



# final report

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## **Collection and reporting of inspection data for continuous improvement and productivity throughout the Beef Supply Chain**

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## Executive summary

This project aimed to develop a method of collecting and reporting meat inspection data for continuous improvement in productivity throughout the supply chain.

Every carcass, head and offal set processed is inspected under legislation for food safety both on an animal health and hygienic dressing basis. Currently the only data that are formally collected and reported back to processors and producers is the condemnation of entire carcasses by government officials. This results in the loss of valuable information on the herd health and dressing process that could be used for continuous productivity improvements.

The change in regulatory requirements to allow the use of third party meat inspectors has provided the opportunity for this project. Third party meat inspectors can collect these data as part of their auxiliary duties.

This project aimed to develop

- a standard data set for the project (that could be used by the wider industry),
- a preliminary collection method through abattoir trials and
- correlation to existing company traceability records, analyse the collected data to develop feedback opportunities to improve productivity throughout the supply chain.

There were a number of major obstacles to the outcomes being achieved. One was the change management of meat inspectors to ensure the collection of data without direct and continual oversight of meat inspectors. The second was the development and integration of the IT system and interface to collect the data. Data has been analysed, identifying significant losses to the supply chain through sub-clinical animal health diseases. This is an approximate \$2.6 million opportunity to the single Teys Australia abattoir in which the system was trialled across a number of sub-clinical conditions and approximately \$1.8 million for liver fluke alone in the cattle supply.

Further extension work was also undertaken with the producers as Teys Australia acknowledged the importance of a successful roll out and the change management process that would have to be worked through with producers to use the feedback to reduce these losses. This resulted in a Phase 2 project proposal to MLA to continue the work including further extension work and cost benefit analysis of the findings, with roll out of this process across the Teys Australia plants.

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## 1 Background

This project aimed to develop a method of collecting and reporting meat inspection data for continuous improvement in productivity throughout the supply chain.

Every carcass, head and offal set processed is inspected under legislation for food safety both on an animal health and hygienic dressing basis. Currently the only data that are formally collected and reported back to processors and producers is the condemnation of entire carcasses by government officials. This results in the loss of valuable information on the herd health and dressing process that could be used for continuous productivity improvements.

The change in regulatory requirements to allow the use of third party meat inspectors has provided the opportunity for this project. Third party meat inspectors can collect these data as part of their auxiliary duties.

This project aimed to develop

- a standard data set for the project (that could be used by the wider industry),
- a preliminary collection method through abattoir trials and
- correlation to existing company traceability records, analyse the collected data to develop feedback opportunities to improve productivity throughout the supply chain.

For example, feedback to the producer on the condemnation of carcasses or part carcass due to herd health, providing producers with the opportunity to adopt practical changes on farm to improve carcass performance that will increase returns to the farm gate.

Trial work conducted by a drug company and an MLA-funded project (B.AHE.0041) in Tasmania demonstrated returns in sheep processing through the collection of post mortem data being fed back to producers, with preventative treatments implemented. This project expands this area of work into the beef sector.

The project has the potential to be utilised across all species (with the development of species specific data sets) and across the entire industry to provide feedback to producers across the country.

## 2 Project objectives

The project objectives were the,

- Development of a data collection standard,
- Development of a system that collects and provides post-mortem inspection feedback to assist improvements in processing procedures and on farm practises, and
- Undertake trials at Teys Australia plants to test the validity of data collection and methodology.

## 3 Methodology

### 3.1 Development of a data collection standard

A draft standard data was developed for collection of the inspection findings and inspection actions taken, collected against each body number. The data to be collected includes not just animal health

/ post mortem inspection findings such as liver fluke but severity of the disease in some cases i.e. grading of liver abscess and/or meat inspector efficiencies gained through trimming.

The data set was developed through research, with the addition of discussions with Teys Australia's feedlot veterinarian, Teys Australia's staff, third party Australian Government Authorised Officer service providers and Meat Inspectors. Information was also sourced from the Department of Agriculture on the reasons for carcass condemnation for the last 5 years.

### **3.2 Development of a system that collects and provides post-mortem inspection feedback to assist improvements in processing procedures and on farm practises**

#### **3.2.1 Review of Teys Australia's existing system in 2015**

A review of Teys Australia's existing information technology system was conducted through discussions with Teys Australia personnel from multiple areas of the business.

Teys Australia's existing software systems for the collection of post mortem inspection were found to have limitations, which required addressing to allow enough data to be collected for the trial.

Limitation 1: Records could only be collected by exception i.e. information on condemn reasons could be entered against affected carcasses however acceptable/passed status was not recorded against all other carcasses. This was recorded by the condemn reason being selected and the body number entered each time, which had the potential of making the recording more laborious. This was the initial advice provided by Teys Australia's staff however on testing of the new system, it was identified that the existing system does allow for the recording of information against every carcass when the 'Accept' button is selected.

Limitation 2: The software only had approximately 20 available fields for the condemnation reasons. This has since been proven not to be the case however the system is limited to a maximum of 16 fields per page, however multiple pages can be used.

Limitation 3: The software is set up for general access rather than an individual log on basis.

Other information required for the project such as ante-mortem condemnation information, carcass weight and supplier information is already collected against body number within the Teys Australia system. This means that with either slight modifications to the Teys Australia system or with the addition and integration of a system for the collection of the post mortem information all the required information could be correlated for analysis and generation of reports.

Teys Australia's hardware consisted of touchscreen terminals at all inspection points at the plant for the first trial however at the other plants the terminals were limited to the head and viscera inspection points. Wifi was available at all three plants and accessible on the slaughter floor however internet coverage in the areas was sporadic due to the building structure and interference caused by the equipment on site.

Based on this information it was identified in the initial trial that a further system for the collection of post mortem information was required and that a minimum of two tablets would be required for the collection of data.

### **3.2.2 Initial development of a preliminary data collection method**

Early in the project planning the decision was made to use touchscreens and tablets and an app or web-based system for the collection of information, should there be a gap in the existing Teys Australia system. It was acknowledged by all involved in the project that there was a number of possible solution that could be used for the collection of the data, however these all came with significant investment. The project's approach to the collection of data allowed for the assessment of the cost-benefit prior to any significant expense or investment in updates to the existing Teys Australia system or implementing advancing technologies for the collection of data.

Three tablets were purchased that meet the operational environment requirements i.e. toughpads. To ensure the tablets were robust enough for the abattoir environment greater capital expense per unit was invested however through the review of Teys Australia's existing systems it was identified that terminals were available for use at all expected trial sites with the exception of two inspection points. This meant that the investment in three tablets allowed the inspectors to train on the system and for the tablets to be uses at those inspection points missing terminals in the second trial period.

Due to the initial limitations a web-based system was developed verses an app, as it would operate on either tablets or touchscreen terminals. Information was provided on the requirements for each screen for the data collection. This included

- the draft standard data set,
- the requirement for individual log on
- the system design and
- feedback on the ease of use.

The tablets and web-based system were tested on plant by inspectors. The findings of these tests were:

- that the tablets were not as responsive to touch as the touchscreen terminals. The tablets will pick up water drips however will not always respond to light gloved touch and are unresponsive to the meat inspectors using the back of their knife handle which was common practise with the terminals. This later opinion of knife handle use was also raised as a work health and safety hazard.
- that the buttons on the system needed to be bigger, to allow for ease of use.
- that a solution had to be built into the system to allow for the quick change over of meat inspectors in inspection positions as is common practice.
- that the internet coverage is not as reliable as needed for the collection of the data. Unfortunately slow internet coverage resulted in a delay in response to entering the data, which in turn resulted in the inspectors not having enough time for the data entry.

Where feedback was directly about the system such as the size of the buttons, the system was amended. To address the speed of the internet connection and the responsiveness of the touch screen the terminals will be used, with Teys Australia's IT team installing a browser and internet access onto the terminals.

### **3.3 Undertake trials at Teys Australia plants to test the validity of data collection and methodology**

#### **3.3.1 Development of training**

The initial idea, although not detailed in the project plan, was to develop a training system that allowed familiarization of the system and assessment of the meat inspectors against the chain speed and time available for them to enter the data. This idea unfortunately was not practical due to the resources it would consume in the collect of all the required photos and cost of the development of the interactive learning system.

As such training of the meat inspectors was conducted in line with the service providers approach of providing a work instruction, on-the-line demonstration and implementation of the system. As such a draft work instruction was developed and in addition snapshots of the system's screens were developed to familiarise the team with the location of different conditions as abbreviations were used.

Inspectors were able to use the system and provide feedback on the development and ease of use of the system during the test phrase period prior to the trial commencing.

There are two areas that have been specifically addressed in the training and work instructions to ensure food safety is not compromised. The order of hand washing comparative to the use of the tables or touchscreen terminals is one of these. For good hygienic practice hands are required to be washed between carcasses, head or offal set to ensure no transfer of contamination either macro-biological in the case of condemnation or microbiological. To ensure that this essential practice is not interfered with, data is to be entered on the screen after inspection and hand washing making the terminal "clean".

In addition to this the time available to conduct inspection and enter data should be assessed. It is essential that the inspection of carcasses, heads and offal sets is not compromised. This is also a clear Department of Agriculture and Water Resources requirement. Meat inspectors are allowed to conduct additional activities reasonably considered to be associated to be meat inspection skills in line with their deed of obligation. To ensure that meat inspection duties are not compromised both a paper based (MISS) assessment and practical assessment were conducted prior to the trials commencing. With experience meat inspectors there appears to be enough time available for the meat inspectors to conduct their duties and collect data in the system developed. To confirm this verification of the inspectors' ability to keep up with the inspection duties whilst collecting data occurred at the beginning of the trials.

#### **3.3.2 Training of meat inspectors for Trial 1**

The third party Australian Government Authorised Officer service provider's Technical Advisor, in line with the current their approach, trained the meat inspectors using the developed work instruction, on-the-line demonstration and implementation of the system. Inspectors were able to use the system and provide feedback on the development and ease of use of the system during the test phase period, prior to the trial commencing. As the plant has three touchscreens for data

collection, the tablets were made available to the meat inspectors to train on and familiarise themselves with the system when not on the chain.

To allow the meat inspectors to be familiar with the system and entering at production speed, a week of onsite support (by either the consultant or Technical Advisor) was provided. Despite the paper and practical assessment proving the meat inspectors had time to conduct their duties and collect data in the system, monitoring and assessment of performance during collection was undertaken.

During this initial training week 80% of heads inspected and 63% of viscera inspected had data captured against them. Despite the original assessments, the Technical Advisor raised concern that there was not enough time to collect data during EU production, as there are additional inspection tasks required for the EU market. Due to this the decision was made that viscera data would not be collected during EU production, whilst the meat inspectors became familiar with the system.

### **3.3.3 Data Collection Trial 1**

The meat inspectors collected data for the trial period of four weeks from 27 July 2015 with one public holiday on 10 August 2015.

During the first week of the trial Dr Samantha Allan, National Veterinary Technical Manager for the Department of Agriculture and Water Resources (DAWR), met with the plant management and project team to discuss the project. She also discussed the project with the meat inspectors and checked that the entry of data did not affect the meat inspectors conducting their duties as Australian Government Authorised Officers. The feedback received was that the project looked interesting with some potential benefits to producers, the third party Australian Government Authorised Officer service provider and Teys Australia (and therefore the wider industry if implemented more broadly). The fact that the meat inspectors now have to consciously make their decisions i.e. rather than normal, normal, normal, abnormal/condemn, normal.... versus normal, normal, normal, abnormal because of a liver abscess grade 1, normal... was raised by the meat inspectors as a positive point. The only concern raised was the light availability for viscera inspection given the placement of the touch screen over the viscera table. The touchscreen positioning had changed during the trial from static placement to being moveable to facilitate the meat inspectors reaching the touchscreen and entering the data. A light meter was used to assess this change showing no concern.

On completion of the four-week trial the data collection volumes were analysed against the kill agenda and lot breakdown. This is available in the results section below. As detailed below, the trial period was extended by five weeks to address cultural change of the meat inspectors.

Based on these results a variation to the project was submitted to MLA and accepted. The variation was to amend the milestone due dates and to conduct the second trial only at one other site. The results and lessons learnt from trial 1 were also taken into account in the methodology for trial 2.



### **3.3.4 Training of meat inspectors for Trial 2**

From the engagement of the second third party Australian Government Authorised Officer service provider including the recruitment and training of the meat inspection team, it was clear that the collection of animal health data was a requirement of the contract.

The meat inspectors were consulted throughout the insulation and set up of the collection system at the Teys Australia abattoir to ensure 'buy in' and ownership in the change management journey. The meat inspectors were consulted with on the placement of the touchscreens in regard to their inspection positions and the hand wash facilities. A decision was made to use the Teys Australia system given that the majority of limitations initial identified were either found to be false or could be worked around. The meat inspectors were consulted with and provided input on the most commonly seen diseases in the supply of cattle to the abattoir and on the reasoning for the simplification of the attributes (or clinical findings) being used.

A work instruction was developed for the team and their input was sought and included to ensure that it was in line with the most efficient work flow and allowed the inspectors to have the most common conditions on the first screen of the system to decrease the time requires for the input of data into the system. The meat inspectors were provided with copies of the screens, the work instruction and the *Standard for the Development, Collection and Reporting of Animal Health Data through the Supply Chain* (which had been developed by this stage) as training documents and a two-week period was provided to test and train on the system. As with any change management processes there were initially some reservations by meat inspectors in the training period, however this was quickly overcome by the inspection services management.

Following the trial period, feedback was provided by the inspection team on the implementation of the system, i.e. suggested amendment and additional inclusions to the system and changes to the placement of attributes on the screens, including requests for an additional terminal on the viscera table. These were worked through with the team including the initial principals of the *Standard* and work arounds identified where needed given the limitations of the Teys Australia system.

### **3.3.5 Data Collection Trial 2**

The data collection trial at the Teys Australia abattoir started on the 2 March 2017. Teys Australia touchscreen terminals (similar to those used at grading) were installed at each inspection point and used with the existing system. This prevented the majority of the IT problems experienced during the first trial however resulted in limitations. These limitations included that the system is a passive entry system so the 'accept' button does not register an entry in the uniworks system, and the requirement to reduce the number of conditions that were available for selection i.e. making sure that the inspectors had enough time to enter data into the system. To overcome these limitations the collection of data was included in the meat inspectors' routine of inspection providing confidence that data was collected against every carcass and they were not told that the system was passive. Also, conditions included in the system were selected based on the meat inspectors' knowledge (and knowledge from previous meat inspectors that are now working directly for Teys Australia) of the most common conditions for the supply of cattle to Teys Australia to fill a maximum of three screens.

The data collection has been verified through data analysis which shows a consistent spread of data collected throughout production periods and on-site monitoring. This verification has demonstrated that 100% of data is being collection with strong team work and change management being the key factors of the success.

Data has now been consistently collected for 12 months allowing for a baseline to have established and subsequent changes to be made to the system including a 'pass' button to circumvent the passive nature of the system.

## **4 Results**

### **4.1 Analysis of the collection data – Trial 1**

On completion of the four-week trial the data collection volumes were analysed against the kill agenda and lot breakdown. This is available in Appendix 1. Key points from this analysis are that:

- Collection of head inspection data ranged from 0-91% averaging at 66%
- Collection of non-EU viscera inspection data ranged from 0-93% averaging at 58%
- Only approximately 30% of lots had viscera inspection data available against each head and the size of these lots were small.
- The touchscreen on the viscera table was not working from 5-7 August 2015 due to the calibration being out. Once this was raised with the project team on the 7 August, it was investigated and fixed.
- Data had been overwritten on at least two occasions due to the date not being checked or corrected prior to data entry.

Consistent and repeated feedback from the Teys Australia plant management was that there was little support or interest from the meat inspectors in collecting the data and therefore making the project work. Inconsistent data collection overtime also supported this assertion.

At this point the project management team held a meeting to discuss a way forward as the attitude of the meat inspectors and the low volume of data collected was of concern, given that to provide collection data to producers, 100% of the lot and therefore 100% of the daily kill needs to be collected. The decision was made for the analyses of the data to stop, and that the culture change and meat inspector attitude needed to be addressed. The third party Australian Government Authorised Officer service provider was provided four weeks to fix the culture change issues and provide further feedback, prior to a decision being made whether the project should continue or end. Given that the lot sizes were very small for the lots where data had been collected, the value of producer feedback reports was limited. As such their development was placed on hold until the volume of data collected could be improved. All preparation for implementation on further sites was also stopped to prevent wasting valuable research, development and extension funding.

The third party Australian Government Authorised Officer service provider management and technical advisors worked with the meat inspection staff to address the culture change and the

importance of a positive attitude and participation i.e. data collection for producers, Teys Australia and the third party Australian Government Authorised Officer service provider. The feedback provided by the third party Australian Government Authorised Officer service provider at the end of the four to five week extension of the trial period was that:

- The meat inspectors had more suggested changes to the system with regard to the language used and ease of use
- The system had IT issues with an 'error 500' occurring at least a couple of times a day. This error required the system to be rebooted and the inspectors to log back on to the system which resulted in losses in excess of 50 heads if it waited for the leading hand to rotate back onto that station
- Change of user entering a password takes too long during rotation of staff
- The afternoon shift inspectors were concerned that they would be struck off by the DAWR veterinary officer for conducted additional duties

The third party Australian Government Authorised Officer service provider addressed the first and last of these concerns internally. The change of user has been amended in the system to no longer need a password. The third party Australian Government Authorised Officer service provider's systems development and Teys Australia's IT teams worked to address the 'error 500' system issue. The two solutions identified were:

- The installation of an automatic reload of the browser when the browser field is closed. This means that the whole touchscreen does not need rebooting, rather the meat inspectors need to just log back in. This would reduce time and number of head not collected due to the 'error 500'.
- The development and installation of a local server. As the 'error 500' occurs when the web browser is trying to connect and send to the main server, the development and installation of a local server allows the browser to connect and send information to a more accessible local server that then passes the information on to the main server or stores the information until the main server is assessable without interfering with the collection of data at the inspection point.

The first of these solutions was installed and the local server was developed and was installed and tested. At this point the meat inspectors were provided a period of a week to prove that a high level of data can be consistently collected.

It should be noted that at the beginning of November 2015 the volume of data collected was on average 96% of all viscera inspected and 38% of heads inspected. The feedback from the plant management on the meat inspectors' change in attitude was also positive. A comment was made that this was due to the implementation of the new system despite the automatic reload being installed on the 26 November 2015 and new local server not being implemented at that stage.

Although producer reports were not developed due to lack of volume of data as explained above, monitoring and basic condemnation reports were developed for the plant management and the third party Australian Government Authorised Officer service provider.

#### **4.1.1 Lessons learnt from Trial 1 – adjustments and amendments to the standard data set and collection method.**

##### *Lessons learnt*

Through the first trial it was confirmed that the change management and attitude of the meat inspectors is paramount to the success of the project. Despite the change in the service provision from government inspector to company paid AQIS Authorised Officers to third party inspection meat inspectors, the lack of data collected has demonstrated that some of the attitude towards additional tasks and value adding and support towards the industry has not changed. Although the ability to manage this is currently being demonstrated through the third party Australian Government Authorised Officer service provider's approach to the project and data collection since early September 2015.

The data analysis showing the writing over of data and the feedback provided has demonstrated that off the line training including all reasons and the importance of the project should be provided to aid change management.

##### *Updates to the draft standard data set*

The draft standard data set was developed for collection of the inspection findings and inspection actions taken, against each body number. Through the trial, feedback was provided by the inspectors and Teys Australia operators on the terminology in the standards and the addition of some findings. These included:

- Addition of findings such as eosinophilic myositis and hydatids in the heart, adhesions in the liver and the thick skirt.
- Amendments to facilitate current trimming practices such as trimming pericarditis (although not aligning with the Australian Standard AS4696), and the removal of trimming fluke and hydatids on livers and cysts on carcasses
- Amendments to terminology for easy of understanding by Teys Australia Operators on the retain rail such as neoplasia to cancer
- Addition of functional status buttons such as Emergency for emergency kill and ECA3 for when a carcass is trimmed and checked by a meat inspector before being released back onto the chain.

The updated standard is attached in Appendix 2.

##### *Updates to the collection method*

As detailed above, during the first trial the Teys Australia touchscreen terminals were used with a web-based system developed and paid for by the third party Australian Government Authorised

Officer service provider. System amendments were made to reflect the changes in the collection standard listed above, to incorporate automatic generated reports, to allow automatic reload of the browser screen and to use a local server.

It should also be noted that the feedback from the third party Australian Government Authorised Officer service provider during the extension of the trial period included that the tablets were unusable for the collection of data at further plants as the screens and therefore buttons were too small and not as responsive as the touchscreens. The purchase, installation and subsequent use of touchscreens for the collection of data will be discussed between the third party Australian Government Authorised Officer service provider and Teys Australia if the project is to continue, as this level of hardware was not initially under the scope of the project.

As detailed above the third party Australian Government Authorised Officer service provider management and technical advisors have worked with the meat inspection staff to address the culture change and the importance of a positive attitude and participation i.e. data collection for producers, Teys Australia and the third party Australian Government Authorised Officer service provider.

The IT solutions of an automatic reload of the browser and a local server were installed. The meat inspectors were provided a number of months to demonstrate a high level of data can be consistently collected. This extension from weeks to months was in part due to the low stock numbers and reduced shifts at the plant.

It should be noted through April 2016 the volume of data collected were on average 88% of all viscera inspected and 93% of heads inspected. As noted above the feedback from the plant management on the meat inspectors' change in attitude since the beginning of November was positive. A comment was made prior to the installation of the IT solutions that this change was due to the implementation of the new system.

## **4.2 Analysis of the collection data – Trial 2**

The data collection was verified through data analysis which shows a consistent spread of data collected throughout production periods and on-site monitoring. This verification demonstrated that 100% of data is being collection with strong team work and change management being the key factors of the success.

The data collected was analysed to assess three questions:

1. What is the prevalence of some of the common conditions of concern?
2. What is the loss to producers due to sub-clinical disease where research was available to support the project data?
3. What is the loss to the processing plant due to condemnations?

Data from the first 3 months of collection was analysed to answer these questions.

*What is the prevalence of some of the common conditions on concern?*

Three of the most anecdotally common diseases in cattle supplied to the Teys Australia abattoir are Liver Fluke, Liver Abscess and Pleurisy. The data showed a prevalence of 20.6% of the cattle show signs of liver-fluke that results in those livers being downgraded. Signs of liver abscesses were seen in 8.3% of cattle and 5.1% of cattle processed had signs of pleurisy in the lungs. This data shows just how high the prevalence is of some of these conditions; all of which are potentially preventable and treatable.

When the data is analysed further, looking in more detail at the effect of these diseases by supply chain i.e. grain-fed or grass/combination-fed (other), it can be seen in Table 1 that despite these conditions being seen anecdotally as grain or grass-fed problems, they are evident across both supply chains and to a greater extent than expected. It can be concluded from the life cycle of liver fluke that the 14.04% prevalence in grain-fed cattle is due to prior exposure with tracts still evident at post-mortem inspection.

Table 1: Prevalence of Disease by Supply Chain

Condition	Grain-fed	Other
Liver Fluke	14.04%	33.62%
Liver Abscess	9.13%	6.63%
Lung Pleurisy	5.61%	3.94%

*What is the loss to producers due to sub-clinical disease where research was available to support the project data?*

Previous research has shown that health conditions can affect carcass weight and daily gains. Although dated and limited to only a handful of diseases, liver fluke can be used as an example of the cost of sub-clinical disease to producers. A weight gain study showed that animals treated early (1-2 weeks after they became infected) gained more weight than animals treated 4-6 weeks or 8-12 weeks after being infected. Cattle treated at 1-2 weeks were 13kg heavier than cattle treated at 8-12 weeks after 20 weeks. Based on the live weight market price of \$2.95 that is \$38.35 per head that could be gained. From the data collected and analysed, Table 2 shows that this would be a loss of \$449,308.60 to producers over the 3-month period or extrapolated out to an annual loss of \$1,797,234.40 to the producers supplying the Teys Australia abattoir, due to liver fluke.

Table 2: Approximate losses to Teys Australia suppliers at one abattoir due to liver fluke over a 3-month period.

Grain	Grass	Total
Cost	Cost	Cost
\$204,482.20	\$244,826.40	\$449,308.60

*What is the loss to the processing plant due to condemnations?*

From the data collected and the cost of offal collected (MLA, 2018), an approximation of the processing losses can be made. Table 3 shows that from the 3-months of data analysed Teys Australia lost approximately \$649,840.33 in condemnations, which extrapolates out to \$2,599,361.32 annually.

Table 3: Approximate losses to Teys Australia due to condemnations over a 3-month period, extrapolated to annually.

	Percentage	Value	Cost
<b>Tongues</b>	7.16	\$ 22.88	\$ 93,281.76
<b>Heads</b>	3.12	\$ 39.78	\$ 70,728.84
<b>Tongue root</b>	1.85	\$ 9.20	\$ 9,715.20
<b>Cheek</b>	0.23	\$ 5.75	\$ 747.50
			\$ -
<b>Liver</b>	37.43	\$ 9.50	\$ 202,616.00
<b>Lung</b>	7.34	\$ 5.35	\$ 21,116.45
<b>Green Offal</b>	6.73	\$ 52.57	\$ 201,553.38
<b>Heart</b>	2.49	\$ 3.77	\$ 4,851.99
<b>Kidney</b>	1.5	\$ 3.37	\$ 2,888.09
<b>Thick Skirt</b>	2.2	\$ 24.32	\$ 30,448.64
<b>Red Offal</b>	0.86	\$ 24.32	\$ 11,892.48
<b>Spleen</b>	0.98		\$ -
		<b>Total</b>	\$ 649,840.33
		<b>Annually</b>	\$ 2,599,361.32

### 4.3 Communication and Extension

Throughout the project a number of meeting were held internally with Teys Australia and the third party Australian Government Authorised Officers service provider’s staff. These meeting have been to gather information, discuss advantages of the project, develop and test the system, seek feedback and input on the standard and manage the change to the meat inspectors’ duties.

In addition, given the Department of Agriculture’s role to verify meat inspection by third party Australian Government Authorised Officers (the meat inspectors) an information briefing went to their staff.

During the extension period of trial 1 Teys Australia’s management were able to view a similar (cut-down) system for the collection and reporting of inspection working in Ireland. This demonstrated to Teys Australia the significant benefits this project will have, once executed successfully, to continuously improve animal health and therefore productivity throughout the beef supply chain. In addition, during their field days, Teys Australia have been discussing the project with producers directly, with positive feedback.

Similar figures to these were presented at the Teys Australia Jindalee Producer Day on 27 April 2017 based on 8 weeks of data having been collected. Appendix 3 provides links to the agenda for the day through Beef Central.

This analysis was subsequently presented to the Inter-Collegial Meat Judging Workshops in Wagga Wagga during July 2017 by Tom Maguire.

#### **4.3.1 Generation of producer feedback reports**

With a high level of data being collected producer reports were developed. The key aspect of these reports was the ease of use by a producer. As such they were generated with the following features:

- Inspection findings against each animal, referenced by RFID and farm tag
- The top conditions observed (up to five) with the number of head affected and prevalence of the condition (% of mob affected)
- The mob number processed to ensure context when reading the report
- Definitions/explanation for the condition identified
- A disclaimer to ensure legal/insurance obligation were met
- A link to where further information could be sought

The development of these reports was an iterative process with the development of an initial design, which used data from the Teys Australia abattoir to generate historic reports and amendments made to increase ease of use. The definition section has under gone the most changes with simple definition originally provided to the character limitation of the system, these were then changed with the view that further guidance to which disease the finding most likely results from being provided. This was then changed back following the running of reports and understanding that this caused greater confusion when multiple findings occur for an animal. Through sharing a copy of feedback with a collaborative producer and their resulting questions the need for further extension material to be generated and further work with producers to be conducted to gain their views into the proposed reports and feedback.

Given this was in addition to the initially contracted work but was necessary for a successful execution of this project of providing animal health feedback to producers, Teys Australia requested this work be done using the remaining expenses funding in the project.

#### **4.3.2 Additional extension of the project to producers**

Additional draft extension material was in the form of the following handouts/sheets:

- How to interpret your Animal Health Summary
- Two examples of Teys Animal Health Summaries to interpret and discuss



- Specific Disease Condition handouts covering Cancer Eye, Hydatids, Liver abscesses, Liver fluke, Lumpy jaw, Pneumonia and Pleurisy, Vaccination abscesses and Wooden tongue.

This extension material was then tested with small workshops of producers at two location in September 2017. The feedback from these workshops was positive and producers were very interested in receiving animal health summaries. It was important to explain the process of how the data is collected so that producers understood the limitations of meat inspection and the legislation i.e. gross pathology rather than histopathology and findings rather than diagnosis. There were two overarching questions from the producers, what is this costing us? and what should we do about it? The true cost of particular animal health conditions to producers for the majority of animal health conditions (including parasite burdens) have not been established. To incentivise changes to on-farm management practices it was recommended that this work be considered. It became clear through discussion that additional support including further training and extension material be developed for producers to assist in the interpretation of animal health feedback, including specialist veterinary advice and support on recommendations for action. These recommendations have been developed into a Phase 2 project with Teys Australia which has been accepted by Meat & Livestock Australia.

## **5 Discussion**

### **5.1 Development of a data collection standard**

A data collection standard was developed and refined through feedback. As the project extended, the importance of the collection of data and an integrated and reliable IT system became more important than the collection of data against a full data set of all possible conditions. With the extension of the project and the introduction of the national *Standard for the Development, Collection and Reporting of Animal Health Data through the Supply Chain*, the national standard was complied with as the underlining principals including the collection of observations or findings rather than diagnosis are paramount to the data collection and use.

### **5.2 Development of a system that collects and provides post-mortem inspection feedback to assist improvements in processing procedures and on farm practises**

A system was developed for the collection and provision of post-mortem inspection feedback to assist improvements in processing procedures and on farm practises. Touch screens were used, and tablets trialled as the front end of the system. The touch screens proven to work in the environment as history as proven at weighing and grading stations. Toughpad that met the environmental requirements proved to not be practical for the collection of data as they were not large enough for the buttons to be large enough for selection and not as responsive. There were two IT systems developed behind the screens. One used adaptations to the existing Teys Australia system, the other was a third party system providing data into the Teys Australia system. The Teys Australia system has limitation on the volume of disease collected however the system is fully integrated and reliable. The third-party system took time and additional expenses to integrate and had reliability issues during the project due to connectivity however allowed for the complete collection of data from a single screen providing a better solution for the inspection staff. However, given the lack of data collected,

blamed in part on the systems reliability, it is unclear as to whether the benefit to the inspectors was realised.

Following development of producer reports it was quickly realised that additional extension work was also required with the producers to allow them to use the feedback to reduce the identified losses. This has resulted in a Phrase 2 project proposal to MLA to continue the work including further extension work and cost benefit analysis of the findings, with roll out of this process across the Teys Australia plants.

### **5.3 Undertake trials at Teys Australia plants to test the validity of data collection and methodology**

Two trials were undertaken across the Teys Australia plants, these have validated the data to be collected and the touch screen methodology of collection. The trials showed that there are significant amounts of change management required to ensure reliable and consistent collection of data and that careful consideration of the IT system to be used is required.

Overall the objectives of the project have been met. The data captured and analysed has identified that significant losses to the supply chain through sub-clinical animal health diseases. This is an approximate \$2.6 million opportunity to the single Teys Australia abattoir across these sub-clinical conditions and approximately \$1.8 million for liver fluke alone in the cattle supply just to a single Teys Australia abattoir.

## **6 Conclusions/recommendations**

Overall the objectives of the project have been met. A standard for data collection was developed and a system that collects and provides post-mortem inspection feedback to assist improvements in processing procedures and on farm practices has been developed. Trials have occurred at Teys Australia plants to test the validity of data collection and methodology.

Additional research and development has been occurred in the meantime around new technologies for improving the method of data collection such as google glasses however further work could be conducted in this area as reliable data to validate the new collection methodologies becomes available more broadly.

In the first trial the level of data was too low to justify full analysis and the generation of producer reports. The major obstacle was cultural change to ensure the collection of data without direct and continual oversight of meat inspectors. Further change management and IT solutions have been implemented to improve data collection volumes and lessons learnt were used in the second trial.

In the second trial data collection, analysis and reporting of post mortem inspection data occurred. The expected outcomes of this project were achieved. The major obstacle to the outcomes being achieved, that were identified as cultural change to ensure the collection of data without direct and continual oversight of meat inspectors, were overcome. Data was analysed, identifying significant losses to the supply chain through sub-clinical animal health diseases. This is an approximate \$2.6 million opportunity to the single Teys Australia abattoir across these sub-clinical conditions and approximately \$1.8 million for liver fluke alone in the cattle supply just to a single Teys Australia abattoir.

Further extension work was also undertaken with the producers as Teys Australia acknowledged the importance of a successful roll out and the change management process that would have to be worked through with producers to use the feedback to reduce these losses. This resulted in a Phase 2 project proposal to MLA to continue the work including further extension work and cost benefit analysis of the findings, with roll out of this process across the Teys Australia plants.

## 7 Key messages

- There are significant obstacles to overcome to ensure accurate and consistent post-mortem data collection. These include change management of meat inspectors and the IT systems used in data collection.
- Tablets in the form of toughpads are not an effective method for data collection, however touchscreen are effective as a collection method.
- Post-mortem data collection and analysis has shown that there are significant losses to the supply chain through sub-clinical animal health diseases. This is an approximate \$2.6 million opportunity to the single Teys Australia abattoir across these sub-clinical conditions and approximately \$1.8 million for liver fluke alone in the cattle supply just to a single Teys Australia abattoir.

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## 9 Appendix 1: Analysis of Volume of Data Collected

Date	Total No. of Cattle	Total No. of EU	Data Entered					No. of lots		Lots collected for viscera data			
			Head		Viscera		Retain rail (recorded by exception)	Total	EU	Total Collected	EU Collected	% of total	% of non-EU
			No.	% of Total	No.	% of non-EU							
<i>Week 0 - training</i>													
20/07/15	1460	120	1180	81	927	69	17	31	1	24	0	77	80
21/07/15	1398	548	1213	87	1171	138	26	13	3	6	0	46	60
22/07/15	1423	347	1276	90	1069	99	1	23	8	13	0	57	87
23/07/15	1414	289	1064	75	633	56	5	32	8	18	2	56	75
24/07/15	1414	0	970	69	694	49	1	39	0	23	0	59	59
<b>Weekly Totals</b>	<b>7109</b>	<b>1304</b>	<b>5703</b>	<b>80</b>	<b>4494</b>	<b>77</b>	<b>50</b>	<b>138</b>	<b>20</b>	<b>84</b>	<b>2</b>	<b>61</b>	<b>71</b>
<i>Week 1</i>													
27/07/15	1425	0	1136	80	961	67	13	37	0	18	0	49	49
28/07/15	1415	463	819	58	655	69	6	18	5	11	0	61	85
29/07/15	1455	840	795	55	679	110	4	14	6	5	0	36	63
30/07/15	1311	381	453	35	401	43		25	5	6	0	24	30
31/07/15	1460	0	867	59	625	43		45	0	11	0	24	24
<b>Weekly Totals</b>	<b>7066</b>	<b>1684</b>	<b>4070</b>	<b>58</b>	<b>3321</b>	<b>62</b>	<b>23</b>	<b>139</b>	<b>16</b>	<b>51</b>	<b>0</b>	<b>37</b>	<b>41</b>
<i>Week 2</i>													
3/08/15	1453	480	1329	91	852	88	4	30	1	23	0	77	79
4/08/15	-	-	844		412		3	-	-	-	-	-	-
5/08/15	1454	398	1081	74	0	0	17	45	0	0	0	0	0
6/08/15	1454	478	1	0	0	0	13	39	6	0	0	0	0

Date	Total No. of Cattle	Total No. of EU	Data Entered					No. of lots		Lots collected for viscera data			
			Head		Viscera		Retain rail (recorded by exception)	Total	EU	Total Collected	EU Collected	% of total	% of non-EU
			No.	% of Total	No.	% of non-EU							
7/08/15	1436	0	1258	88	3	0	71	53	0	0	0	0	0
<b>Weekly Totals</b>	<b>5797</b>	<b>1356</b>	<b>4513</b>	<b>78</b>	<b>1267</b>	<b>29</b>	<b>108</b>	<b>167</b>	<b>7</b>	<b>23</b>	<b>0</b>	<b>14</b>	<b>14</b>
<i>Week 3</i>													
10/08/15	-	-	-	-	-	-	-	-	-	-	-	-	-
11/08/15	1402	342	1149	82	541	51	49	48	10	13	0	15	22
12/08/15	1482	717	400	27	364	48	30	62	21	9	9	17	30
13/08/15	1538	948	427	28	377	64	52	42	19	7	3	0	0
14/08/15	1463	207	510	35	635	51	38	51	4	0	0	10	14
<b>Weekly Totals</b>	<b>5885</b>	<b>2214</b>	<b>2486</b>	<b>42</b>	<b>1917</b>	<b>52</b>	<b>169</b>	<b>155</b>	<b>44</b>	<b>16</b>	<b>12</b>	<b>10</b>	<b>14</b>
<i>Week 4</i>													
17/08/15	1398	169	738	53	400	33	16	34	3	0	0	0	0
18/08/15	1458	639	817	56	704	86	33	27	8	18	0	67	95
19/08/15	1410	490	1015	72	427	46	3	32	7	0	0	0	0
20/08/15	1423	391	1237	87	397	38		37	12	0	0	0	0
21/08/15	1407	0	1156	82	1305	93	24	57	0	52	0	91	91
<b>Weekly Totals</b>	<b>7096</b>	<b>1689</b>	<b>4963</b>	<b>70</b>	<b>3233</b>	<b>60</b>	<b>76</b>	<b>187</b>	<b>30</b>	<b>70</b>	<b>0</b>	<b>37</b>	<b>45</b>
TRIAL PERIOD	32953	8247	21735	66	14232	58	426	786	11	244	14	31	36
excluding training	25844	6943	16032	62	9738	52	376	648	97	160	12	25	29

## 10 Appendix 2: Updated version of the Draft Standard Data Collection Set

Head Station							
defect_h1_l	defect_h1_n	defect_h1_c	defect_11_	defect_11_n	defect_11_c	defect_11_sc	defect_11_st
Cavity	Oral/Nasal Cavity	9000	Gr Impact	Grass impaction	9001	10	condemn
			Sinus.	Sinusitis	9002	10	condemn
			Polyps-T	Polyps	9003	5	trim
L. N.	Lymph nodes	10000	Granu.	Granuloma	10001	10	condemn
			Absc.	Abscess	10002	10	condemn
Tong	Tongue	11000	ActinoB	Actinobacillosis	11001	10	condemn
			Absc.	Abscess	11002	10	condemn
			Contam.	Contamination	11003	10	condemn
			Gr S Absc.	Grass seed abscess	11004	10	condemn
			Trim	Trim	1105	5	trim
Tong root	Tongue root	12000	ActinoB	Actinobacillosis	12001	10	condemn
			Absc.	Abscess	12002	10	condemn
			Contam.	Contamination	12003	10	condemn
			Gr S Absc	Grass seed abscess	12004	10	condemn
Cheeks	Cheeks	13000	ActinoM	Actinomyocosis	13001	10	condemn
			Contam	Contamination	13002	10	condemn
			Gr S Absc	Grass seed abscess	13003	10	condemn
Head	Head	20000	Contam.	Contamination	20001	10	condemn
			Trim	Trim	20002	5	trim
All	General	14000	Cancer E	Cancer Eye	14001	10	condemn
			Ingrow H	Ingrown horn	14002	10	condemn
			Other	Other	14003	10	condemn
			Melano	Melanosis	14004	10	condemn
			Xanth	Xanthosis	14005	10	condemn
			Myo	Myosotis	14006	10	condemn
			Cyst	Cyst	14007	10	condemn
Hydat	Hydatids	14008	10	condemn			

Viscera Station							
defect_h1_	defect_h1_n	defect_h1_	defect_11_l	defect_11_n	defect_11_c	defect_11_s	defect_11_st
Heart	Heart	1000	Pericard	Chronic Pericarditis	1001	10	condemn
			Perica-T	Chronic Pericarditis	1008	5	trim
			Valve L.	Obvious Valve	1002	10	condemn
			Absc	Abscess	1003	10	condemn
			Emac	Emaciation	1004	10	condemn
			Neurofib	Neurofibromas	1005	10	condemn
			Xanth	Xanthosis	1006	10	condemn
			Other	Other	1007	10	condemn
			EosinMyo	Eosinophilic myosotis	1009	10	condemn
			Hydat	Hydatids	1010	10	condemn
Lungs	Lungs	2000	Pleu Gr1	Pleuritis Gr1	2001	10	condemn
			Pleu Gr2	Pleuritis Gr2	2002	10	condemn
			Pleu Gr3	Pleuritis Gr3	2003	10	condemn
			Pneu	Pneumonia	2004	10	condemn
			Absc	Abscess	2005	10	condemn
			Neoplas	Neoplasia	2006	10	condemn
			Granul	Granuloma	2007	10	condemn
			Bl Inhal	Blood Inhalation	2008	10	condemn
			Hydat	Hydatids	2010	10	condemn
			Other	Other	2009	10	condemn
Kidneys	Kidneys	3000	Neph	Nephritis	3001	10	condemn
			Absc	Abscess	3002	10	condemn
			Neoplas	Neoplasia	3003	10	condemn
			Cyst	Cyst	3004	10	condemn
			Other	Other	3005	10	condemn
Spleen	Spleen	4000	Hydat	Hydatids	4001	10	condemn
			Rupt	Rupture	4002	10	condemn
			Degen	Degeneration	4003	10	condemn
			Other	Other	4004	10	condemn

Liver	Liver	5000	Fluke	Fluke	5001	10	condemn
			<del>Adhes</del> <del>Fluke</del> <del>T</del>	Adhesions <del>Fluke</del>	5002	<del>10</del> <del>5</del>	condemn
			Absc Gr1	Abscess Gr 1	5003	10	condemn
			Absc Gr2	Abscess Gr2	5004	10	condemn
			Hydat	Hydatids	5005	10	condemn
			<del>Hydat</del> <del>T</del>	<del>Hydatids</del>	<del>5006</del>	<del>5</del>	<del>trim</del>
			Fibro	Fibrosis	5007	10	condemn
			Cirrhosis	Hepatic Cirrhosis	5008	10	condemn
			Hepat	Hepatitis	5009	10	condemn
			Telang	Telangiectasis	5011	10	condemn
G Offal	Green Offal	6000	Inflam.	Enteritis	6001	10	condemn
			Polyps	Polyps	6002	5	trim
			I-contam	Ingesta	6004	10	condemn
			B-contam	Bile contamination	6005	10	condemn
			Other	Other	6003	10	condemn
L. N.	Lymph Nodes	7000	Inflam	Lymphadenitis	7001	10	condemn
			Absc	Abscess	7002	10	condemn
			B.Leuco	Bovine Leucosis	7003	10	condemn
All	Full Viscera Set	8000	B-contam	Bile contamination	8001	10	condemn
			I-contam	Ingesta	8002	10	condemn
			Other	Other	8003	10	condemn
Thick Skirt	Thick Skirt		Absc	Abscess	20001	10	condemn
			I-contam	Ingesta	20002	10	condemn
			B-contam	Bile contamination	20003	10	condemn
			Other	Other	20004	10	condemn



Retain Rail							
defect_h1_l	defect_h1_n	defect_h1_c	defect_11_l	defect_11_n	defect_11_c	defect_11_sc	defect_11_st
R F Qtr	Right Fore Quarter	15000	Wound	Wound	15001	10	condemn
			Wound-T	Wound	15002	5	trim
			Absc	Abscess	15003	10	condemn
			Absc-T	Abscess	15004	5	trim
			Cyst	Cyst	15005	10	condemn
			<del>Cyst-T</del>	<del>Cyst</del>	<del>15006</del>	<del>5</del>	<del>trim</del>
			Arthr	Arthritis	15007	10	condemn
			Arthr-T	Arthritis	15008	5	trim
			F.Body	Lead shot/metal	15009	5	trim
			Bruis	Bruising	15010	10	condemn
			Bruis-T	Bruising	15011	5	trim
			Scar	Scaring	15012	10	condemn
			Scar-T	Scaring	15013	5	trim
			Ecchymo	Ecchymosis	15014	10	condemn
			I-Contam	Ingesta Contamination	15015	5	trim
			B-Contam	Bile contamination	15016	5	trim
			F-Contam	Faecal contamination	15017	5	trim
			H-Contam	Hair contamination	15018	5	trim
			M-Contam	Milk contamination	15019	5	trim
			U-Contam	Urine contamination	15020	5	trim
R H Qtr	Right Hind Quarter	16000	Wound	Wound	16001	10	condemn
			Wound-T	Wound	16002	5	trim
			Absc	Abscess	16003	10	condemn
			Absc-T	Abscess	16004	5	trim
			Cyst	Cyst	16005	10	condemn
			<del>Cyst-T</del>	<del>Cyst</del>	<del>16006</del>	<del>5</del>	<del>trim</del>
			Arthr	Arthritis	16007	10	condemn
			Arthr-T	Arthritis	16008	5	trim
			F.Body	Lead shot/metal	16009	5	trim

defect_h1_l	defect_h1_n	defect_h1_c	defect_11_l	defect_11_n	defect_11_c	defect_11_sc	defect_11_st
R H Qtr	Right Hind Quarter	16000	Bruis	Bruising	16010	10	condemn
			Bruis-T	Bruising	16011	5	trim
			Scar	Scaring	16012	10	condemn
			Scar-T	Scaring	16013	5	trim
			Ecchymo	Ecchymosis	16014	10	condemn
			I-Contam	Ingesta Contamination	16015	5	trim
			B-Contam	Bile contamination	16016	5	trim
			F-Contam	Faecal contamination	16017	5	trim
			H-Contam	Hair contamination	16018	5	trim
			M-Contam	Milk contamination	16019	5	trim
			U-Contam	Urine contamination	16020	5	trim
L F Qtr	Left Fore Quarter	17000	Wound	Wound	17001	10	condemn
			Wound-T	Wound	17002	5	trim
			Absc	Abscess	17003	10	condemn
			Absc-T	Abscess	17004	5	trim
			Cyst	Cyst	17005	10	condemn
			<del>Cyst-T</del>	<del>Cyst</del>	<del>17006</del>	<del>5</del>	<del>trim</del>
			Arthr	Arthritis	17007	10	condemn
			Arthr-T	Arthritis	17008	5	trim
			F.Body	Lead shot/metal	17009	5	trim
			Bruis	Bruising	17010	10	condemn
			Bruis-T	Bruising	17011	5	trim
			Scar	Scaring	17012	10	condemn
			Scar-T	Scaring	17013	5	trim
			Ecchymo	Ecchymosis	17014	10	condemn
			I-Contam	Ingesta Contamination	17015	5	trim
			B-Contam	Bile contamination	17016	5	trim
			F-Contam	Faecal contamination	17017	5	trim
			H-Contam	Hair contamination	17018	5	trim
			M-Contam	Milk contamination	17019	5	trim

defect_h1_l	defect_h1_n	defect_h1_c	defect_11_l	defect_11_n	defect_11_c	defect_11_sc	defect_11_st
L F Qtr	Left Fore Quarter	17000	U-Contam	Urine contamination	17020	5	trim
L H Qtr	Left Hind Quarter	18000	Wound	Wound	18001	10	condemn
			Wound-T	Wound	18002	5	trim
			Absc	Abscess	18003	10	condemn
			Absc-T	Abscess	18004	5	trim
			Cyst	Cyst	18005	10	condemn
			<del>Cyst-T</del>	<del>Cyst</del>	<del>18006</del>	<del>5</del>	<del>trim</del>
			Arthr	Arthritis	18007	10	condemn
			Arthr-T	Arthritis	18008	5	trim
			F.Body	Lead shot/metal	18009	5	trim
			Bruis	Bruising	18010	10	condemn
			Bruis-T	Bruising	18011	5	trim
			Scar	Scaring	18012	10	condemn
			Scar-T	Scaring	18013	5	trim
			Ecchymo	Ecchymosis	18014	10	condemn
			I-Contam	Ingesta Contamination	18015	5	trim
			B-Contam	Bile contamination	18016	5	trim
			F-Contam	Faecal contamination	18017	5	trim
			H-Contam	Hair contamination	18018	5	trim
			M-Contam	Milk contamination	18019	5	trim
			U-Contam	Urine contamination	18020	5	trim
All	Whole Carcase	19000	Fever	Fever	19001	10	condemn
			Emac	Emaciation	19002	10	condemn
			Pleurisy	Pleurisy	19003	5	trim
			Other	Other	19004	10	condemn
			Melano	Melanosis	19005	10	condemn
			Metr	Metritis	19006	10	condemn
			Eosino Myo	Eosinophilic myosotis	19007	10	condemn
			Anaem	Anaemia	19008	10	condemn
			Ecchymo	Ecchymoses	19009	10	condemn

defect_h1_l	defect_h1_n	defect_h1_c	defect_11_l	defect_11_n	defect_11_c	defect_11_sc	defect_11_st
All	Whole Carcase	19000	Oedema	Oedema	19010	10	condemn
			Polyps	Polyps	19011	5	trim
			Neurofib	Neurofibromas	19012	10	condemn
			Lipoma	Lipomas	19013	10	condemn
			Jaund	Jaundice	19014	10	condemn
			Xanth	Xanthosis	19015	10	condemn
			Cancer Neoplas	Neoplasma	19016	10	condemn
			Other	Other	19017	10	condemn
			Emergency	Emergency	19018	10	condemn
			Septic	Septicaemia	19019	10	condemn
			ECA3	ECA3	19020	5	trim

## **11 Appendix 3: Beef Central Article on the Jindalee Producer Day**

<https://www.beefcentral.com/news/dexa-technology-to-feature-at-teys-southern-producer-day/>