Final report

GMP Digital Value and Supply Chain Extension and Adoption Officer

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Executive summary

Background

The co-funding of a Digital Value and Supply Chain Extension and Adoption Officer at Gundagai Meat Processors (GMP) has been extremely valuable not only to GMP but also to the wider industry. The purpose of this role was to enhance digital capability, specifically through the provision of advanced analytics of data sets to generate new insights for the business and provide support for Clients and Producers in enhanced feedback, interpretation of feedback, and practice change.

Objectives

The objectives of the position were to.

- Participate in the Health4Wealth pilot study at GMP to determine the most efficient method of disease and defect collection on the slaughter floor for offal and carcases, along with the verification of the data collected and flow of information into feedback systems.
- Mentor the uptake and usage of the Lamb Value Calculator.
- Trial carcase yield optimisation work for interested Clients.
- Benchmark the business case around the cost of fat and weight to GMP.
- Determining the value of carcase yield optimisation for selected cuts for Clients.
- Work with ALMTech project leaders to develop new tools and technologies benefiting the entire supply chain.
- Establish cost of conditions most prevalent at GMP.
- Adoption and delivery of feedback through LDL (or other systems).
- Identify Clients interested in working with producers to increase compliance.
- Work with ALMTech project leaders to improve feedback given to Clients and Producers.

Results/key findings

There were many key findings associated with this project.

- The professional development resource allowed for participation within a leadership course and travel to meetings and conferences that may not have been accessible otherwise. This allowance within the contract has been extremely important in the development of this position and in ensuring that collaboration can occur due to networking at events, meetings, and conferences, providing benefit to the wider industry through project findings.
- The installation of a hot DEXA has produced many challenges and opportunities. Producers require support when interpreting their feedback and a clear pathway must be presented to producers to achieve this.
- The installation of a new system to record individual carcase disease and defect information was challenging. A clear vision as to why the collection of this data is important is required to ensure success.

- Supporting producers through plant tours and opportunities to be part of workshops are integral to ensuring that producers can increase their capacity and capability. Feedback given by producers whom have attended workshops and events has been positive with many producers indicating that they would change practices after attending the event or workshop.

Benefits to industry

This project has produced many benefits to the industry. These benefits have included working with producers local to the Gundagai area to increase capacity and capability through the delivery of workshops and events. Professional development opportunities have resulted in an increase in collaborative projects being undertaken for whole of industry benefit. Additionally, this project has moved towards the commercialisation and value adding of DEXA for producers and processors through work undertaken with ALMTech along with the installation of a new animal health recording system for individual carcase reporting. The learnings for industry taken from the installation and operation of such a system have been extremely valuable.

Future research and recommendations

The continuation of this program is important to ensure industry continues to collaborate and move forward in the areas of producer engagement and data innovations. The importance of allowing opportunities for people in co-funded positions to undertake professional development and meet with others in similar positions should not be overlooked as this provides a supportive collaborative environment.

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1. Background

This project facilitates the employment of a hybrid Digital Value and Supply Chain Extension and Adoption Officer within the Gundagai Meat Processors (GMP) company to enhance digital capability, specifically through the provision of advanced analytics of data sets to generate new insights for the business and provide support for Clients and Producers in enhanced feedback, interpretation of feedback, and practice change.

The position will analyse the value in linking existing and new company data with other data sets and mining the data to generate value and new opportunities.

2. Objectives

The objective of this project was to employ an officer for 2.5 years who is responsible for the following objectives given in Table 1. Table 1 also indicates whether each objective was met successfully.

Table 1. Objectives of the role and success in achieving objectives.

Objective	**Success in achieving objective**
Stocktake of data within the company	Complete.
Conduct a series of analysis projects to uncover the value of linking data within the company, and applying it across the business and its clients	Completed and ongoing work in this area, with facilitated workshops.
Provide recommendations for how data can be used more efficiently and be responsible for the implementation of the agreed recommendations	Ongoing work area. This has been completed for some data aspects.
Work with clients and suppliers to identify data sharing arrangements for mutual benefit	Ongoing.
Facilitating workshops for clients and producers in supporting carcase feedback	Completed and ongoing work in this area.

Investigate the opportunity to collect more (or targeted) information within the plant, and provide carcase feedback to producers and clients	Completed in relation to a first stage of disease and defect recording. Ongoing within the plant relating to the collection of more information.
Develop extension material relevant to the feedback provided to producers	This work has been in conjunction with animal health companies and internally in relation to objective carcase measurement information.
Identify relevant external tools and systems and implement in the supply chain where appropriate	Work has occurred in conjunction with ALMTech to develop the carcase optimisation tool.
Collaborate with ALMTech project leaders and undertake meetings through the year to discuss progress in collaboration	Complete and ongoing.

3. Outcomes

3.1 Digital value chain outcomes

- Participation in the Health4Wealth pilot study at GMP to determine the most efficient method of disease and defect collection on the slaughter floor for offal and carcases, verification of the data collected and flow of information to feedback systems.
- Mentoring uptake and usage of Lamb Value Calculator.
- Trial carcase yield optimisation work for Clients interested.
- Benchmarking the business case around the cost of fat and weight to GMP.
- Determine the value of carcase yield optimisation for selected cuts for Clients.
- Work with ALMTech project leaders to develop new tools and technologies benefiting the entire supply chain.

3.2 Extension and adoption outcomes

- Participate in the Health4Wealth pilot study at GMP and disseminate information to producers.
- Establish cost of conditions most prevalent at GMP.

- Adoption and delivery of feedback through LDL (or other systems).
- Increase compliance of producers as a result of utilising feedback and support offered to Clients and Producers.
- Identify Clients interested in working with producers to increase compliance.
- Work with ALMTech project leaders to improve feedback given to Clients and Producers.

4. Digital value chain

4.1 Project overview

There were many projects undertaken as part of the digital value chain position at Gundagai Meat Processors.

- Review of current producer feedback and data audit for producers.
- Project management of DEXA commissioning, calibration and data use and management.
- Animal disease data pilot study.
- Carcase optimisation tool development and research scenario investigation.

4.1.1 Review of data

A review of current producer feedback and information collected at Gundagai Meat Processors was initially undertaken. Gundagai Meat Processors has in place a multipart producer feedback system which utilises different delivery methods. GMP is continuing to move to a feedback system which includes a greater amount of information that will support producers. The current feedback system comprises two pieces of information.

1. Regulatory grid sent to clients for distribution to producers. This grid is given in figure 1.

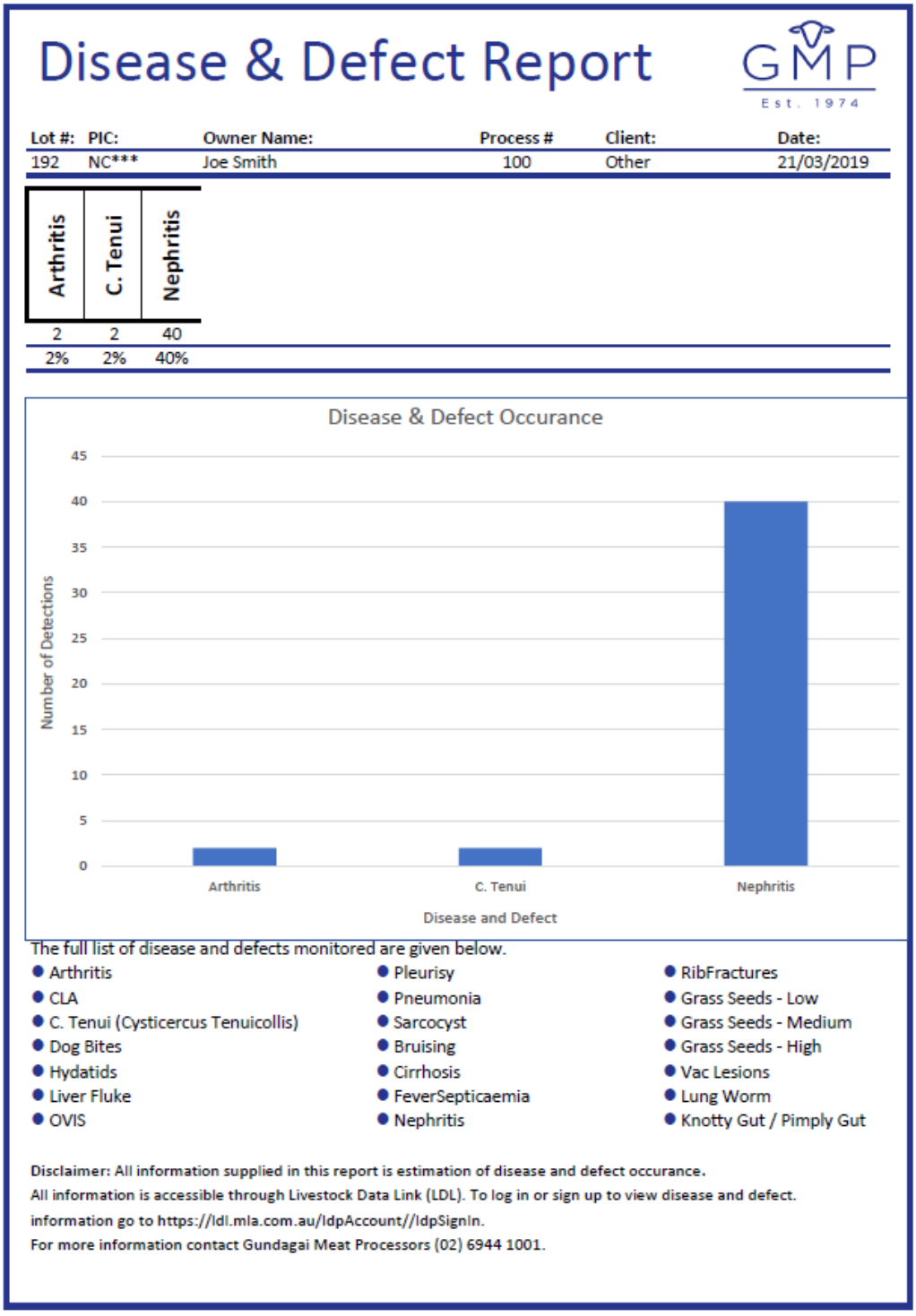
GMP
Est. 1974

Gundagai Meat Processors
Date: 08/04/2019
Lot: 1
Stock Sourced From: xxx

	Fat Class					
Weight Range	**1**	**2**	**3**	**4**	**5**	**Total**
0-15.9kg		2	23			25
		26.5	339.0			365.5
16-17.9kg			50			50
			841.5			841.5
18-20.0kg			37	3		40
			698.4	58.4		756.8
20.1-22kg			18	2		20
			376.7	43.2		419.9
22.1-24kg			2	18		20
			44.3	416.2		460.5
24.1-25kg			1	8	1	10
			24.9	195.6	24.7	245.2
25.1-26kg						0
						0.0

Figure 1. Example of a grid sent to producer which forms part of the producer feedback package at GMP.

2. Disease and defect feedback is currently provided to producers in two ways.
    a. Gundagai Meat Processors is part of the National Sheep Health Monitoring Project which ensures all information collected is uploaded to Livestock Data Link (LDL) where producers can access this information freely. GMP are currently integrating new systems into the process to record this information on an individual carcase basis through the Health4Wealth project, covered in section 4.1.4.
    b. Disease and defect feedback is also sent to producers within a GMP feedback sheet (see Figure 2). The reason for delivering feedback in this way is to ensure that producers who do not have the propensity to access information via an online feedback system are able to receive feedback. Producers are also given fact sheets to ensure they can access information on the disease and defects detected. Additionally, producers are encouraged to contact the Client Research Advisor at GMP to gain further information if required.



Disease & Defect Report

GMP Est. 1974

Lot #:	PIC:	Owner Name:	Process #	Client:	Date:
192	NC***	Joe Smith	100	Other	21/03/2019

Arthritis	C. Tenui	Nephritis
2	2	40
2%	2%	40%

The full list of disease and defects monitored are given below.

- Arthritis
- CLA
- C. Tenui (Cysticercus Tenuicollis)
- Dog Bites
- Hydatids
- Liver Fluke
- OVIS
- Pleurisy
- Pneumonia
- Sarcocyst
- Bruising
- Cirrhosis
- FeverSepticaemia
- Nephritis
- RibFractures
- Grass Seeds - Low
- Grass Seeds - Medium
- Grass Seeds - High
- Vac Lesions
- Lung Worm
- Knotty Gut / Pimply Gut

Disclaimer: All information supplied in this report is estimation of disease and defect occurance.
All information is accessible through Livestock Data Link (LDL). To log in or sign up to view disease and defect.
information go to https://ldl.mla.com.au/ldpAccount//ldpSignIn.
For more information contact Gundagai Meat Processors (02) 6944 1001.

Figure 2. Example of GMP generated disease and defect feedback sent to clients and producers as requested.

4.1.2 Upcoming data

Gundagai Meat Processors are currently recording a range of new information in relation to each carcase that is processed. The new information generated includes carcase composition values (lean, fat and bone percentage) produced by DEXA and individual carcase disease and defect information recorded in relation to the offal and the carcase. DEXA and individual animal health data will be made available to producers through Livestock Data Link and GMP's own feedback system.

4.1.3 DEXA project

Throughout the process of installing a hot DEXA it has been extremely clear that this is a large project that requires a dedicated person within the company installing the DEXA to manage as a project. The approach GMP has taken throughout the project planning and management phase has been to undertake time in motion planning, prioritisation and visualisation as to what the Eutopian state will be, the current state of the project and the steps that will need to be taken to get to the Eutopian state.

The DEXA project at GMP has been divided into the following stages.

1. Continuous operation
2. Systems and procedures
3. Calibration and data integrity
4. Data integration
5. DEXA commercialisation
6. Value adding (internally)
7. Value adding (externally)

4.1.3.1 Continuous operation

The continuous operation of the DEXA refers to the uptime of the DEXA. GMP defines the required uptime of the DEXA as 100%. As seen in Figure 3, DEXA uptime, when averaged across weeks has been variable, averaging 77% over the past 59 weeks. The trendline indicates that scan rate is increasing over time, such that the scan rate during the first 30 weeks averaged 59%, while from week 31 to 59 the scan rate averaged 79%.

Impacts

The impact that continuous operation has on the success of the overall project cannot be understated. It is imperative that the DEXA can achieve continual operation to ensure there is trust within the system. This trust is extremely important for the employees at GMP responsible for the

continual operation of the DEXA as this ensures there is trust throughout the company in DEXA for clients and producers using the data. The impact of having a DEXA which does not continually operate presents issues for staff at GMP. The installation of hot DEXA at GMP is not essential for the operation of the slaughter floor, therefore, it is easy at times to bypass the DEXA rather than fix the issues that interrupt the continual operation of the DEXA. Further, the more false starts a new technology has, the less likely it will truly imbed within systems and processes. Therefore, it is extremely important to ensure there is a structured approach to ensuring the DEXA is embedded within the process at GMP. The approach to achieve this is to ensure all team members are listened to and have input into voicing their needs to ensure they can achieve true integration of the technology into the system.

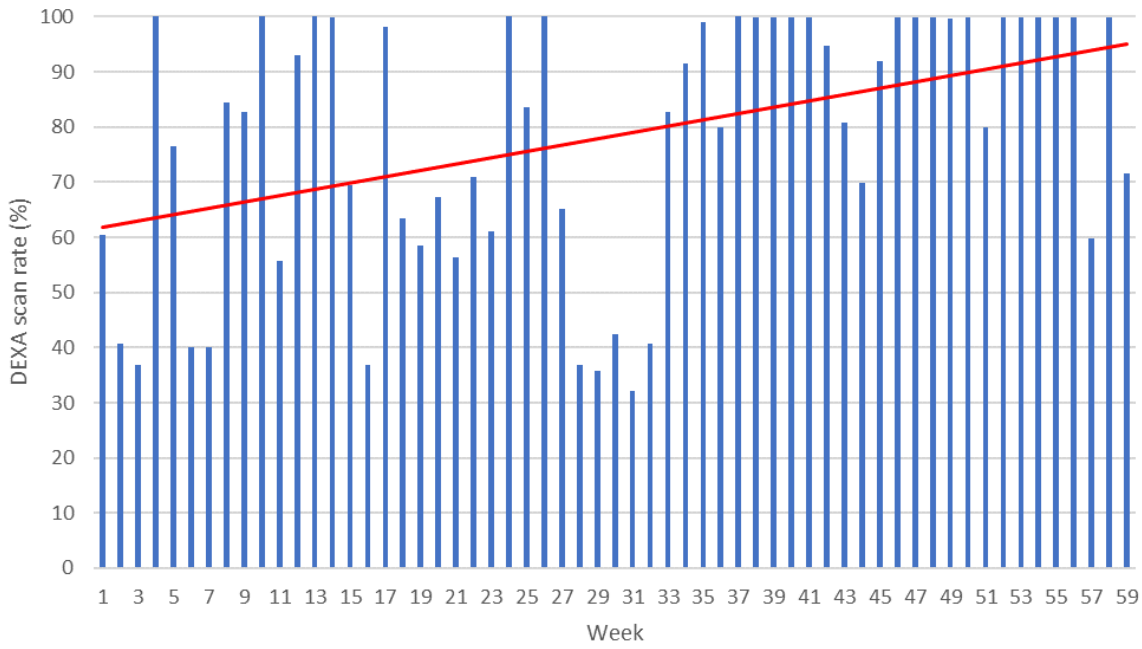


Figure 3. DEXA scan rate percentage, timeframe from February 2020 to March 2021, categorised by week.

Issues that have reduced the scan rate are given below.

a. Light curtain fault

An ongoing fault that has been occurring at GMP, particularly when the weather is cooler is the light curtain fault. GMP has found that the light curtain is not a safety mechanism that is fit for purpose on the slaughter floor. The light curtain continues to trip at GMP due to the formation of condensation across the light curtain. The formation of condensation is due to a difference in temperature and therefore when ambient temperature reduces to at or below freezing point condensation builds up and sits on the light curtain causing false tripping to occur. A solution has

been determined with Scott Automation and Robotics involving the removal of the light curtains and installing a set of platforms as a new safety barrier. This solution is expected to be in place by early May.

b. Data imaging issue and other software issues

A data imaging issue has been occurring throughout the project. This issue results in missing data when the DEXA is physically operating, with no messaging to indicate that data is not being recorded. The root cause of this issue is still undefined and may be due to differing reasons. One of the causes of this has been due to invalid calibration of the DEXA in the morning. The messaging presented to the maintenance staff upon start up does not inform of an error, and due to the DEXA physically operating, results in lost data. A solution has been put in place with a change in messaging when this fault occurs to ensure the maintenance staff are aware of missing data. Other software issues have occurred when there have been updates to the software or when changes to the current software have been made.

c. Mechanical issue

A mechanical issue has been occurring at GMP with a pusher located prior to the DEXA not operating at the correct speed. This issue has caused significant issues reducing scan rates achieved by the DEXA. GMP are working with Scott's to determine whether a warning can be inbuilt when this issue starts to occur.

4.1.3.2 Systems and procedures

Consultation with the GMP team is continuing to ensure the correct level of support is available to employees to achieve the policies and procedures put in place. Additionally, policies and procedures are continuing to be written to ensure the correct considerations are being taken into account. Examples of procedures and policies that are currently being developed and systems being considered include but are not limited to.

- Continual operation of DEXA – carcase scan rate policy. This will be set to 100% with a range of systems and procedures put in place to ensure staff are supported to achieve this scan rate.
- Calibration sign-off procedure – allocation to the QA department to undertake this along with a procedure when calibration is unsuccessful.
- Data quality check prior to release of data. This procedure requires a robust system to be built. Currently GMP are checking data quality manually. This is undertaken by ensuring that

the values generated fall within acceptable limits. Further, the recording of disease and defect information on an individual carcase basis is extremely important to ensure that data quality is acceptable. If a carcase has been severely trimmed, the carcase composition values are no longer valid as they do not represent the pre trimmed carcase. Therefore, having a system in place to ensure individual disease and defect information is recorded is extremely important in ensuring that invalid values are removed prior to sending feedback to producers.

Further work within the data quality area is currently being focused upon. There are further data quality reporting issues that need to be rectified such as when a carcase is presented to the DEXA in a turned position or when a carcase is scanned swinging creating a blurred image. These data points need to be flagged and removed due to incorrect values being generated.

- Fault reporting, breakdown and bypass reporting. To ensure faults/alarms, breakdowns and bypassing of the DEXA are recorded along with the reasons why these occur are recorded. The reporting system currently used is communication between the slaughter floor, maintenance and DEXA project manager. This information is collated into a weekly report, along with the carcase scan rate to ensure all faults are being recorded and dealt with accordingly.
- Start up and shut down procedures for DEXA. This section will encompass the calibration check procedure for maintenance and interaction that will need to occur between maintenance and the QA department. This has become an important aspect of ensuring that a calibration check procedure is in place when producers are receiving feedback.
- Producer feedback policy and procedure. This aspect has been developed to fit a manual data assessment model. When a carcase has been trimmed on the retain rail for disease or defect or in the case of a missing data point, the average for the remainder of the mob will be applied when payment based on lean meat yield is occurring, otherwise a missing data point will be applied with explanation to the producer as to why the carcase was trimmed and why the composition value cannot be applied.

4.1.3.3 Calibration and data integrity

Calibration and data integrity are extremely important within his project. Systems and procedures will be developed as highlighted in the previous section. This section highlights the ranges of values that have been recorded from February 2020 until March 2021 for lean (Figure 4), fat (Figure 5) and bone tissue (Figure 6).

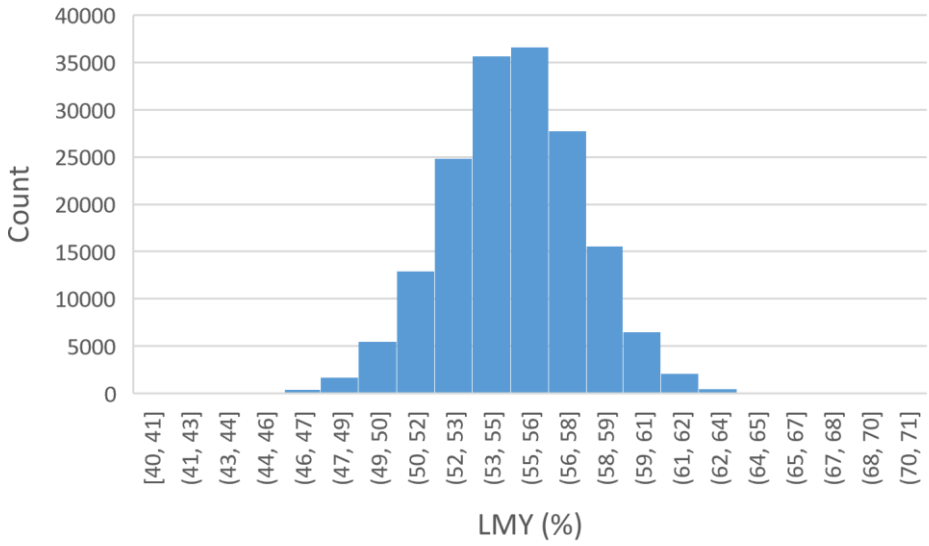


Figure 4. Lean percentage histogram indicating the range of values recorded since February 2020.

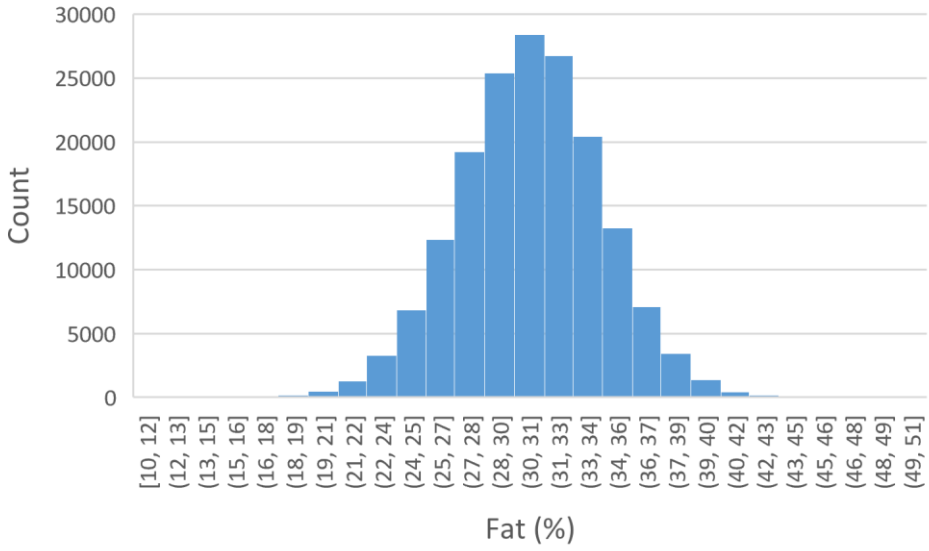


Figure 5. Fat percentage histogram indicating the range of values recorded since February 2020.

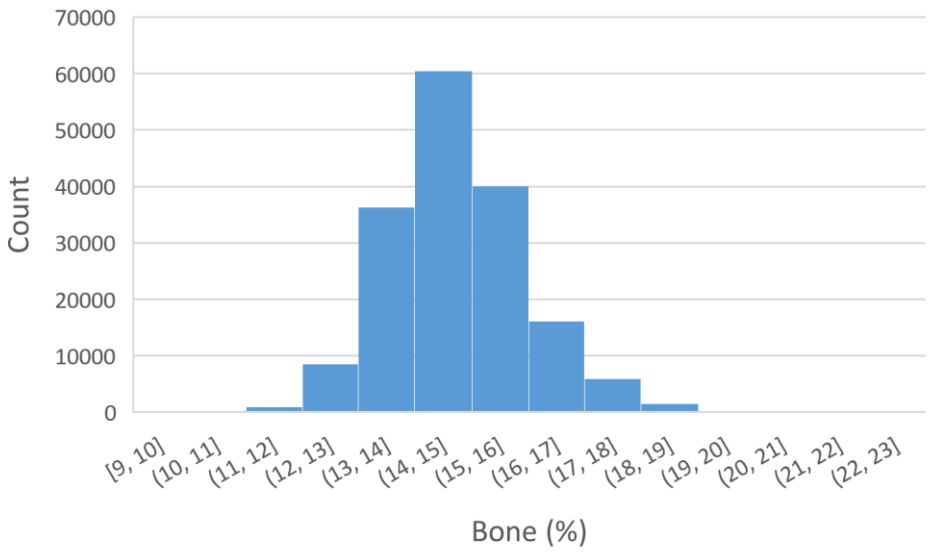


Figure 6. Bone percentage histogram indicating the range of values recorded since February 2020.

Table 2. The minimum, maximum and average values for lean, fat and bone tissues generated at GMP between February 2020 and March 2021.

	Minimum value	**Maximum value**	**Average value**
Lean %	40	70	53
Fat %	10	50	32
Bone %	9	22	15

Table 2 indicates the minimum, maximum and average values recorded with the site-specific algorithms. A paper published by Gardner et al (2018) indicates that within the resource flock lambs, which were variable in composition, the limits of normality sit with the ranges given in Table 3 below.

Table 3. The minimum and maximum values for lean, fat and bone tissue generated within the resource flock lambs (Gardner et al 2018).

	Minimum value	**Maximum value**
Lean %	47.29	66.80
Fat %	15.76	39.53
Bone %	11.07	21.04

There is a difference in the values recorded at GMP in table 2 versus the expected ranges in table 3. The likely reasons could be due to trimmed, rotated, or unbalanced carcases being included in Table 1, resulting in values that may not be representative of a standard carcase. Additionally, a wider range of lambs may have been processed through GMP producing a wider range of values in table 2. This highlights the need for an individual carcase disease and defect system to be in place to ensure values that lie outside if the expected range are account for. Additionally, in depth reporting needs to be developed to ensure that any rotated, swinging, or unbalanced carcases are identified and excluded.

A calibration project was undertaken with Murdoch University in November of 2019. During this project lambs were scanned through the DEXA in quick succession and every 12 hours throughout the chilling process. Murdoch University exported the data from the experimental work undertaken and produced a GMP site specific algorithm for the GMP DEXA. This enable the data to be relied upon with high accuracy.

4.1.3.4 Data integration

There have been several projects within the data integration phase of this project that have either been completed or are ongoing. These projects include the following.

- Movement of HSCW from the Triton system to the Scott Automation and Robotics system for use within the algorithm.
- Movement of DEXA values from the Scott Automation and Robotics system to the Triton system for storage.
- Installation of an ALMTech PC for trialling and testing new algorithms.
- Upload of DEXA composition values to the Livestock Data Link platform.

The movement of HSCW from the GMP Triton system to the Scott's Automation and Robotics systems has been achieved. Scott Automation has worked with Triton to ensure hot standard carcase weight is used within the algorithm to generate the most accurate composition values. The movement of DEXA values from the Scott Automation and Robotics system to the Triton Fusion system for storage and use has also been completed. DEXA composition values have not been uploaded to Livestock Data Link due to there being further work required to complete this task.

ALMTech have commissioned Scott Automation and Robotics to install a PC at GMP to ensure there is a quick way to test new algorithms as they are developed. The size of the PC has recently been upgraded, delaying the install of this component.

4.1.3.5 DEXA commercialisation

GMP have been undertaking ongoing work to commercialise the hot DEXA that has been installed. The development of business rules has been extremely important to ensure that producers are receiving feedback that is sensible, clear, and concise and that there are business rules in place in the case there are missing values, a carcase has been heavily trimmed, the DEXA values are not valid due to the orientation of the carcase or due to carcase movement. The commercialisation of DEXA will see that feedback starts to flow back to producers and the DEXA is able to be used for internal value also. GMP is currently putting together business rules associated with DEXA. This involves making decisions around what type of feedback is given to a producer.

GMP are working with ALMTech project 5 to develop the business rules and systems to ensure that data that is released to producers and used internally is valid.

4.1.3.6 Value adding (internally)

A large body of work has been undertaken with ALMTech project 5 to work towards commercialising and driving value from hot DEXA internally. This has encompassed carcase yield optimisation work to drive value through smarter carcase sortation decisions in the chillers. A large body of work has been undertaken to improve the useability of the carcase optimisation tool, including cut decision trees and sense checking outputs. Further work has been undertaken to begin the process of automating the carcase optimisation process so that it is embedded within GMP's IT systems. This is an extremely important step to ensure optimisation of sortation groups from precision composition information is utilised on an everyday basis. A tactical tool has also been in development to allow for real world sortation decisions to be made quickly and efficiently with the use of the research tool for scenario testing.

4.1.3.7 Value adding (externally)

Driving value from hot DEXA for producers has begun. This is a slower process and largely involves education and the use of the Profitable Grazing Systems objective carcase measurements workshop delivery. This is an extremely important part of the DEXA project. If producers do not understand the value of hot DEXA or are not able to convert the feedback they are given into more profitable business outcomes, the technology and feedback will become worthless to producers. Additionally, with the lamb industry moving forward with objective carcase measurement, it is extremely important that producers are supported with this novel feedback to ensure longevity of the Australian Lamb Industry. To provide this support, GMP have set up a project with ALMTech to ensure that producers are fully supported when first receiving feedback. This support consists of a

follow up call to producers once they have initially received their feedback, a one-on-one session with an advisor and GMP representative to provide guidance around the feedback, and the opportunity to take part in the Objective Carcase Measurement Profitable Grazing Systems series of three workshops. The use of three different approaches has been used to determine the most effective way of engaging with producers and offer a range of strategies that may suit each producer. Throughout this project feedback will be collected from producers to ensure that there are clear learnings from this project and that an approach can be used by the wider industry when introducing novel feedback to producers.

4.1.4 Animal disease pilot study

Animal health feedback can allow producers to make informed on-farm decisions to manage the health status of their livestock and improve productivity and profitability. Despite the level of meat inspection that occurs within plants, the ability of meat processors to provide disease and defect data as feedback is currently limited by the ability to accurately and efficiently identify and record conditions. Processors are also limited by the information systems also required to then manage and transfer this information to producers in meaningful ways. The Health4Wealth project aims to support processors in upgrading animal health and disease information systems. As part of the project, an animal disease pilot study is being conducted to test whether disease and defect data can be more accurately and efficiently captured and collected on the processing floor, then transferred from processor software systems into the National Livestock Identification System (NLIS) database and Livestock Data Link (LDL). Gundagai Meat Processors (GMP) are participants in the animal disease pilot study.

The objectives of the project were.

- To demonstrate that individual and lot-based animal disease and defect data can be effectively and efficiently transferred to producers through existing industry infrastructure such as NLIS and LDL.
- To demonstrate that animal disease and defect data can be correlated to an individual animal where individual ID is present.
- To determine if the cost of animal disease and defects can be recorded and calculated reliably, and if this information will be valuable as feedback to producers.
- Provide animal disease and defect inspection information to producers to assist them in making better informed decisions regarding on-farm practices to improve livestock/carcase performance.
- To provide learnings that can be incorporated into the Health4Wealth project.

- To provide recommendations that can be incorporated into the NLIS and LDL project plan.
- To develop systems capability in the animal health area if the proof of concept is successful.

To achieve the desired outcomes of this project, there were 6 stages to the project.

Stage 1. Agreed conditions of interest & standardising of recording

The first stage of this project determined which diseases and defects were of greatest interest to GMP, and therefore, which diseases and defects to focus on within this project. Given the data analysis undertaken, the critical diseases and defects observed at GMP included pleurisy, bladder worm, bruising, vaccination lesions, sheep measles, arthritis and nephritis. To reduce the number of diseases and defects recorded at the offal station and retain rail whilst the Australian Authorised Officers (AAO's) were learning the system, two diseases and defects will be selected for each recording area: nephritis and bladder worm at the offal trays, and pleurisy and arthritis at the retain rail.

A review on the current state against the draft Australian National Standard for the Development, Collection and Reporting of animal health data, as well as feedback on the standards, was provided. Finally, a review of the current plant systems used for disease and defect lists was undertaken to allow for a setting that controls which disease and defects are reported for vendor feedback. Requirements identified include installation of hardware (screens/keypads) to capture data, as well as software upgrades to incorporate the health data collected into feedback and reporting systems (including alignment with PIC/lot numbers/kill agendas).

Stage 2. Amendment of existing IT systems

The second stage of this project was to undertake the required systems software changes to ensure that the draft standards were included in the programming and to ensure that an automated email could be sent with the information included. The hardware required for this project included three touch screens located at the gambrel up area of the slaughter floor, the offal trays and the retain rail, and RFID readers located at each area the touch screens were located. Additionally, there were requirements for mounts, power, and waterproof power requirements.

Stage 3. Identification of infrastructure and hardware required

The third stage of this project was to identify the additional infrastructure and hardware required to enable existing systems to record standardised diseases and defects.

The hardware and preliminary data collection method consisted of touchscreens and num pads. A hook tracking system was also required to ensure recording diseases and defects against individual

carcases was possible. AAOs were heavily involved in this process to ensure they can effectively complete the task.

The equipment identified for the animal health data collection portion of the project was minimal: scales, tubs, clipboards, and a table purchased to assist in the collection of samples on the slaughter floor.

Stage 4. Training of meat inspectors

The fourth stage of this project occurred simultaneously with stages 2 and 3. AAO's were heavily included in the decision-making processes during all stages. Communication with meat inspects was important to assist in the changes impacting their roles. Emphasis was placed on the meat inspectors understanding the importance of recording disease and defect information, along with understanding the system changes that were going to occur.

Different forms of engagement were used to inform the AAO's of the importance of the project and their role within the project. The AAO's at GMP were well engaged in the project with presentations given along with casual get togethers to discuss the project. An appropriate level of engagement with the AAO's and company employing them has been extremely important to ensure success, especially given the AAO's role in the project.

AAO's were trained to use the new system. This was undertaken by showing the AAO's how to use the system and allowing the AAO's time to get used to the system without pressure of data recording accuracy. This environment also allowed the AAO's to give feedback and assess whether they have time to enter information into the system.

Data collection trails were undertaken to ensure system changes allowed meat inspectors enough time to collect data, and that their duties were not compromised. This was tested at the gambrel up station, evisceration trays and retain rail. Work instructions have been drafted taking into account the amendments required to ensure AAAO duties are not compromised.

GMP recognise and appreciate the extremely engaged AAO team, which collaboratively worked together to achieve the goals of this project.

Stage 5. Validation of data collection

The validation stage was extremely important as it determined if the data being collected was correct. Data inaccuracy issues were investigated during this phase, and issues detected were resolved.

Data verification activities occurred through MINTRAC coming on site and comparing each AAO to a National Sheep Health Monitoring Project (NSHMP) inspector at the carcase and offal inspection points. Each assessment period was 30 minutes for each AAO at each inspection point with the identity of the AAO kept confidential. Disease samples were sent to Charles Sturt University (CSU) Veterinary Diagnostic Laboratory to verify the findings of the GMP AAO and the NSHMP inspector. It was found that the GMP AAO's were correct 86% of the time with 6% misdiagnosed and 8% missed. Of the histopathology analysis undertaken, 85% were most likely to be confirmed as the condition assigned by inspectors.

Future validation activities are planned to ensure the feedback provided to producers by GMP is accurate.

Stage 6. Cost of animal health

This stage conducted important investigations on providing feedback to producers relating to the reduction of profits due to disease and defects at processing.

The prevalence of disease and defects observed at the retain rail were firstly estimated using NSHMP data and compared to real-time data collection. It was recommended that the recording of diseases and defects during processing be conducted on an individual carcase basis, for all mobs processed.

A case study to develop a severity scoring system for arthritis was conducted. Paige Mazoudier, a CSU honours student was recruited to work on this part of the project. Paige spent week long blocks at GMP on the slaughter floor collecting and weighing trim components. A scoring system was developed which consisted of four categories of arthritis trim (foreshank, hindshank, foreleg and hindleg). The average proportion of carcase loss for affected carcases across all mobs was 4.6% of HSCW, which ranged from 1.1% and 20.4%. This equated to a cost of range from $2.95 for a forequarter shank to $18.08 for a hind quarter leg.

Provided as feedback to producers, these revenue losses due to disease provide a financial incentive to drive change to reduce the risk of disease and improve productivity. Further investigations are required to include the removal of multiple limbs in the arthritis severity scoring system, and the financial impact of multiple diseases.

Stage 7. Producer engagement and soft launch

Engagement activities with producers have been undertaken when GMP have undertaken workshops and events. This engagement included showing producers how they can currently access feedback via Livestock Data Link in relation to the National Sheep Health Monitoring Project whilst introducing

them to the Health4Wealth project and the introduction of feedback with greater accuracy. Producers were shown how to access their feedback and how to create a Livestock Data Link account. The cost of arthritis case study was also presented to producers at an MLA producer event held at GMP with Paige Mazoudier presenting preliminary findings to producers. The release of individual disease and defect data is yet to occur.

4.1.4.1 Challenges & Opportunities

There were many challenges associated with the Health4Wealth project at GMP. These ranged from IT systems to changes in the process on the slaughter floor to hardware issues. An extremely important aspect of this project has been the vision and importance of this project to GMP, without this vision, given the number of challenges, it would have been easy to cease to continue. This project has presented many opportunities for producers and for GMP. The capture of individual disease and defect information allows producers more transparency in their feedback and the ability to link different pieces of information back to individual carcases (such as hot standard carcase weight and Dual Energy X-Ray Absorptiometry (DEXA) information). In future, the cost of disease and defect may be relayed back to producers on an individual carcase basis, this information will allow producers to make informed management decisions on farm in relation to their lambs. For GMP the introduction of a more accurate system will remove the paper-based system currently used by AAO's for the National Sheep Health Monitoring Project and remove the need to estimate the incidence of disease within lines of lambs.

4.1.4.2 Conclusions

1. **An individual system to record disease and defects can be implemented within an ovine processing plant, although not without challenges.**

GMP were able to demonstrate the challenges and opportunities in introducing a new process to collect individual carcase disease and defects on the slaughter floor. Whilst the project has not reached the final stages, the system is being used on the slaughter floor to identify and remove any issues and to start introducing the new process. Through patience and persistence, GMP has been able to demonstrate that a new system to record individual disease and defect information can be achievable. This individual disease and defect recording system will allow GMP to pair several pieces of information together to provide greater insight to the producer. However, the full rewards of this system are yet to be determined.

2. **Clear visions for use of health data are required, and processing plants must ensure they assign a member of staff to drive the project to ensure success.**

A clear vision of how the data will be distributed and used is extremely important to ensure there is patience and a commitment to ensuring success. An assigned staff member to consistently drive the project is important for success.

3. **Further development of an enhanced feedback system to producers including cost of disease is required. However, it is possible to achieve this level of feedback.**

The cost of arthritis study shows that carcase losses were highly correlated to individual trim components, and so predicted losses in terms of absolute weight and revenue losses were derived. Provided as feedback to producers, these revenue losses due to disease provide a financial incentive to drive change to reduce the risk of disease and improve productivity. Further investigations are required to include the removal of multiple limbs in the arthritis severity scoring system, and the financial impact of multiple diseases.

4.1.5 Carcase optimisation tool

The carcase optimisation tool is a tool which has been in development for some time. Work has been ongoing with ALMTech project 5 and the University of Adelaide in running scenarios through this tool, undertake sense checking and the development of a new tactical tool for use within a real-world sortation approach.

Learnings

Several learnings have occurred in relation to the carcase optimisation tool. Further development of the tool has enabled cut and carcase weight constraints to ensure real world scenarios can be modelled. Further constraints are being considered to ensure the output from the optimisation tool can reflect what is realistic in the real world as much as possible. These constraints have been in the form of labour and mechanical restraints to ensure when an output is created the boning room manager is not rejecting outputs and continuing with the current sortation strategy. A new tactical tool is under development to ensure that scenarios can be run quickly and efficiently, whilst the original tool will remain as a research tool.

Learnings in the form of ensuring all parties are up to date and involved throughout the process has been important. Additionally, the line that exists between bringing in the boning room manager too soon, whilst the scenario outputs generated are still too hypothetical and in the development phase and bringing the boning room manager into the process too late, resulting in a lack of ownership over the process, is important to acknowledge. This has been a learning and a challenge and thus presents the core of managing this part of the project back to the human element. Thus far the focus has been technical in ensuring the carcase optimisation tool is producing sensible outputs and that

all constraints have been accounted for, the human element has somewhat been overlooked, however, this is now the most important aspect of this project to ensure that this tool can be embedded within GMP systems.

Impacts

The impact of successfully embedding this part of the DEXA project within GMP cannot be understated. This is a major way that GMP are going to be able to receive value from hot DEXA. With the current carcase chilling system ensuring that the practical aspects of this are achievable, it is entirely possible that this can be embedded at GMP. The human element must now be focussed upon to ensure those involved each day understand the importance and impact of having this embedded at GMP. Further, this must produce benefits for those most closely involved each day, such as decreased processing time through the boning room.

New opportunities

The new opportunities that have been realised with the carcase optimisation tool recently with a technical focus have been.

- Incorporation of new cuts within the lamb value calculator to ensure a wider breadth of cuts can be optimised.
- Incorporation of real world labour and mechanical restraints within the tool. This will allow for these constraints to be factored in and ensure the output produced is sensible for production in the real world. Additionally, this function can be used to produce what if scenarios. For example, if there is a real world constraint on which cuts can be produced together due to a machinery shortage, a scenario could be undertaken with and without this constraint to determine if the financial benefit of purchasing a new piece of machinery is paid off by ensuring that the correct carcases can be used for specific cuts.
- Development of a tactical tool which allows for scenarios to be processed quickly and efficiently for use in the real world.

Through realising the stage of the project and the human element required at this stage a new opportunity has presented itself in ensuring a plan for the human aspects of the project is put into place. There are still technical aspects that need to be worked through, however, to resolve these technical aspects there needs to be further human input. The new opportunity in this sense is to continue the work that needs to occur to ensure that all people involved have buy in and understand the importance of this project. Working with individuals and explaining the opportunities associated with using this tool in the real world will be integral to ensuring that the why is understood, further,

ensuring that those working with the tool daily have as much input as possible to ensure they have taken ownership.

5. Extension and Adoption

5.1 Producer workshops

A range of different producer workshops were undertaken at Gundagai Meat Processors throughout the life of the current project (see Table 4). These workshops ranged from an MLA event to animal health focus workshops and objective carcase measurement profitable grazing systems workshops. More recently producer engagement has focused on supporting producers receiving novel objective carcase measurement feedback, in the form of one-on-one engagement with a consultant.

Table 4. Producer engagement activities undertaken at Gundagai Meat Processors throughout the current project.

Activity	Date	Description	Number attended/businesses
MLA event	29/05/2019	MLA event funding was gained to provide the producers of a client with an educational day at GMP. Producers were broken into groups and given a tour of the facility, presented on animal health, genetics and livestock data link. Feedback in relation to this event is given in appendix 1 of this document.	30
Objective carcase measurement (PGS) workshop #1	21/06/2019	Producers came on site for the first in a series of three objective carcase measurement workshops. The workshop started at GMP with lecture style learning and activities undertaken. Producers undertook fat scoring in lairage and the carcases were followed through into the chillers with GR fat measurement	10

		taken to determine the accuracy of fat scoring in lairage. The feedback given for this session can be found in appendix 2 of this document.	
Illabo show committee carcase competition	14/10/2019	A local show committee were on site at GMP to process lambs that were entered into the competition. The show committee were taken for a tour of the facility and a GMP staff member undertook the carcase judging. The Illabo show committee producers assisted with the tracking of carcases through the lamb floor and into the chillers.	8
Animal health focus day in conjunction with Zoetis	11/11/2019	Zoetis arranged for a group to come on site to undertake an animal health focus workshop at GMP. Participants were given a tour of the processing plant with a focus on the collection of disease and effect information. For the remainder of the day a workshop was facilitated by Zoetis which included case studies and lecture style information.	16
Objective carcase measurement (PGS) workshop #2	13/11/2019	Producers came on site for the second in a series of three objective carcase measurement workshops. The workshop started at GMP with lecture style learning and activities undertaken. The group then travelled to a nearby farm (Coolac) to undertaken learning in ram selection and pastures. The feedback give for	10

		this session can be found in appendix 3 of this document.	
Objective carcase measurement (PGS) workshop – keeping engaged	25/08/2020	The third and final workshop for the objective carcase measurement PGS was postponed due to COVID. This workshop was put together to keep the group engaged and to give them an opportunity to have a tour of the GMP plant. Will Barton led the tour using an iPhone and undertook a presentation through zoom to the group.	10
Gundagai Lamb half day producer engagement	30/03/2021	Gundagai Lamb producers have been given novel feedback. In order to support this feedback the producers attended a half day workshop detailing the support that will be offered to them in interpreting the feedback and determining how they will use it within their business. Producers were also given a tour of the GMP facility and were presented information regarding Gundagai Lamb.	7
Gundagai Lamb one on one engagement sessions	April onwards	An important aspect of supporting Gundagai Lamb producers is supporting the novel feedback offered. A project with ALMTech support has been put together to offer producers one on one consulting services to ensure producers can interpret their feedback and make decisions within	5

		their business in relation to the feedback.	
Gundagai Lamb Objective Carcase Measurement (PGS) workshops	April onwards	Gundagai Lamb producers have been offered the opportunity to learn more regarding objective carcase measurement through the Profitable Grazing Systems program. This will ensure that Gundagai Lamb producers can access the three workshops, funded by ALMTech.	10-12

5.1.1 Successes

There were many successes associated with producer engagement at Gundagai Meat Processors throughout this project.

- Successfully running producer tours through Gundagai Meat Processors.
- Piloting the objective carcase measurement profitable grazing systems workshop.
- Delivering a live virtual tour of Gundagai Meat Processors with great feedback and opportunity for producers to see inside the plant whilst access was restricted (due to COVID).
- Beginning the education of producers around animal health and objective carcase measurement.
- Running an MLA event and determining the best way to do so given the facilities at Gundagai Meat Processors.
- Building relationships with local producers, consultants, and service providers.
- Setting up and starting to deliver a larger project around objective carcase measurement feedback.

5.1.2 Challenges

Although there were many successes in producer engagement at Gundagai Meat Processors, there were also some challenges along the way.

- Engaging with producers who were not tied to a specific client or brand was challenging.
- COVID was a big challenge that resulted in the halting of producer engagement due to visitor restrictions on site.

5.1.3 Future opportunities

- Engagement with producers as part of the Gundagai Lamb brand will ensure easier access to producers.
- With the offering of novel feedback there is an opportunity to ensure that producers understand and can interpret their feedback and ensure that objective carcase measurement is of value to businesses.
- Creating a connected supply chain from producer to wholesaler through Gundagai Lamb.
- Development opportunities for early career consultants through projects undertaken through Gundagai Lamb with local producers.
- Continued relationship building with local consultants, service providers, Universities, and Government Departments through project support and exploration of new opportunities.
- Continued relationship building with local producers, offering producers transparency, and connecting the supply chain together.
- Demonstration of how value can be derived from objective measurement technology for all stakeholders involved.

6. Professional development

6.1 Activity participation

A range of professional development activities were undertaken throughout this project. Table 5 indicates the professional development activities, time frames and the benefits of each activity.

Participation in the Women and Leadership Executive Ready professional development activity was a highlight amongst the activities undertaken. This course allowed me to be exposed to women working in a range of different industries and to develop my skills and knowledge in the leadership area. Attendance at the Meat Business Women events has exposed me to a range of different people working within the Meat Industry in Australia and given me the opportunity to be part of a large network of women working within the industry. Each event has involved a range of presenters who have spoken about their journey throughout the meat industry and other industries. The opportunity to learn from others through listening to presenters and networking has been invaluable to my development.

Participation in conferences such as the International Congress of Meat Science and Technology (ICoMST) conference online and the Australian Association of Animal Sciences (AAAS) conference online were opportunities to keep up to date with research occurring worldwide within the meat

and animal science areas. These opportunities are extremely important to continue developing as an animal scientist and to be able to present published work undertaken as part of this role.

Participation in meetings including the National Supply Chain Group, Supply Chain and Digital Value Chain Officer meetings and the MLA Co-Innovation Manager meetings all allow exposure to external parties and other people working within companies. This exposure ensures that collaboration can occur when appropriate and for a supportive network to develop externally.

Opportunities for professional development when working within the private sector are not as bountiful as compared to working within a University or Departmental environment. The opportunity to participate in professional develop opportunities through this co-funded position has been extremely valuable to ensure growth and learning continue to occur.

Table 5. Professional development activities undertaken.

Description	**Time frame**	**Location**	**Benefits**
Women and Leadership Executive Ready Course	12/02/2019 23/05/2019 19/08/2019	Sydney	Being involved in this course allowed me to learn more about leadership styles and personality styles. It changed how I approached working with others and gave me strategies that I could use at Gundagai Meat Processors. I would recommend any woman working with the Red Meat Industry to take on leadership courses to increase skill sets and confidence when leading within industry.
Meat Business Women Events	3/04/2019 9/10/2019	Melbourne Brisbane	The biggest highlight of the Meat Business Women events I attended were focussed around hearing about other women's journeys with the Red Meat Industry, and importantly, other industries. Additionally, the ability to network and meet new people working within the industry has been extremely valuable and something I will continue to be involved with.
Sheep CRC Final Conference	19-20/03/2019	Dubbo	Having been supported by the Sheep CRC from 2016-2019 it was important for me to attend the Sheep CRC Final Conference. This conference presented the opportunity to network with a range of people including other processing company representative, researchers, extension workers and industry partners.
National Supply Chain Group meetings	18-19/3/2019 15-16/10/2019 25-26/02/2020	Dubbo Sydney Brisbane	The main benefits of attending the National Supply Chain Group meetings has been the opportunity to network and work face to face with external collaborators. Attending these meetings has also allowed me to be exposed to different guest speakers and the relationships I have formed as a regular attendee of these meetings has resulted in collaboration with researchers in projects that may not have otherwise occurred.
Red Meat 2019	18-20/11/2019	Tamworth	It was a great opportunity to attend and take part in the Integrity Systems Company panel at Red Meat 2019 in Tamworth. This was a great experience in presenting to the room as part of a panel and attending a Red Meat event for the first time and engaging with the producer attending was a great experience.

Supply chain and digital value chain officer workshop (online and in person)	4-5/12/2019 (in person) 6-7/05/2020 (online) 1-2/12/2020 (online)	Sydney and online	The workshops offered as part of the Supply Chain and Digital Value Chain Officer roles had multiple benefits. When able to be held in person these workshops allowed for the most important benefit, networking. This is a such an important part for people employed within different companies as the novel nature of these roles can be challenging within a business. The ability to network with others in similar roles is extremely important. Additionally, hearing from a range of different departments within MLA is helpful in having the awareness of the range of projects being undertaken within MLA and how collaboration can occur.
International Congress of Meat Science and Technology (ICoMST) conference online	3-6/08/2020	Online	Attendance at ICoMST online allowed for access to scientific content and presentations in relation to meat science. This professional development allows for continual learning and awareness of current research occurring within the meat science area.
Australian Association of Animal Sciences (AAAS) conference online	1-3/02/2021	Online	AAAS was an extremely important conference to attend. I was able to join the Wagga Wagga hub for one day and undertake some networking with others that joined in person. Additionally, as part of the Gundagai Meat Processors Health4Wealth project a paper was published regarding the arthritis scoring system work undertaken. Paige Mazoudier presented this work at the conference and as such it was an important conference to attend given this work.
MLA Innovation Manager Meeting	17-18/02/2021	Online	This was the first MLA Innovation Manager Meeting I have attended. Attendance at this meeting was beneficial in that I was able to hear about other work being undertaken in these roles. Additionally, the meeting was engaging and allowed for workshops to occur with other participants which increased the value of the workshop.

6. Conclusion

There were many challenges and opportunities associated with each aspect of this co-funded position. Overall, the provision of funding for this position has given the opportunity for a greater range of collaborative projects, particularly with ALMTech and with Universities and Departments as the co-funding model has ensured that there has been exposure to a range of external parties, along with a range of professional development activities that have fostered collaborative activities.

Whilst there were challenges associated with producer engagement there were also many successes and, more importantly, future opportunities. In total there were eight producer engagement activities undertaken at Gundagai Meat processors, ranging from animal health engagement days to objective carcase measurement three-day workshops, an MLA event and support of a local show. These activities were beneficial to not only Gundagai Meat Processors but importantly they were greatly beneficial to producers. Producers have been able to come on site and experience a tour of a meat processing facility, an opportunity not all producers have, along with the opportunity to take part in learning activities whilst on site.

There have been many challenges associated with the installation of DEXA, these challenges have been associated with the continual operation of DEXA and ensuring that appropriate solutions are put in place to increase operational uptime and scan rate of carcases. Additionally, working through the business rules and how to commercially implement DEXA has been challenging. The benefits of installing a DEXA, in relation to providing an objective carcase measure of carcase composition to producers will be extremely valuable to producers. This information will allow producers to know exactly what they are producing and to review how they select genetics and manage nutrition to ensure they are gaining value out of the feedback. Additionally, through a project with ALMTech, GMP will be able to determine how to provide this as feedback to producers to ensure value is gained.

The Health4Wealth project has presented many challenges, however, through a clear vision of why the collection of information is important to the business it has continued and is moving through the trialling phase currently. The delivery of individual carcase disease and defect information will become extremely important for producers when disease management decisions. Further, it will ensure that an invalid carcase composition values are not fed back to producers or used within the business.

6.1 Key findings

The key findings and learnings from the professional development work undertaken are given below.

- Participation in the Women and Leadership Executive Ready program was extremely beneficial as it introduced new ideas, awareness, and people from difference industries.
- The mentor program within the Women and Leadership program allowed for relationship development to occur with other people within the program.
- The budget allowance was critical in allowing for travel to occur to meetings and for attendance at conferences.
- Support in the professional development area is critical within co-funded roles in private companies. Opportunities to participate in professional development activities are not as easily accessible when working within the private sector, thus, support within this area is critical for continued development.

The key findings and learnings associated with the data projects undertaken include the following.

- The integration of a hot DEXA into a plant is a complex process with involvement from many different parties. This requires good communication and co-ordination.
- One of the largest issues is ensuring the continuous operation of the hot DEXA and the ability to manage faults and alarms that may occur.
- Calibration of the DEXA to ensure a site-specific algorithm is in place is extremely important for data integrity purposes.
- The steps to commercialisation and ability to generate internal and external value are large parts of the project and need to be supported by business rules.
- A program of work to ensure producers understand and can generate value from the DEXA composition values is extremely important. The feedback being produced is novel to the lamb industry and thus needs to be supported appropriately.
- Integration of an individual disease and defect recording system is a challenging project. Many obstacles will be presented, and it is important to continue to move forward rather than allow any one obstacle to stop progress.
- Having a clear idea as to how disease and defect data will be used in a business is important to ensure there is continual support to project completion.
- An arthritis scoring system can be developed to support transparent feedback to producers that could include a cost aspect in future.

- The development of the carcase optimisation tool takes input from many different parties to ensure it can be used to produce real world scenarios.
- When developing a new tool it is important to gain input from different parties, however, it is important to determine the correct time to bring different parties into the development phase to ensure there is internal buy in.

There were many key findings and learnings taken from the producer engagement work undertaken.

- The importance of producer engagement must be appreciated by the brand or client when working in a service processing business.
- Producers do want advanced feedback in relation to objective carcase measurement and can be engaged in workshops to increase their understanding in this area.
- There is a need to ensure that producers understand advanced feedback for their business to ensure they gain value.

6.2 Benefits to industry

The key benefits to industry of this co-funded position are as following.

- Capability and capacity building for producers in the local area.
- Connecting the supply chain through delivery of workshops for producers at Gundagai Meat Processors, including delivery of facility tours.
- Development of a supportive program to be delivered to producers receiving DEXA composition feedback for the first time.
- Engaging with many different industry service providers and stakeholders and building relationships within the industry for future content delivery to producers.
- Development of tools and strategies to drive value from DEXA composition data.
- Development of an arthritis scoring system that has been published and is available to the wider industry.
- Development of a resource within the red meat industry through access to professional development activities.
- Collaborative projects of benefit to industry have been completed due to collaborative work undertaken with external parties.

7. References

Gardner GE, Starling S, Charnley J, Hocking-Edwards J, Peterse J, Williams A (2018) Calibration of an on-line dual energy X-ray absorptiometer for estimating carcase composition in lamb at abattoir chain-speed. *Meat Science* **144**, 91-99.

8. Appendix 1

8.1 MLA event producer feedback

Table 1. Distance travelled by producers whom attended the GMP:KC Natural MLA event held at GMP.

Item	Kilometres
Average km travelled	173
Minimum km travelled	37
Maximum km travelled	528
Standard deviation km travelled	132
Count	29

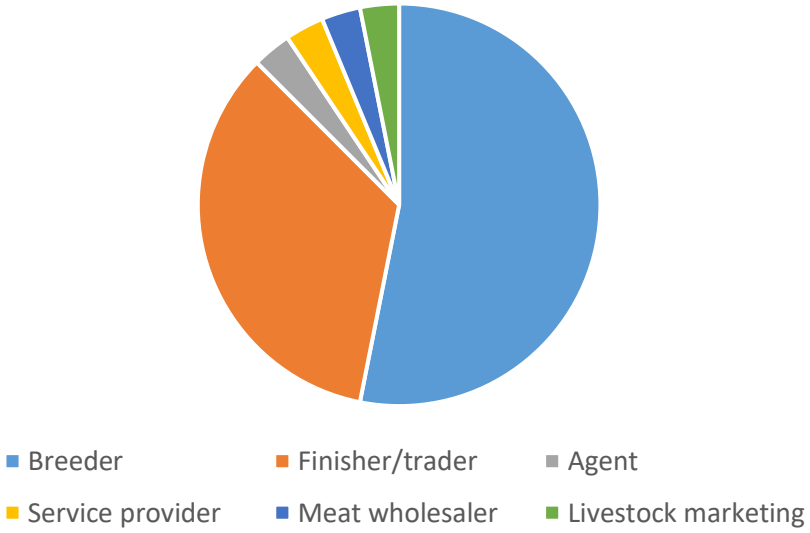


Figure 1. Pie chart indicating the number of attendees representing different business types.

Table 2. Descriptive statistics regarding the number of ewes and sheep carried on producer properties.

Item	Value
Ewe population on farms	
Average	2820
Minimum	600
Maximum	8000
Standard deviation	2031
Sheep population on farms	
Average	5425
Minimum	1400

Maximum	14000
Standard deviation	3389

Table 3. Descriptive information regarding each presentation undertaken.

Was the presentation clear and engaging?	
Was the Objective Carcase Measurement presentation informative?	
Agree	19
Strongly agree	10
Was the Livestock Data Link presenter clear and engaging?	
Disagree	1
Neither	2
Agree	15
Strong agree	12
Was the Genetics presenter clear and engaging?	
Neither	1
Agree	15
Strong agree	13
Was the genetics session informative?	
Neither	3
Agree	16
Strongly agree	10

Table 4. Livestock data link specific feedback

Item	**Count**	**Percentage**
Had you heard of LDL?		
Yes	8	27
No	22	73
Do you have an existing LDL account?		
Yes	4	13
No	26	87
Will you create an LDL account?		
Yes	20	74
No	6	22
Undecided	1	4

Table 5. Descriptive information regarding animal health specific feedback.

Item	Count	Percentage
Would you like further feedback on animal health?		
Yes	28	93
No	2	7
Would you change practices with further animal health feedback?		
Yes	26	93
No	1	3.5
Maybe	1	3.5
Would you like health feedback to include cost to your operation?		
Yes	25	83
No	5	17

Table 6. Descriptive information in relation to the genetics session specifically.

Item	Count	Percentage
Was there any further genetics information you would like to hear?		
Yes	4	15
No	22	85
Item	**Count**	**Percentage**
Did you enjoy the tour?		
Yes	26	100
No	0	0
Did you feel safe during the tour?		
Yes	26	100
No	0	0
Was the tour informative about how your lambs are processed?		
Yes	26	100
No	0	0
Had you been through a meat processing plant previously?		
Yes	15	58
No	11	42
Did you enjoy the Q&A session?		
Yes	26	100
No	0	0

Would you be interested in attending further producer days?		
Yes	25	96
No	1	4
Did you enjoy morning tea and lunch?		
Agree	3	11.5
Strongly agree	23	88.5

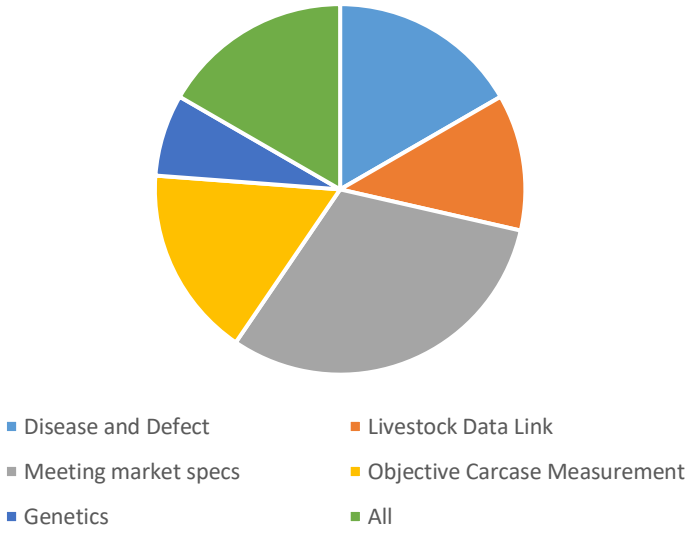


Figure 2. Areas producers are interested in focusing in on for future producer event days.

Producers indicated they would like feedback to encompass the following areas in future.

- Carcase quality.
- Different breeds, grids and how they compare to my mob (benchmarking).
- Disease and animal health.
- Markets feedback information.
- Reproductive and lamb production and survival.

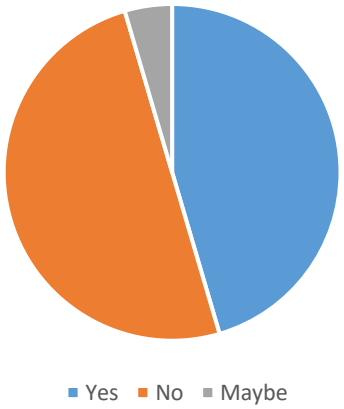


Figure 3. Responses from producers when asked if they would like to form producer groups in future with meetings conducted across time focusing on different areas.

General comments given by some producers included the following.

- Always comment on the catering…was excellent. Tour of plant exceptional.
- Fantastic – well done!
- Focus on markets.
- Great scones, well done.
- Thanks.
- Very good day thank you.
- Well done.

9. Appendix 2

9.1 OCM PGS workshop 1 feedback

Table 7. Evaluation of the first workshop.

	Average	min	max
Live Lamb Assessment: All	**8.9**	8	10
Terminologies/LMY benefit value chain: Deliverer 1	**7.9**	6	10
Objective Carcase Measurement: Deliverer 1	**8.6**	7	10
Livestock Data Link: Deliverer 2	**8.6**	7	10
Tools for producer / Action Plan: Deliverer 1	**8.0**	7	10
Event Coordination / Organisation / Catering / Venue: Deliverer 2	**9.5**	7	10
How satisfied	**8.0**	7	9
How valuable	**8.4**	8	9
Recommend to others	**100%**		
Plan to make changes	**100%**		

What did you like most and why?

- IMF / most profitable lamb
- LMY% discussion and why it's important
- Information about present and future carcase assessments
- Group of like minded producers / focused on a target market (Mirool Creek), invested in supply chain.
- Having Mirool Creek (Bill Hayes) present and being invited to contribute
- How to focus on improving genetics to produce better lambs for the current market trends.
- Live lamb assessment (2)
- Beating the Boss at the live lamb / fat scoring assessment
- Interactive – get your hands on the lambs, your won fat score vs GR Knife.
- Feedback information (LDL) – carcase (to come), and animal health (available).
- Introduction to LDL

- Session on feedback and its importance
- It was good session to ask Producers about their system, and then refer / reflect back to them during the workshop.
- Bruce's friendly teaching style
- The scones!!!
- Great venue – warm, right size, good data / video projection
- Well presented, engaging, relevant information

What did you like least and why?

- Missing out on a tour of the plant (but understand that will be in session 2)
- Nothing stood out – all generally good
- Need to define the terms better, as its important to set the scene.

Suggestions for improvement

- Hearing about what genetics and whose got what, to see what everyone's ideas are and how the LMY% are coming back. Share some benchmarking
- LDL (carcase) needs a case study, or able to access own data
- A lot of "info still coming", soon to be released, and no IMF% OCM yet – need to ensure to get deeper into the actions on-farm in Sessions 2 and 3.
- More information about options for producers to make the changes needed at low cost.
- Maybe some issues were quickly run through (and didn't come back to them) – time management.
- Missing / running through quickly – I hope after 3 session, everything will be covered and it will be clear what I can do with my lamb enterprise.
- A bit more information to producer on complexities of production, transport and retail beyond the farm gate (will be in session 2)
- In session 2 (Plant Tour), ensure you show producers where the measurements are taken, how and why losses occur.

Specific Feedback on each Session:

Live Lamb Assessment:

- Just a shame I didn't fat score better

Essential Terminologies/LMY benefit value chain:

- Need to be more clear in slides

Objective Carcase measurement

- All rather new to me, so it was a quick / rushed lesson.

Livestock Data Link:

- Needs a real-time example, or case study.
- Maybe a little rushed
- I look forward to logging into LDL

Tool for the Producer / Action Planning

- Needs more time probably leads to one on one discussion after the sessions or follow-up

Event Coordination / Organisation / Catering / Venue:

- Thankyou to GMP and Mirool Creek.
- Roast lamb lunch would have been a winner!
- Great venue.
- Well presented.

10. Appendix 3

10.1 OCM PGS workshop 2 feedback

Table 8. Evaluation of the second workshop.

	Average	min	max
Prime Lamb Profit Drivers: Deliverer 1	**8.8**	5	10
Understanding ASBV's & Indexes / breeding objective: Deliverer 1	**9.3**	8	10
RamSelect App: Deliverer 2	**9.3**	7	10
Feed quality and quantity - Deliverer 1	**8.8**	6	10
Nutrition and growth path - effects on LMY & EQ - Deliverer 1	**8.8**	6	10
Host rams: ASBV's (practical - on farm) – All deliverers	**9.7**	9	10
*Pasture assessment (on-farm): Deliverer 2	**6.3**	2	10
Seasonal feed production / Action plan: Deliverer 1	**8.7**	8	10
Event coordination / Catering / Venue: Deliverer 3	**9.7**	8	11
How satisfied with this event	**8.8**	5	10
How valuable	**8.8**	5	10
Recommend to others	**88%**		
Plan to make changes	**75%**		

* No feed to assess in pasture assessment, so difficult to do. Spent time looking at containment/drought lot

What did you like most and why?

- New tools available: RamSelect
- Openness of all conversation, positive environment
- ASBV's
- All sheep farmers should do this. Well done
- Drought lot management
- Understanding of ASBV's

- Farm workshop and talk at the start from CEO of Gundagai Meat Processors
- The point being demonstrated that looks aren't everything
- Learning about ASBV's and selection of rams

What did you like least and why?

- All interesting - you can always learn something
- Last session on calculating growth rate of lambs
- Pasture assessment: no pasture
- Pasture assessment: not enough grass to assess!!

Suggestions for improvement

- More sessions for different areas
- Try to finish up by 4pm so we can travel
- More on ASBV's

Specific Feedback on each Session:

Host rams: ASBV's & Indexes (on-farm practical session)

- Great to demonstrate the point using ASBV's

Event Coordination / Organisation / Catering / Venue:

- Excellent
- Food was excellent. Great food on offer (FOO)