enables a more granular and probably monthly insight into the emissions of the operation and then also ensures that comparisons year on year can be conducted into the future.

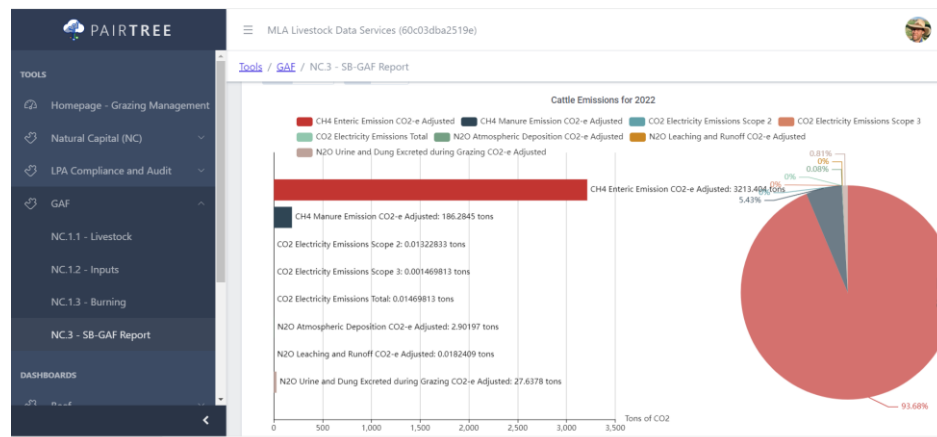


Figure 1: GAF Report, The GAF report page shows the emissions from the Wilmot property, where the data has been generated for Maiagrazing and also WattWatchers.

- **Further Natural Capital observations** – When engaging with the various Stakeholders in Milestone 1, these were additional pages to the GAF tool, but still assist farmers with their insights or tracking of broad Natural Capital changes over time.

The key stats page will be a placeholder type page, which will operate as a 'Summary' page. Whilst basic at present, as users add additional integrations, this summary page can expand with enterprise data sets to be tracked.

'Co-beneficial' outcomes for Carbon credits ensure that farmers can sell their credits at a premium. Being able to accurately and easily track and gather the information that complements the 'Co-Benefit' claims will create additional income streams for the farmer. LPA, Animal Welfare, Bio-security and alternate management changes are all components that could be tracked within these services.

- **Livestock Production Assurance (LPA) module**, this section maintained the basic structure that was collaborated upon through Milestone 1. As the Pairtree Integrated LPA tool was the first of its kind to be demonstrated broadly to industry stakeholders, there was significant support and interest in the approach.

This tool is standalone and will be rolled out to interested clients of Pairtree to further testing and its practical application within the compliance approach. This module is extremely complex with integrations from LMS's, NLIS, eNVD, APVMA's PubCris, as well as

additional data for Infrastructure, Biosecurity and risk tools from geospatial providers like Cibo Labs.

It was observed that if the LPA integrity program is to move into a more connected approach, then the LMS data is a critical starting point to form the BPE approach for compliance. BUT there is a range of additional data sets that can be brought together to provide greater integrity and linkages to the overall Program.

By aligning the NLIS and eNVD data sets with the LMS data, there is an opportunity for greater self-auditing of the NLIS database and stock transfers in the eNVD database. The APVMA's PubCris portal could also provide greater integrity if the base data is supplied to Agtech companies in a formatted approach. As all Vetchem and Agchem are fully documented through PubCris, 'Withholding periods' (WHP), Chemical Categories and many additional assumptions could be derived and implemented as 'risk' factors for the LPA module. A quick example of this is when an animal has a potential Withholding period breach or supplying animals treated with a prohibited chemistry category (Hormones, Antibiotics) for an export market.

The experimental and demonstration pages for Animal Welfare were also left within this module for further discussion. At present, the 7th Element in LPA is animal welfare and contemplates animal welfare beneficial practices, rather than just access to the Australian Standards. By taking a similar approach to the Natural Capital approach for 'Co-Benefits' a range of tracked data points can be developed to provide more accurate and continual BPE of good animal welfare outcomes for that operation/ PIC and thus the industry.

The objectives of the Milestone (M4) and also the Project have been met, providing a deep dive into what the potential benefits would be to the industry from a BAU and BPE approach.

It is noted that the second objective of this Milestone (M4) and to finalise the Project is to be handled by 3rd party contractors and MLA communications staff. This report will assist KPMG in firstly building out the use cases and opportunities that this research project has revealed. Once KPMG has overseen the broad scope of the Project, Pairtree will assist in direct communications and delivery of examples of industry improvement opportunities and also assist with other introductions that are required to acquit the Project's objectives.

3. Methodology

The methodology for Pairtree's contribution to this 4th and final Milestone was simply to work back through the external feedback and then also to work internally to upgrade the service.

The V1 MVP was firstly provided as a completely prototypical service that was (still is) capable of accommodating changes and iterations to better refine the overall experience for farmers, auditors and other stakeholders.

Now that there has been general acceptance of the V1, the GAF tool and LPA modules, they have been more tightly coupled to the Pairtree Integration Engine. The Pairtree Integration Engine will enable scalable adoption of these and other services that will lead to integrity, stewardship and compliance outcomes.

4. Results

This Project has uncovered outstanding results for farmers, levy payers and the Red meat industry.

This Project has enabled the industry to access the potential of a more significantly connected industry and methods to overcome the issue of disparate data silos. The Project has developed several key outcomes that can be more broadly assessed by KPMG against the KPMG Agtech ROI calculator. Pairtree will also use our continuing traceability focus as a potential case study to generate some economic values, these include: -

- **Business As Usual (BAU) data collection** – The primary assumption that this Project was based on was that farmers collect enough data on their farmers and unlocking this data for repurposing can provide additional value and save time.

BAU data collection assumes and creates a 360 view approach to firstly identifying where and what data sets can be used for integrity, stewardship and compliance activities and then working through processes to access these data sets for additional purposes digitally.

BAU data collection supports greater adoption of Agtech by farmers as the delivered examples provide additional value propositions for the adoption and engagement of Agtech services. This approach allows programs to be more 'Metric focused' rather than prescriptive about particular apps or services that traditionally programs were constrained by.

By unlocking the additional value of Agtech adoption, the services can continue to build better User Experiences and User Interfaces to more efficiently collect a range of data particular to the service (livestock management, satellite imagery, asset monitoring (tank sensors), soil tests, etc.)

- **Behavioural Practice Evidence (BPE)** – This concept we developed through discussions within the 2nd Milestone, where BAU data collection was questioned.

BPE should provide greater data accuracy, and behaviour as all Agtech data is time-stamped and very complex to manipulate the data for alternate reasons. Compared to a 'Point-in-time' audit with manual evidence and no connectivity to other elements, BPE provides a heightened advantage for industry accuracy whilst also saving time.

A farmer will use Agtech to manage their operations better, collate tax information, and track trends over the long term. For accuracy to occur, farmers must keep their data as accurate as possible. The reverse is also the same. If there is an additional value proposition where the data flows into a compliance tool and minimises additional work, farmers would be more likely to comply and complete the additional fields with an LMS or other Agtech solution.

- **Query-based assessment** – It was raised by several stakeholders in the 3rd Milestone that that the entire risk and audit approach could be improved with a simple change. It was also noted that physical audits are still essential to pick up critical compliance or non-compliance issues that may be overstated or unwittingly missed by the farmer.

Query-based assessment is essentially where several points of data are converged to raise specific risk-related assumptions. The traditional audit approach with third-party auditors would struggle to quickly and effectively understand an auditee's document to effectively

understand whether any animals have been sold within a Withholding period (WHP). This Withholding period violation scenario was tested and proven with this Project.

- **Self-audit** – This opportunity was also identified within Milestones 2 and 3, where having a digitally formatted approach to data collection can quickly highlight to the Auditor and farmer, where missing data gaps are.

It was raised and discussed that specific gaps can be prioritised and highlighted for when farmers revisit the LPA tool. The specific table formats of the approach that Pairtree has provided enable easy identification of non-compliance or shortfalls within a program. Enabling Traffic light scenarios to nudge the farmers to improve data capture and precision continually will quickly improve a large cross-section of the industry.

Self-audit benefits will also flow from the support of Agtech adoption and ensuring that these tools collect the right data sets. If there is a simple user interface to enter who 'Administered' the Drench or the 'Batch Number' of the chemical, compliance will improve as these issues can be systemised and streamlined.

- **Reduce the duplication of questions** – A long-running issue for farmers and auditors within Cattlecare, Flockcare and now LPA was that Auditors were required to view select bodies of evidence with a specific focus (ie: Property risk, Livestock transactions, etc.).

With the approach that Pairtree undertook, we identified a whole range of pages that were continuously reviewed by the Auditor for the specific Element. (ie: The Chemical register appears in E2 and E3, Training appears in E2, E3 and E6, Risks appear in E2, E3, E4 and E6).

This BAU approach allows the same data to be either re-iterated a number of times for the specific Element. But preferably, a single page can be developed to ensure that all risks of non-compliance can be captured in a page for the suite of Elements and risks, that Auditors are assisting in reviewing.

- **Simple integration** – To avoid the usual apprehension about the adoption of new technologies, this process will require a simple approach to integrate the broad range of solutions that will drive the GAF and LPA tools.

Pairtree has over 100+ integrations that can be manually provisioned quickly and will enhance the next phase of testing of these Program approaches. This ensures that the Integration Engine and metric mapping then provisions the tools (ie LPA, GAF or other) as expected. This has been a focus from the start and should improve uptake and adoption of new services.

- **Manual entry and document control** – To ensure that both modules can be utilised by farmers with 'one or no' Agtech solutions. Inherent within the module builds, Pairtree has ensured that documents, manually entered, can be uploaded into the elements, where evidence is required.

It was identified as being extremely important to have an inclusive approach that allowed farmers to transition through these tools and adopt Agtech that suits their business and budget and can fulfil the required metrics. Enabling a manual entry first approach, but leveraging the integration ability of BAU and BPE, will provide a pull-through for these modules.

- **Access windows for data/ permissions** – The most pivotal consideration to enable BAU data collection is that the farmer (Data Originator) has control and oversight of their data for any external usage.

Within the 2nd and 3rd Milestones, this Project highlighted an importance for farmers to be able to 'Opt-in' to sharing their data to tools like what was demonstrated within this Project. An option to appease suspicion of additional and secondary usage of the data could be a 'Time window' access for the data. Time-windows for data would allow the farmers (data originators) to enable secure and managed access to their data for the evidence based outcomes that a program would require.

This concept would allow farmers to know that Auditors would have an 'Audit-Window', where Auditors have a defined data range of when they can access and review the evidence presented within the tools. This approach would allow access to the platform (not necessarily the raw data) to remotely prepare for the Audit prior to the actual Audit.

The contemplation of this issue further supports the Query-based assessment, as farmers share and control their data. By moving away from 'identified' data and moving to de-identified or 'functions' based outputs can further support data sharing concerns and manage the risk appetite of farmers nervous about sharing data.

- **Remote Audit** – COVID initiated a remote Audit approach, where Auditors ran virtual Audits via Zoom or online video conference (VC).

The formatted process that 'integrated' tools like the Pairtree LPA or GAF tools provide is a connected assessment process. This connected assessment process is where the data is ingested and formatted, allowing for a quick and repeatable audit process for the Auditors, unlike the unstructured VC approach. There are seven or more different LMS's (Agriwebb, MaiaGrazing, Sapien, eLynx, Mobble, Stockbook and iLivestock), which with the addition that some farmers run two of these LMS's on the property for mob based and Individual animal management.

Wilmot Cattle Co. was a case in point where MaiaGrazing was used for mob movements and pasture management, and Sapien was used for Animal treatments and individual activities. A connected assessment process would streamline the Audit and minimise the back and forth.

It was noted that physical Audits should not be completely removed as there are many observations and 'Auditor's intuition', that are required to maintain the 'Third-Party' audit rigour.

This process can change the current tri-annual face to face audit to one in 6 years, with Bi-annual Connected assessment audits. Thus halving the Physical audit costs whilst tripling the audit touch points.

- **Embedded assumptions** – With a tool like the LPA module, there could be a number of embedded assumptions that save time for a user's input but also act as the 'Control' of risk. This approach also aligns with the Queries based assessments. Still, it can enable the service to go wider to additional non-auditee data sets to complement and leverage the opportunity for connected data assessments.

For example, if APVMA's Public Chemical Register (PubCris) was usable and more accessible, all chemical risks (WHP's, ESI's, Chemical categories and more) could be queried within this process.

Thus ensuring that Processors and supply chain partners are more confident that the chemicals applied aren't going to impact a shipment of products.

- **Manual entry savings** – The Pairtree GAF tool provides a significant step into data convergence, where the farmer can 'Opt' data into other services to repurpose the data for similar requirements. Using BAU and BPE principles there is clear evidence and advantages for streamlining programs like this for integrity, stewardship and compliance.

Sam Duncan from Farmlab has stated that it would take a normal farmer about 4-5 hours, per quarter to fully complete the spreadsheet or tool. This Projects outcome can provide heightened monthly insights as well as significantly reduce manual entry.

- **Supporting Agtech adoption** – An external consideration to the industry focus, that BAU and BPE proposes is more significant support for Agtech in general. The traditional approach of specific apps for data collection creates issues for farmers with double-entry and generally leaves 'Program' (integrity, stewardship or compliance) apps as Stranded apps, which struggle with providing a clear value proposition or reason to contribute valuable time too.

Through focusing on a 'Metrics' data approach rather than developing new 'Program' apps or Stranded/ single focus apps will increase the support and adoption of Agtech, rather than create more noise and confusion for farmers.

Pairtree has seen that 80% of farmers have between 5-10 agtech and digital Ag solutions and they are frustrated, feel overwhelmed and struggle with data overload. Minimising their critical data collection services and enabling 'connected' insights tools will reduce the complexity and barriers for adopting of new Agtech.

- **Human Issues** – There are a number of human issues that streamlining the compliance, integrity and stewardship process can assist with better outcomes at an industry level.

Human error, with mundane and arduous tasks of data re-entry, specifically with larger number sets, human error can creep in to reduce the value of data and its integrity. By supporting easy user interfaces (Agtech apps) that are designed for production data capture purposes can leverage their functionality whilst minimising exposure manual entry.

Continual input of data also detracts from the value of services like the GAF tool. If there is a requirement to continually update and append data, the value proposition has to be extremely high to ensure compliance in data entry. Reducing these activities will create greater value propositions for repurposing data from similar data sets and sources via BAU and BPE.

Stranded Apps also get lost by the way-side as they are an initial focus whilst new. Still, if they are hard to access or are stranded and only serve a singular purpose, researchers and extension officers have found that many apps struggle to be fully adopted broadly at an industry level.

Having a 'Connected' solution can unlock this issue and allow farmers to access 'Current' data when needed and as required.

- Economic potential for a Biosecurity lockdown event.
 - Considering Australia's long-term focus on traceability and program specific supply-chains, adapting BPE principles could provide a stop gap proxy to empower these supply pathways and assurances. Whilst there may be a number of mistakes and phantom animals within the LMS programs (in the future, direct real-time comparisons between the NLIS database, eNVD services and LMS's can start to reduce error and improve accuracy). The paper format of livestock accounting would be far more antiquated and cumbersome during a stock stand still and harder to provide clear statistics and insights on mass.

The real benefit to producers would be, those that can show compliance between the physical livestock numbers and their LMS figures could gain freedoms as they eventuate. Thus moving these stock to an abattoir rather than euthanise or stranded on a property could provide a \$150 - \$250/ head benefit to producers. To realise this benefit an integrated real-time tool would need to be connected to a farmer and their production system.

- The following issue for quick re-entry and return of limited trading would be a significant level of compliance and traceability for both on-farm and broader industry co-mingling activities. For a importing body like the EU Commission to gain confidence in our procedures and practices, then a central point would be required to normalise the individual activities and then provide a range of insights.

For Farmers to comply with a new digital bio-security framework, anything other than a Business-as-Usual approach would add significant pressure and time costs to their operations, with a heightened level of potential human error in the early stages. By encouraging adoption of 'suitable' Livestock Management Software (that can integrate easily and also has the required metrics for reporting) would save 3-5 days for every levy payer. Thus (8 hours x \$60/ hr = \$480/ day) \$480 x 5 Days = \$2,400/ levy payer/ [per year x 80,000 farmers = \$AUD 192 Million / Year + Industry compliance costs (Audits, verification, stakeholder access, etc.) that could be minimised with this approach.

- With the Pairtree infrastructure available to industry for quick ideation and testing of metric focused data collection tools, the \$AUD80 Billion dollar industry can have a significant cross-section running and feeding departmental modelling within weeks.

The recovery phase and returning to trade is the critical point within a potential biosecurity breach. If through this connected metric focused approach Australia could return to normal trade relationships faster, then for each year that we can shave from the ban could be \$AUD 5-10 Bn annual boost to the industry. This methodology would also provide stronger and more accurate industry integrity, analytics and insights.

These insights and results can be considered by KPMG as potential starting points for generating the potential ROI and Value propositions for engaging BAU and BPE solutions into the future.

5. Conclusion

The MLA 2021 Request for Tender (RFT) - '**MLA RDA summer'21 Adoption drive**', which had four themes that were being individually requested for tender, was the initiation of this Project.

Pairtree Intelligence approached Wilmot Cattle Co. as a business with a range of Agtech providers and was seen to be pioneering the environmental stewardship pathway for the Beef Industry to partner with the proposal.

It was decided to approach and tender for two themes to provide dual outcomes for MLA and Levy payers instead of just a singular focus. Our group of collaborators saw that the principles of data integration, data convergence, data visualisation and reporting were the utilisation of theme 1, to achieve theme 3.

- **Theme 1** (Digital Agriculture dashboards and internet of Things (IoT)), and
- **Theme 3** (Enabling new sources of revenue for Australian red meat producers (from environmental stewardship))

These two themes have been combined to prove to the industry that connected data services through BAU, and BPE data collection processes propose a significant leap forward in compliance, stewardship and integrity evidence collection.

Improving the quality and the method of data collection provides tangible outcomes for farmers wishing to access new programs. By focusing and ensuring activities within the scope of the Program are sufficient to allow access to a market or receive funds from a counterpart, will directly benefit from this projects objectives.

By enabling a future that maintains high standards with easier access or simpler compliance verification, will fully deliver on the Theme 3 option of the 2021 MLA RFT. Having greater access to new environmental stewardship, integrity or compliance programs will provide new or additional revenue streams for farmers.

The SB-GAF tool that has been collaborated upon within this Project will provide a strong and scalable baseline for MLA within its CN30 aspirations. This tool will enable the broader macro modelling of the various production systems to be verified and supported by farm-level data collection services through BAU and BPE.

The LPA module tool still has a significant amount of development to become a scalable and recognised pathway for Auditing within the red-meat industry. The key deliverable for this Project was proven through the collaboration of the group of Agtech companies and also that BAU and BPE data can be repurposed to fit within a greater context of an integrity program like LPA. The outcome of being able to initiate a 'Metrics' focused approach to collecting evidence for compliance is a 'Game Changer'.

5.1 Key findings

The key findings are that Australian Agtech is willing to collaborate and ensure that farmers (their clients) can maximise their data as required by their clients.

The approach of BAU and BPE data collection then supports Agtech companies as they can still serve their clients, but also enable complementary Agtech services to be built or align additional data sets. The repurposing of additional data to complete the overall compliance requirements then underpins the need for greater Agtech adoption and also the necessity of better user interfaces by those Agtech services.

This body of work has demonstrated that a metric focused approach to data management can open a wide range of future opportunities. This project has really positioned the Red Meat industry in a strong position to validate the opportunities and also setup further more defined scopes of work in the future.

The Biosecurity lockdown case study has been used to calculate some potential economic opportunities for the industry to return to a normal trading approach. In this case either the farmer would be potentially better off by \$150-\$250/ head of Cattle or Industry better off in the magnitude of Billions by resourcing existing infrastructure and reducing the burden on the farmers.

A wide range of direct and indirect benefits can be considered through this Project and the innovative outcome of BAU and BPE. These considerations can be implemented in a broad range of integrity, stewardship and compliance methodologies.

If more consistent documentation (via API) can be collected whilst reducing the number of physical audits or verifications, this will have a compound effect on many layers within the industry and its integrity and compliance.

5.2 Benefits to industry

The key benefit to the industry is that Business-as-Usual (BAU) and Behavioural-Practice-Evidence (BPE) have been proven within the Project to have potential for integrity and compliance.

If farmers can be confident to adopt Agtech that can easily share elements of data, rather than having to manually re-enter continuously similar data sets for similar programs, this will provide a profound outcome for the industry.

Farmers are generally time-poor and also spread very thin across the Operations' overall requirements. If time can be saved on documentation and compliance, this can allow additional work or productivity to be carried out within the business.

From industry's point of view, there are several key benefits that the Project delivered that were highlighted in the 3rd Milestone.

- If Processors know that there is a greater chain of data, if a recall or issue arises, this provides new levels of confidence within that sector.
- If Self-assessment and easy integrations can be enabled, this will slowly lift the 'Bar' and overall compliance outcomes for the industry.
- If more regular virtual audits can be observed with less physical audits attended, this will create significant cost savings and increases in confidence at the same time.

6. Future research and recommendations

Dr Richard Eckards Sheep-Beef Greenhouse Accounting Framework (SB-GAF) was 'productised' by Farmlab with an API first approach within this Project. This approach allowed us to provide data directly into the GAF tool, without any double entry, through the BAU and BPE frameworks.

Sam Duncan from Farmlab suggests that to complete the GAF tool manually, this would generally take 4-5 hours per quarter. With Pairtree providing Livestock data, Rainfall, Fuel usage, and electricity consumption, the majority of the tool will be completed automatically and with more granular increments.

It is prudent to propose a project where MLA can improve its assessment process and CN30 assumptions. This approach will allow a comparison of Micro (Farm level) to the Macro (State or Industry level) emissions profile. A Benchmarking emissions tool, per-say could assist producers analysis where they sit within the national range.

The Project would be to engage a researcher who would verify the difference between the Automated SB-GAF tool (Pairtree) and the actual on-farm management options. There would be 50 farms in the first year (25 MaiaGrazing and 25 Agriwebb clients), If the tool can capture and prove to be a better proxy than the Macro assumptions, the Project would move into a second phase with a significantly larger sample set.

This NEW Project would quickly and effectively gain on-farm insights into the actual emissions profile. This Project also then has the potential to retrospectively show previous years' production and create a long-term emissions profile on a broad section of the industry, making direct impact and evidence.

Behavioural Practice Evidence (BPE) project

As the Project has tested in theory a number of stakeholders that saw the value in the concept of BPE, there is scope for a body of research to

- Firstly test this theory, and
- Secondly understand the drivers that can improve Agtech adoption and the opportunities that BPE can potentially provide to industry.

Appendix

Below are a range of updated screenshots that accommodate the key concerns of navigation and accessibility.

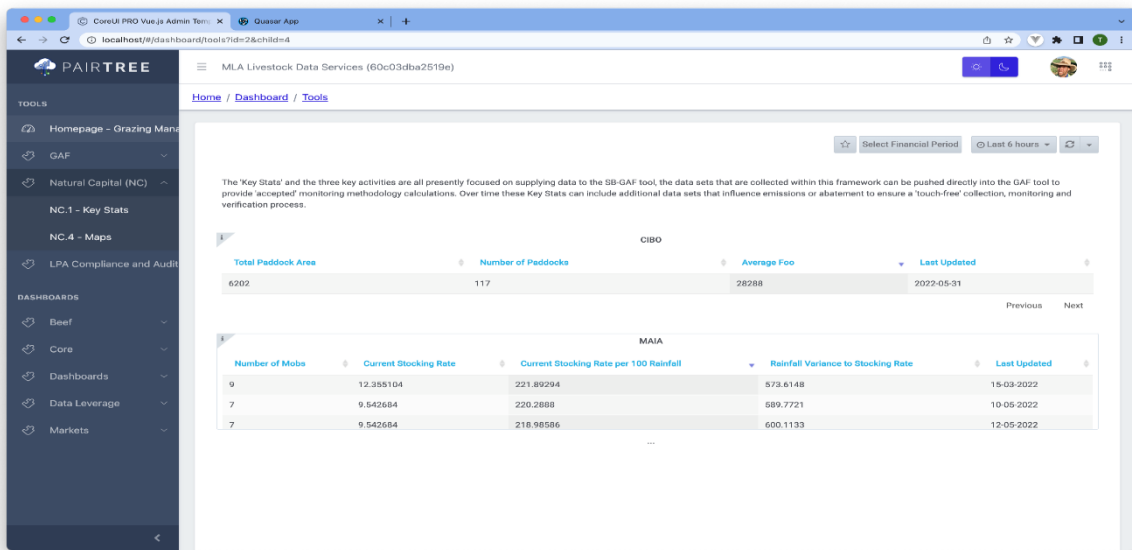
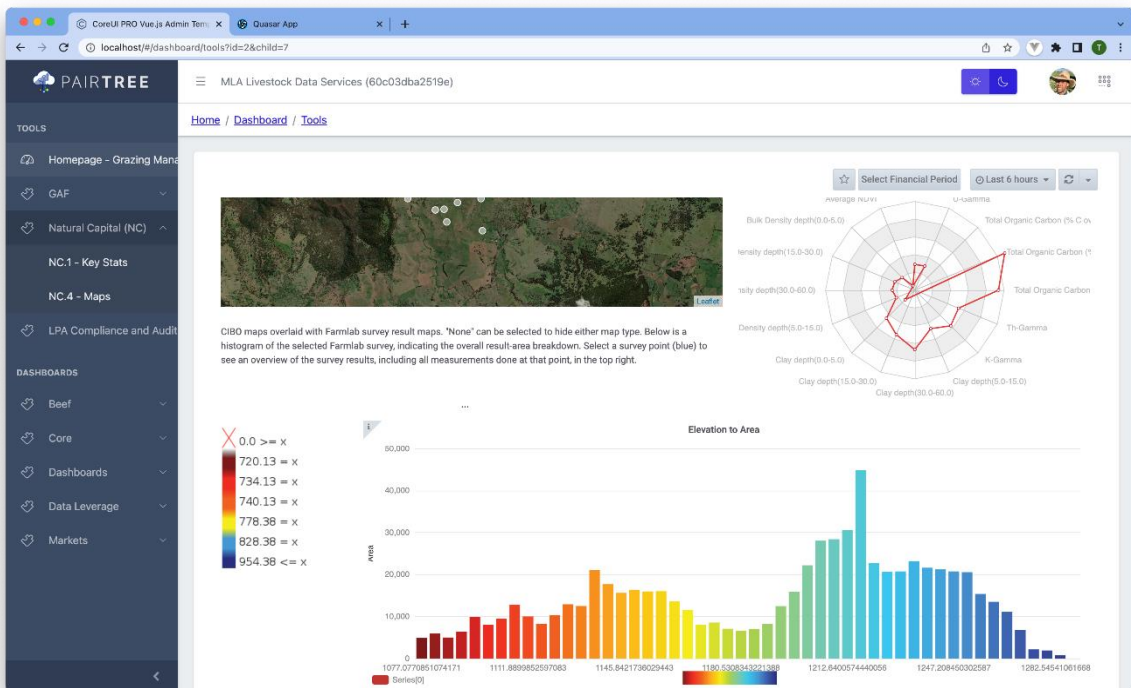
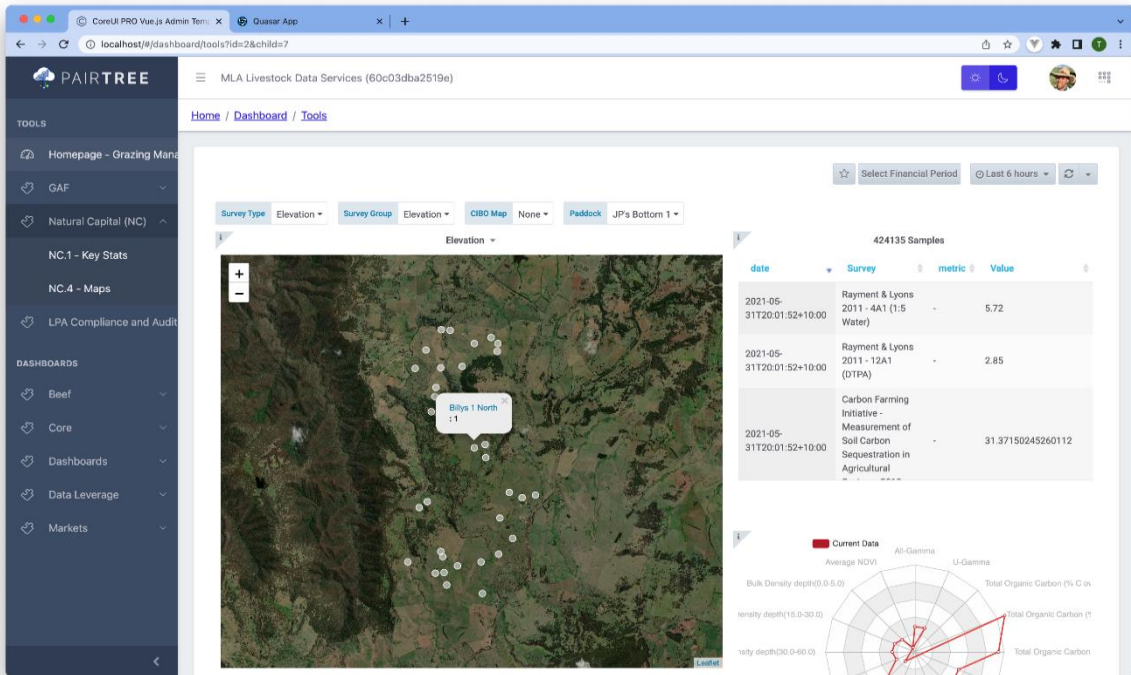


Figure 2: Highlights some of the key Summary metrics that can be captured and re-displayed as an aggregated view from several sources (ie: Cibo labs and Maiagrazing)



Figures 3 and 4: Provide the updated view of the Natural Capital (NC) summary page, which will allow a wide range of new NatCap activities to be 'Collated' through BAU and BPE services.

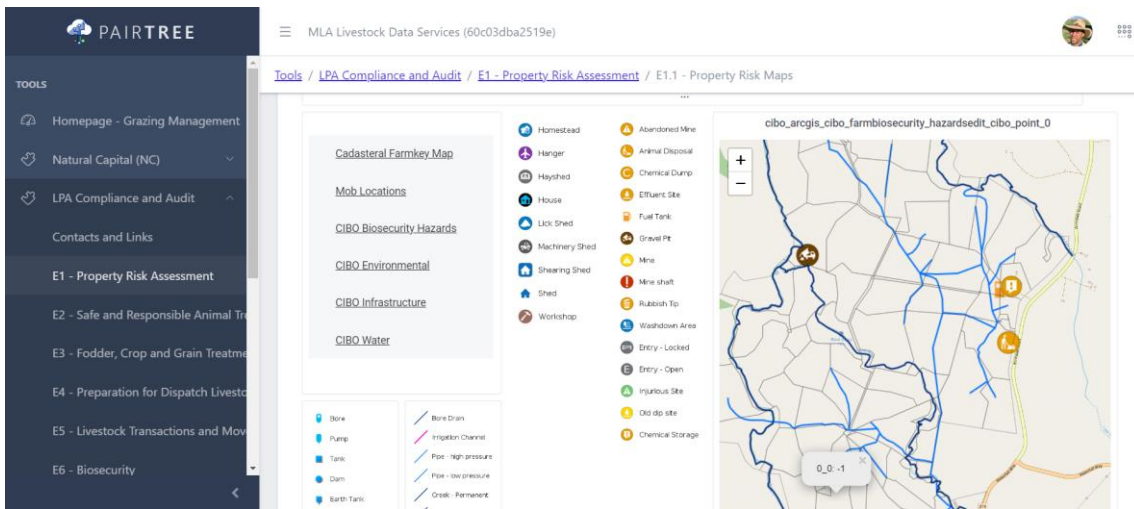
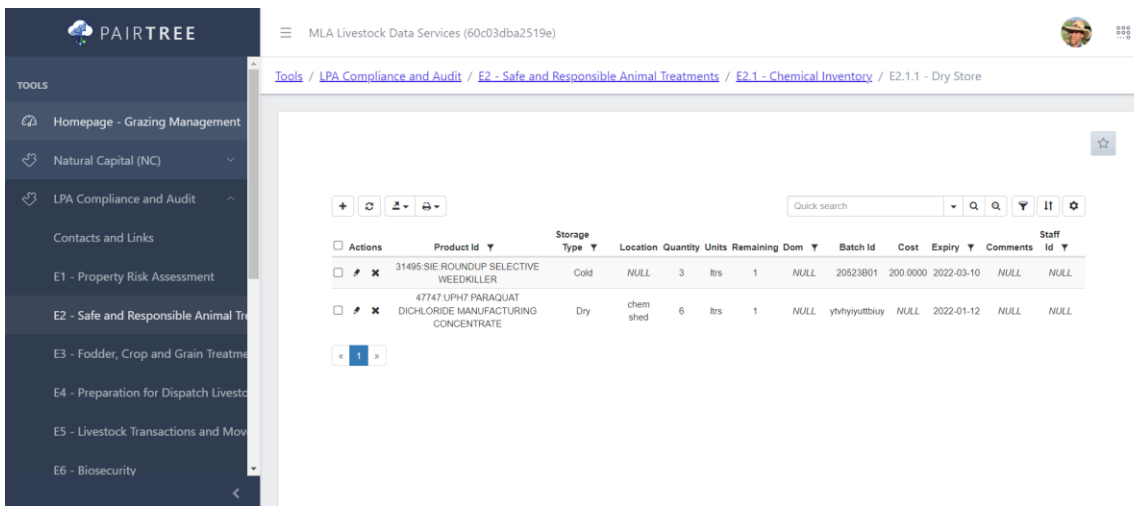
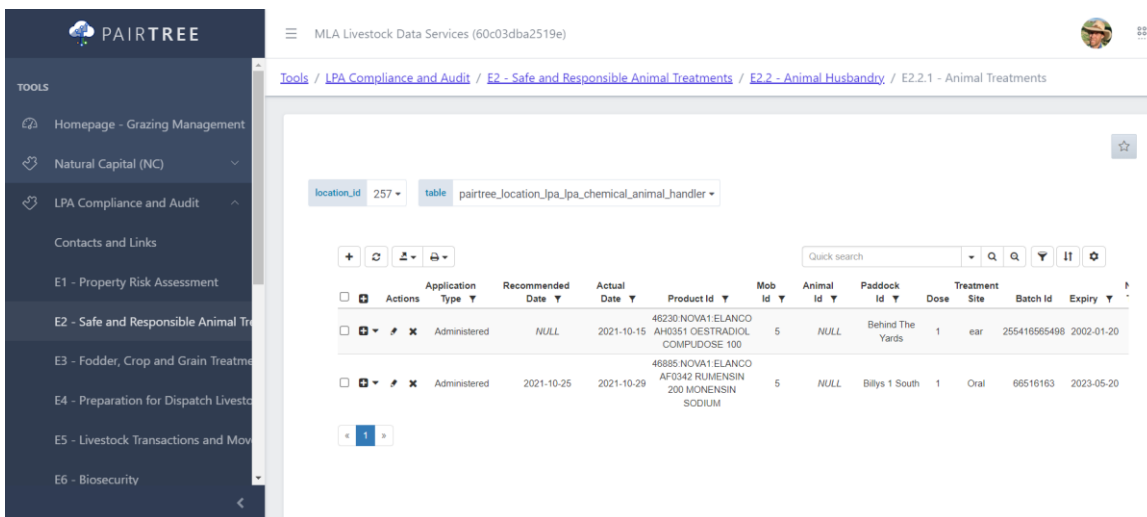


Figure 5: Provides insight into the Risk Maps within LPA tool and how these layers can become dynamic and relational.



Figures 6 and 7: Highlights the Animal Treatments view, which also enables the manual entry and addition of treatments not captured by a Livestock Management Software program. This also shows where files and alternate evidence layers can be added to as well.