# final report

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| Project code: | V.TEC.1704 - DEXA System estimations for red meat industry |
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| Date published: | 05 February 2019 |

PUBLISHED BY
Meat and Livestock Australia Limited
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# V.TEC.1704 - DEXA System estimations for red meat industry

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

# Abstract

This project is a “Whole of Australia DEXA Price Up” to establish the cost to develop and install lamb and beef DEXA Systems across the Australian red meat industry.

The AMPC board approved to jointly co-fund with MLA, the OCM taskforce request for an independent review on the plant per plant costing associated with the DEXA implementation. This review will be conducted by an engineering company, which will survey AUS-MEAT accredited processing sites who are wanting to “opt-in” to the DEXA implementation.

MLA has formed a whole of industry “Objective Measurement Industry Deployment Committee”. This committee will provide direction and determine the rules for any industry wide adoption of all objective measurement developments including the data management systems, rules and regulations.

39 of 45 abattoirs (17 Beef and 22 lamb) from a group of 36 participants were analysed and surveyed to determine the cost of implementing the Scott DEXA system and what considerations need to be taken into account to account for variances between sites.

# Executive summary

It has been identified that the current grading methods deteriorate the level of trust within the value chain and risk harming the competition and efficiency of the red meat industry.

It has also been identified that having objective measurement of yield for every carcase available to all participants in the value chain will provide a great deal of benefit and control required to remain competitive globally and to respond to changing consumer demands.

More than 60% of companies that hold an AUSMEAT accreditation responded to a call by MLA's to participate in an exercise designed to determine the cost and considerations that need to be taken into account if the SCOTT DEXA were to be implemented in all AUSMEAT accredited abattoirs.

39 of 45 abattoirs (17 Beef and 22 lamb) from a group of 36 participants were analysed and surveyed to determine the cost of implementing the Scott DEXA system and any relevant considerations.

It has been found that to implement DEXA across industry a total investment of AUD263M for operating AUSMEAT accredited abattoirs would be required. This would include the DEXA unit, its installation, commissioning, site infrastructure upgrade to support the unit and a traceability system to ensure the integrity of data available to the last owner of the animal before slaughter.

It was also determined that if DEXA is to be installed as a measurement tool for industry there are a number of factors that will need to be considered that may impact on these costs.

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# 1 Background

## 1.1 Scott DEXA for Lean Meat Yield analysis

The SCOTT DEXA scanner when coupled with an industry derived algorithm to predict CT lean meat yield has a number of opportunities for providing benefit to the red meat value chain. The system is designed to scan every lamb or beef carcase processed and to determine a range of characteristics vital to ensuring that maximum value is attained in the manufacturing of each carcase and in continuing to improve the supply of livestock that deliver on consumer demand.

The diagram in figure 1-1 summarises the SCOTT DEXA machine operation and some of its more prominent uses.

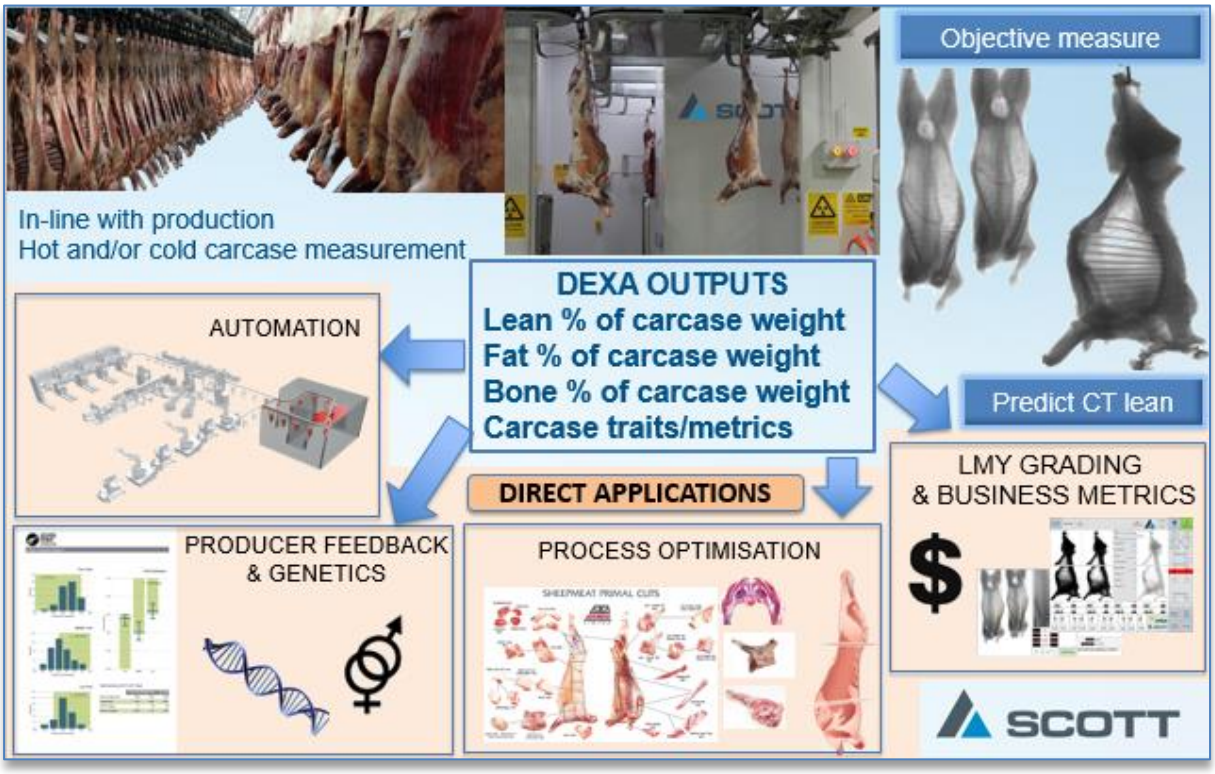



*Figure 1-1- SCOTT DEXA summary of operation and prominent uses*

### 1.1.1 Automation

DEXA scanning each carcase (beef or lamb) is able to identify and measure in 3D the internal skeletal anatomy required to enable the carcase to be dis-assembled accurately and to a specification that returns the greatest value for each carcase based on what customers are requesting. These co-ordinates and vectors are used to guide the cut paths of the downstream SCOTT LEAP (lamb) and LEAP4Beef (beef) automated processing machines. These machines are designed to cut accurately and repeatedly to ensure that valuable product is retained with the high value consumer cuts.

Automation provides a number of well-established and understood benefits ranging from yield recovery, labour availability, health & safety, product quality and food safety.

Benefits of the automated systems over manual processing can extend well beyond $7/carcase in lamb and in Beef well in excess of $15/carcase.

### 1.1.2 Carcase Value Optimisation

It is currently a natural phenomenon that lamb and beef livestock have a great deal of variance in eating quality, yield, efficiency, manageability (temperament), reproduction and genetic inheritance. Many practices and techniques have been established within the value chain to manage these variances and deliver on consumer trends/demands. As automation and sensing technologies are developed to operate commercially within the red meat value chain there becomes an ever increasing opportunity to both re-enforce the traditional processes and practices as well as establish new processes based on objectively measuring characteristics that are important the consumer.

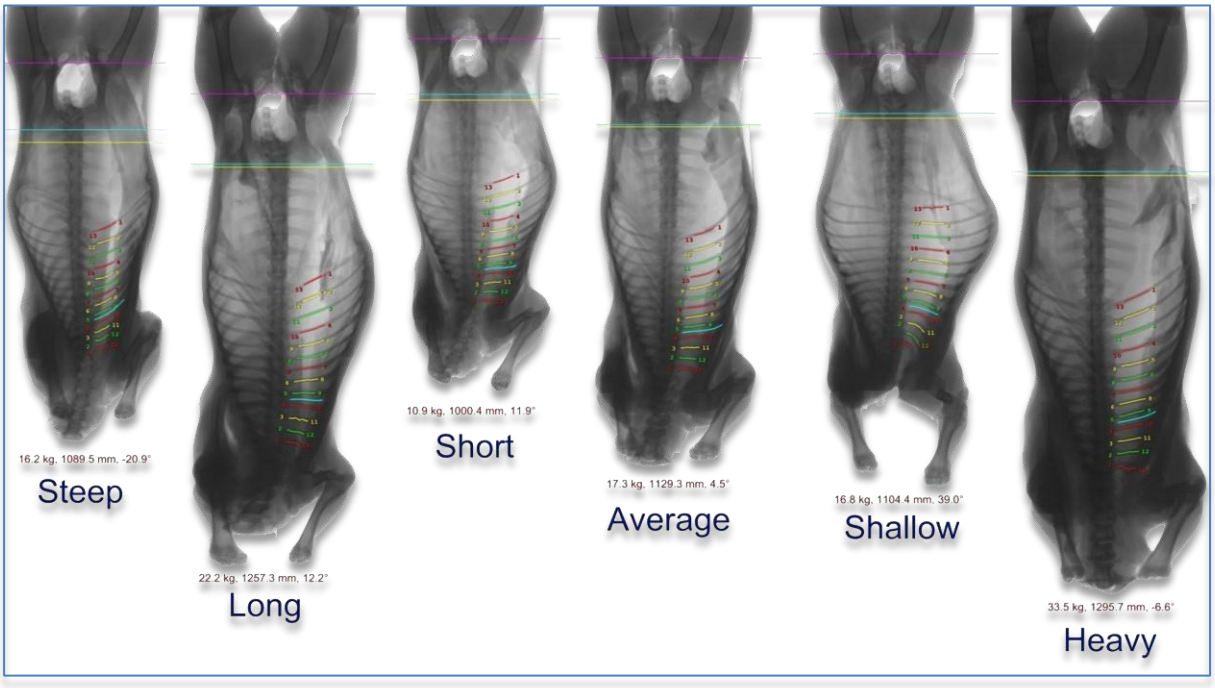



*Figure 1-2- Natural carcase variations are extensive end ever increasingly measurable*

New measurement and value chain processes will enable the whole value chain to take control over the natural variances and deliver a high quality and reliable consumer outcome.

The SCOTT DEXA is able to measure a number of metrics that have traditionally not been known until each carcase had been broken down for example meat yield, length measures, shapes and rib counts among many more.

Having this information known for each carcase prior to dissection enables decisions to be made to maximise the value each carcase is able to return and as such cut each carcase differently depending on the final market or customer (group).

### 1.1.3 Efficiency measurement

Processors have traditionally relied on subjective measures and weights to understand how efficiently their deboning operations are performing. In some instances improvement programs are established which incentivise staff based on these measures.

The SCOTT DEXA enables a more accurate and reliable measurement of the total yield in carcase inventory that can then be correlated to the processing room output to determine how effectively and efficiently the deboning process is recovering yield. When coupled with the industry lamb value calculator and the SCOTT advanced carton scanning equipment there is an opportunity to understand this mass balance down to specific primal components.
This SCOTT DEXA can be used to underpin continuous improvement and measure process improvements.

### 1.1.4 Value chain decision making

Objectively measuring important characteristics of each carcase and correlating this to the livestock supply enables a reliable input to drive on farm activity and genetic breeding decisions. The SCOTT DEXA was originally conceived as a tool to enable processing facilities to provide a measurement input to their producers businesses that could guide the continuous improvement in livestock supply.

### 1.1.5 Various other applications

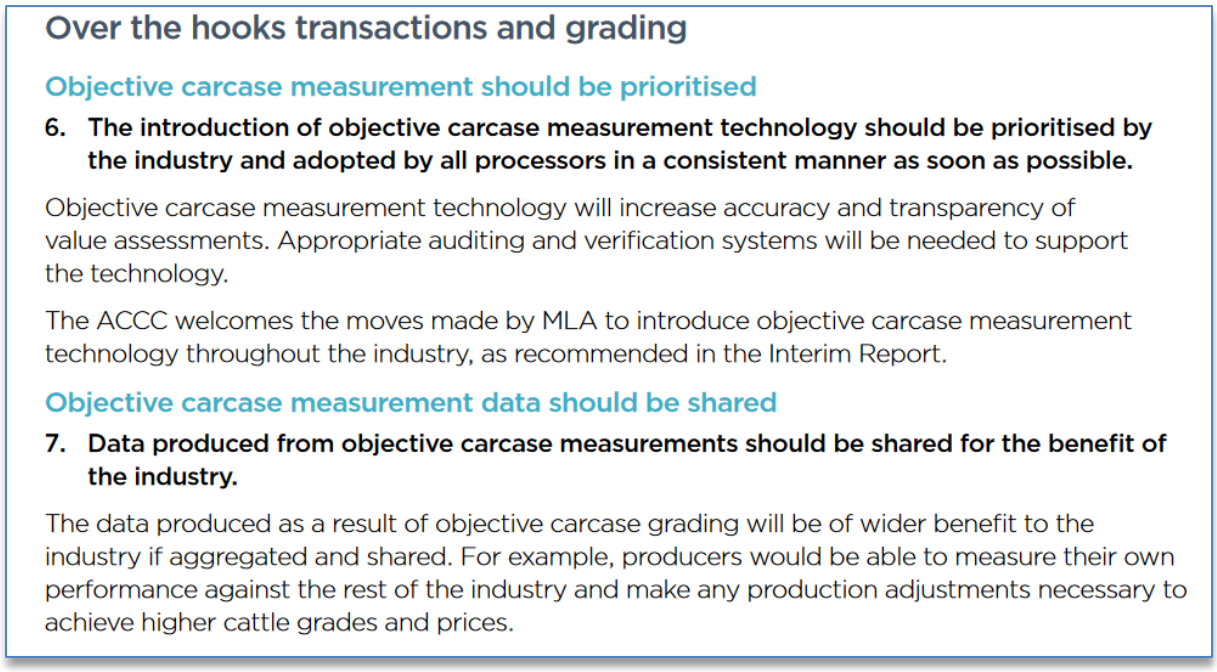
There are a number of further beneficial uses for the SCOTT DEXA and without doubt further applications will be identified as the technology becomes more widely adopted. Some examples include: deriving inputs to stimulation technologies for improved eating quality, as an input to carcase chilling systems to improve eating quality and efficiency, establish comprehensive and accurate carcase value calculations among many more applications.

## 1.2 Industry need

### 1.2.1 Objective based trade language

Roughly 90 percent of beef carcase trade in Australia is reported as a direct transaction with the producer as opposed to transactions through the saleyards. Many of these transactions are assessed in value by way of a post slaughter dressed carcase grading system. Similarly CIRCA 30 percent of lambs are sold over the hooks and are subject to post slaughter dressed carcase assessment. This is meat to reflect the value achievable in consumer cuts and as such the true value for each animal. The current grading assessment is based on the AUS-MEAT and MSA standards however measurements themselves are subjective and can vary greatly between operators, plants, and over time. This has an effect of eroding trust between parties as well as distorting important feedback signals required to underpin continued improvement within the value chain.

A recent report commissioned by the Australian Competition and Consumer Commission (ACCC), *Cattle and Beef market study* March 2017, highlighted some of the challenges for the industry in this area. The report had 15 recommendations relating to improvements that would benefit the red meat value chain. Below is an example of recommendations made with respect to grading and over the hooks transactions.



## Over the hooks transactions and grading

### Objective carcase measurement should be prioritised

6. **The introduction of objective carcase measurement technology should be prioritised by the industry and adopted by all processors in a consistent manner as soon as possible.**

Objective carcase measurement technology will increase accuracy and transparency of value assessments. Appropriate auditing and verification systems will be needed to support the technology.

The ACCC welcomes the moves made by MLA to introduce objective carcase measurement technology throughout the industry, as recommended in the Interim Report.

### Objective carcase measurement data should be shared

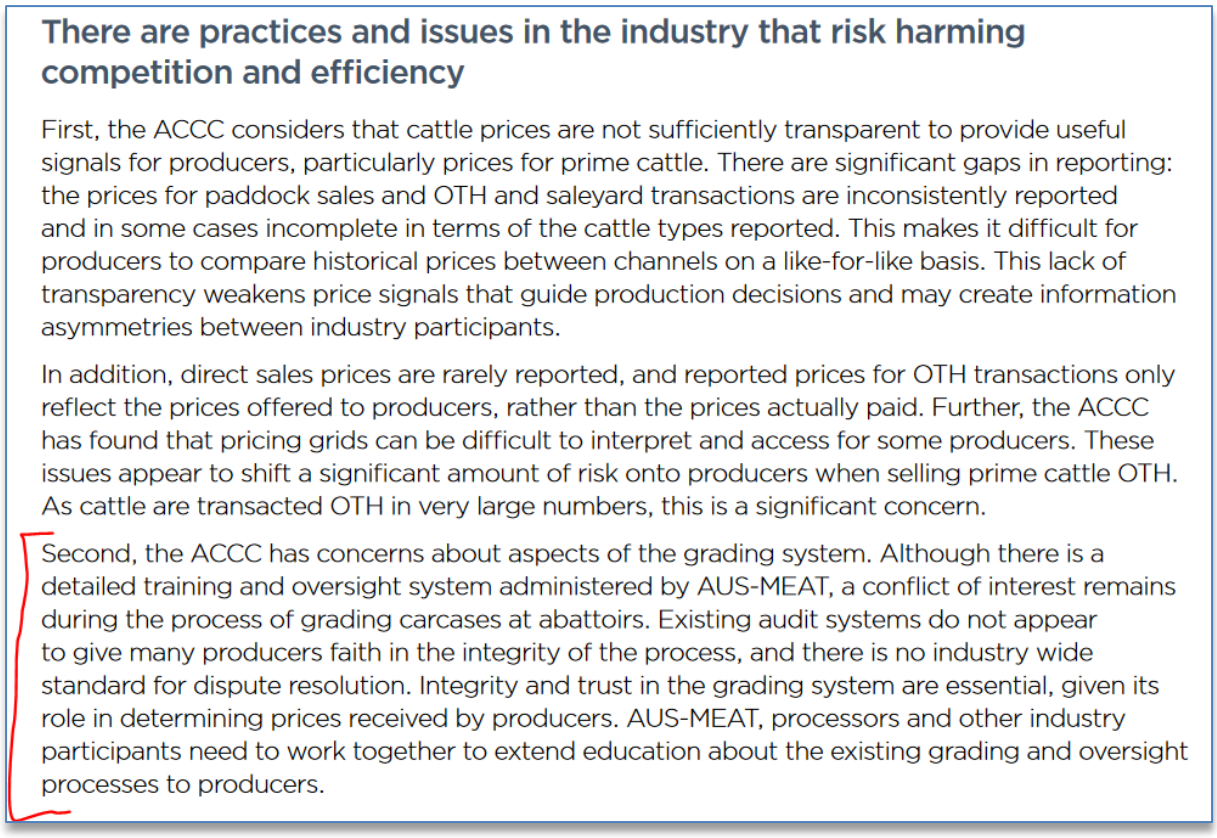
7. **Data produced from objective carcase measurements should be shared for the benefit of the industry.**

The data produced as a result of objective carcase grading will be of wider benefit to the industry if aggregated and shared. For example, producers would be able to measure their own performance against the rest of the industry and make any production adjustments necessary to achieve higher cattle grades and prices.

*Figure 1-3 - Excerpt: "Cattle and Beef Market Study" ACCC Final Report 2017 – Recommendations - page 12*

### 1.2.2 Value chain trust

Normal text
From the same report commissioned by the ACCC, *Cattle and Beef market study* March 2017, It was identified that the current grading methods deteriorate the level of trust within the value chain and risk harming the competition and efficiency.



### There are practices and issues in the industry that risk harming competition and efficiency

First, the ACCC considers that cattle prices are not sufficiently transparent to provide useful signals for producers, particularly prices for prime cattle. There are significant gaps in reporting: the prices for paddock sales and OTH and saleyard transactions are inconsistently reported and in some cases incomplete in terms of the cattle types reported. This makes it difficult for producers to compare historical prices between channels on a like-for-like basis. This lack of transparency weakens price signals that guide production decisions and may create information asymmetries between industry participants.

In addition, direct sales prices are rarely reported, and reported prices for OTH transactions only reflect the prices offered to producers, rather than the prices actually paid. Further, the ACCC has found that pricing grids can be difficult to interpret and access for some producers. These issues appear to shift a significant amount of risk onto producers when selling prime cattle OTH. As cattle are transacted OTH in very large numbers, this is a significant concern.

Second, the ACCC has concerns about aspects of the grading system. Although there is a detailed training and oversight system administered by AUS-MEAT, a conflict of interest remains during the process of grading carcases at abattoirs. Existing audit systems do not appear to give many producers faith in the integrity of the process, and there is no industry wide standard for dispute resolution. Integrity and trust in the grading system are essential, given its role in determining prices received by producers. AUS-MEAT, processors and other industry participants need to work together to extend education about the existing grading and oversight processes to producers.

*Figure 1-4 - Excerpt: "Cattle and Beef Market Study" ACCC Final Report 2017 - page 4*

It is proposed that objective measurement of the key grading characteristics combined with a strong and reliable process with help to build the level of trust behind transactions as well as act as a reliable signal to drive efficient and effective value chain practices.

### 1.2.3 Control and continuous improvement of red meat protein manufacture

There are a number of manufacturing theories that look to improve lead time, reduce inventory, reduce waste and improve quality for example six sigma,, materials resource planning, lean manufacturing and theory of constraints to list a few. A common theme in all established manufacturing theories is a principal of continuous improvement through measurement and control.

The SCOTT DEXA provides a measurement and level of control to red meat processors that has until now not been possible or reliant on subjective assessment. Processors will now be able to more reliably lean on data/evidence based decision making to underpin operational improvements.

Increasingly consumer behaviour is placing a higher level of emphasis on supply chains in all industries to deliver fast and flexible response to changing demands. Process control and whole of value chain co-ordination become critical to achieving this. The SCOTT DEXA is a critical part of enabling industry to achieve safe and efficient consumer outcomes.

# 2 Project objective

The Consultant will visit a number of processing sites (up to 45) that have chosen to 'opt-in' to the industry wide DEXA installation, and who have chosen Scott to provide a quotation. The Consultant will prepare a site-specific costing for the installation of DEXA. A $5,000 fee will be paid for each completed site costing.

# 3 Methodology

## 3.1 AUSMEAT Accredited Abattoirs

All AUSMEAT accredited lamb and beef abattoirs in Australia were given an option to participate as part of this pricing exercise. In determining the current AUSMEAT accredited sites AUSMEAT were contacted and a publication of their accredited plants was used. The Scott/AUSMEAT agreed AUSMEAT accreditation list is contained in appendix 9.1 and is current as at the 24/8/2017.

Meat and Livestock Australia used this listing plus the feedback from AUSMEAT to contact each abattoir and register their interest. Eligible sites included any site accredited to slaughter beef or lamb (or both) within Australia.

From AUSMEAT feedback there are 90 abattoir accreditations. From Scott's best knowledge at this time 6 of these accreditations do not associate with an operating abattoir.

Scott understand from their own investigations that there are 106 abattoirs operating under the 90 accreditations.

39 processors with 72 abattoirs responded to a request from MLA for a pricing to be completed. These 36 sites became the participants for this exercise.

| #** | | Count |
|---|---|---|
| **A** | No of AUSMEAT Accreditations ( *for lamb and beef abattoirs in Australia*) | 90 |
| **B** | No of abattoirs under these accreditations in "A" | 115 |
| **C** | No of abattoirs currently closed or not operating | 8 |
| **D** | No of operational abattoirs as a subset of "A" | 107 |
| | | |
| **E** | No of companies that hold an accreditation | 63 |
| **F** | No of companies responded as a participant for this project | 39 |
| **G** | No of abattoirs with accreditation owned by participating companies | 72 |
| **H** | No of companies not responded (*and have operational* AUSMEAT abattoirs)* | 30 |

* To the best of Scott's knowledge

** B, C, D, E, F, G & H are all calculated using Scott's best knowledge at the time of writing

*Table 3-1 - AUSMEAT accreditation and participating companies*

## 3.2 Participants

More than 60% of companies that hold an AUSMEAT accreditation responded to MLA's call to participate. 36 Australian sites constituting 45 abattoirs were identified as participating abattoirs. A list of the abattoirs is found in figure 3-1 below.

| Site | AUSMEAT No | Location | Lamb or Beef |
|---|---|---|---|
| ACC - Australian Country Choice | 1620 | QLD | Beef |
| ALC Colac | 282 | VIC | Lamb |
| Bindaree Beef | 218 | NSW | Beef |
| Fletcher Albany | 8 | WA | Lamb |
| Fletcher Dubbo | 2309 | NSW | Lamb |
| Frewstal | 53 | VIC | Lamb |
| Gathercole Carrum Downs - Beef | 69V | VIC | Beef |
| Gathercole Carrum Downs - Lamb | 69V | VIC | Lamb |
| Gathercole Tatura - Lamb | 2261 | VIC | Lamb |
| Gathercole Wangarata - Lamb | 62V | VIC | Lamb |
| Green Mtn - Beef | 194 | QLD | Beef |
| Greenhams Moe | 205 | VIC | Beef |
| Greenhams Smithton | 716 | TAS | Beef |
| Gundagai Meat Processors | 106 | NSW | Lamb |
| Hardwick Meats | 43 | VIC | Lamb |
| Harvey Beef | 648 | WA | Beef |
| JBS Brooklyn - Beef | 6888 | Vic | Beef |
| John Dee - Beef | 243 | QLD | Beef |
| Junee | 90 | NSW | Lamb |
| MC HERD - Beef | 13 | VIC | Beef |
| MC HERD - Lamb | 13 | VIC | Lamb |
| Midfield Meats - New Beef site | 180 | VIC | Beef |
| Midfield Meats - New Lamb site | 180 | VIC | Lamb |
| Midfield Meats - Old Beef site | 180 | VIC | Beef |
| Midfield Meats - Old Lamb site | 180 | VIC | Lamb |
| NCMC | 239 | NSW | Beef |
| Nolan Meats - Beef | 80 | QLD | Beef |
| Oakey - Beef | 558 | QLD | Beef |
| Ryan Meats Co - Lamb | 22 | VIC | Lamb |
| Southern Meats - Goulburn NSW | 217 | NSW | Lamb |
| Stanbroke - QLD - Beef | 203 | QLD | Beef |
| Thomas Foods - Lobethal | 866 | SA | Lamb |
| Thomas Foods Murray Bridge | 533 | SA | Lamb |
| Thomas Foods Tamworth | 394 | NSW | Lamb |
| Wagstaff Cranbourne | 46 | VIC | Lamb |
| Wagstaff Garfield | 587 | VIC | Beef |
| WAMMCO | 572 | WA | Lamb |
| Western Meat Exporters | 101 | QLD | Lamb |
| Wingham Beef | 154 | NSW | Beef |
| Wodonga Abattoir - Lamb | 612 | VIC | Lamb |
| Wodonga Abattoir- Beef | 612 | VIC | Beef |
| AMG Dandenong | 3085 | VIC | Beef |
| VV Walsh lamb | 686 | WA | Lamb |
| Wellard | 369 | WA | Lamb |
| Kilcoy Pa | 640 | QLD | Beef |

*Figure 3-1- Participating abattoirs*

## 3.3 Evaluation process

### 3.3.1 Site evaluation

Each site was contacted by Scott to arrange a site visit. Most all sites were visited with a few exceptions where information was requested to be provided by correspondence rather than conduct an on-site evaluation or the site was not in a position to be able to undertake a costing. A total of 38 sites were able to be costed.

For each site where a visit was conducted the following activity was conducted:

1. An explanation of the SCOTT DEXA and discussion on how it could be best implemented was had with key plant management and/or operational staff
2. Scott worked with plant staff to understand where about in the existing process the technology could be implemented
3. Scott worked with site staff to understand how the identified location would function technically
4. Scott collected information related to how the DEXA would be implemented and noted any specific considerations that may impact on industry wide adoption that were identifiable at the time.

It should be noted that during the course of this project that there were some key developments with the DEXA technology that enabled the site evaluation process to have a higher level of accuracy as more plants were visited:

1. The first production prototype beef DEXA was under construction so the system specifications were being refined in parallel to this pricing exercise. This means that some of the later DEXA pricing were able to account for a revised footprint and services requirements.
2. There have been a range of smaller room concepts developed to suite lower throughput processors. Many of the lower throughput processors that were evaluated prior to the small room concepts were priced based on a full size 20ppm room design.
3. The lamb DEXA was being rolled out to the first few sites at the time of this pricing. Some additional improvements to the system have been implemented that may assist with implementation. It is not believed that these will have a significant impact on the outcome of this pricing project.

### 3.3.2 Information collection

There is a range of information that was collected to assist in the pricing of the DEXA systems for each of the participating facilities. An example of typical information collected would include the following where applicable:

It should be noted that as many participants were unaware of what DEXA was, how DEXA worked or how the process (and value chain) could benefit from its use the location chosen and the information collected was based on a briefly considered implementation.

It is Scott view that as participants become more familiar with the DEXA technology this will affect their view on how and where it should be implemented in their chain. This in turn will mean that costs of implementation at that time may vary from current estimates.

Scott do not believe that costs will vary significantly however as in many cases the implementation costs would have similar considerations if moved to a new location.

| | | |
|---|---|---|
| Establishment No | | |
| Contact | | |
| Phone | | |
| Email | | |
| Address | | |
| ABN | | |
| Trading name | | |
| Shutdown period? Date: | | |
| | | |
| **Lamb** | | |
| | | |
| **Site works additional costs** | | **Site works additional costs** |
| Hot or Cold product into DEXA | | New cabinet room required |
| Throughput rate max and min | | Demolition required |
| Full size room or small room | | Slab requirements |
| Ground floor or multi level | | Number of new/moved sinks/basins |
| Lamb, Sheep, Goat or Mutton | | AC requirements for processing room? |
| Gambrel make | | AC requirements forcabinet room? |
| Are Parking stations required? | | Remove/move Air handling equipment? |
| Any pre-processing between HSCW and DEXA? | | Temporary walls required for install |
| Spray chilling before DEXA? | | Fire system modifications |
| Access considerations for install | | Does the roof require removal to install? |
| Under floor access (shielding required?) | | Additional amenity required? |
| Number of new chains required to interface to DEXA | | Additional Elec Supply required? |
| Length of chain required to interface (total) | | Additional Pneumatic supply requried? |
| number of sprockets to interface | | Drainage or plumbing required? |
| 2D or 3D chain | | |
| Number of switch gates required | | |
| Total gate and pusher sensors | | |
| Total chain encoders required | | |
| DA required? | | |
| Structural steel or support required | | |
| Cranage requirement | | |
| Demolition or Relocation of structural required? | | |
| Modify existing chain required? | | |
| | | |
| **Beef** | | |
| | | |
| **Site works additional costs** | | **Site works additional costs** |
| Hot or Cold product into DEXA | | Cranage estimate |
| Throughput rate max and min | | New cabinet room required |
| Full size room or small room | | Demolition required |
| Ground floor or multi level | | Slab requirements |
| Cow, Steer, Veal or Bull? | | Number of new/moved sinks/basins |
| Hook or Roller type | | AC requirements for processing room? |
| Parking stations required? | | AC requirements forcabinet room? |
| Any pre-processing between HSCW and DEXA? | | Remove/move Air handling equipment? |
| Spray chilling before DEXA? | | Temporary walls required for install |
| Access considerations for install | | Fire system modifications |
| Under floor access (shielding required?) | | Does the roof require removal to install? |
| Sides or quarters | | Additional amenity required? |
| Number of new chains required to interface to DEXA | | Additional Elec Supply required? |
| Length of chain required to interface (total) | | Additional Pneumatic supply requried? |
| number of sprockets to interface | | Drainage or plumbing required? |
| 2D or 3D chain | | |
| Number of switch gates required | | |
| Total gate and pusher sensors | | |
| Total chain encoders required | | |
| DA required? | | |
| Structural steel or support required | | |
| Demolition or Relocation of structural required? | | |
| Modify existing chain required? | | |

*Figure 3-2- Example information collected from participating sites*

### 3.3.3 Analysis

Pricing and implementation was separated into four categories of delivery:

1. SCOTT DEXA machine Ex works
2. Installation of the Ex works system and commissioning
3. Implementation of any structure or services to support the DEXA system specific to each individual site
4. Cost of implementing an RFID based traceability system to enable data generated by the SCOTT DEXA to be attributed to individual livestock at the point of slaughter.

Given the scale of this project the pricing exercise was limited to a single site visit per abattoir and using information that could be gathered without employing destructive methods to make an estimate for the above categories.

The costs associated with the Ex works component are well known and have very little variation from site to site. The only variation that is experienced in this cost will be in relation to specific modifications to the Ex works machine that would be required to ensure a working solution at a particular site. In general no such variations were recorded.

Installation and commissioning of the Ex works machinery has some variation between sites. This cost considers factors such as accessibility for installation technicians, accessibility to get equipment into position, Specific site integration commissioning tasks to interface onto existing process and site specific factors that affect the install technician's length of stay at site or additional resource and materials.

Structural modification and services required to support the DEXA system will vary significantly from site to site. Some sites will require very little infrastructure where the DEXA is to be located on a solid existing support base and interface directly onto the side of an existing chain. On the other end of the scale, sites that require a multi-level implementation where existing support infrastructure is not sufficient and where existing services have not got sufficient capacity there will be a significant cost of implementation.

It should be noted that to get a high level of accuracy in the costs associated with infrastructure and services upgrades a far more significant quotation process is involved than that allowed for under this project. However without undertaking any destructive testing or structural analysis a high level estimate based on similar installations by Scott and using industry standard costing techniques for example using *The Australian Construction Handbook*, Rawlinsons 2010, an estimate that should provide a good indication of total implementation cost was determined.

Category 4 involved determining a price to enable data generated by the DEXA system to be traced back to the point of kill. In general nearly all plants have a comparable process to implement traceability reliably.

Lamb

Most all small stock plants surveyed except 1 use an inverted dressing system and transfer full dressed carcases to a hook and gambrel. The following method is proposed to ensure data integrity:

- Livestock are scanned at the knocking box using ear tag technology (Not in all states for small stock at the time of writing)

- Animals are slaughtered and placed onto the first stage of the inverted dressing chain. This chain is fixed pusher and it is not possible for animals to move forward or back a pusher. (It is possible for an animal to come off a pusher at which point that pusher becomes empty)
- The ear tag is scanned on this chain before the head is removed.
- The animals are processed on this chain before passing to the second stage of the inverted chain which again is fixed pusher where animals are not able to move between pushers.
- As these two chains are fixed pusher and can be tracked by monitoring the chain position it is proposed that tracking integrity is ensured to this point.
- After stage two inverted chain carcases are then transferred to a hook and gambrel system by the hind leg. Gambrels are moved along a rail using a chain conveyor or pushed by operators manually.
- At this point carcases are able to be removed from the rail and re-introduced to the rail and thus tracking integrity cannot be ensured by tracking the conveyor alone.
- An RFID tracking device in each gambrel is proposed and costed as part of this exercise

Beef

Most all beef plants surveyed use a continuous dressing system and transfer full dressed carcases to a hook and gambrel there are a few differences in the beef dressing system including tenderstretch, shackling process and quartering. The following method is proposed to ensure data integrity for Beef:

- Livestock are scanned at the knocking box using ear tag technology
- Animals are slaughtered and placed onto a shackling chain. This chain is fixed pusher and it is not possible for animals to move forward or back a pusher. (It is possible for an animal to come off a pusher at which point that pusher becomes empty)
- As the shackle chain is fixed pusher and can be tracked by monitoring the chain position it is proposed that tracking integrity is ensured to this point.
- The animals are processed on this chain before passing to the continuous dressing chain which uses a roller (or skid) for each of two hind legs. Rollers/skids are moved along a rail using a chain conveyor or pushed by operators manually.
- Typically with all beef currently the carcase is split into two sides after evisceration.
- At this point carcases are able to be removed from the rail and re-introduced to the rail and thus tracking integrity cannot be ensured by tracking the conveyor alone.
- An RFID tracking device in each Rollers (or skids) is proposed and costed as part of this exercise

No rooms were costed in a position where the sides had been quartered and as such:

- No Ex works variation to deal with quarters has been made
- No Traceability costs associated with quartering hooks has been allowed

# 4 Results

## 4.1 Individual processors output and feedback

### 4.1.1 Letter to processors (and MLA)

An example of a typical letter developed for each abattoir is shown below.

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# DEXA SCANNER FOR LEAN MEAT YIELD ANALYSIS

SITE EVALUATION AND COSTING

**Processor PL.**
Address line 1,
Address line 2,
Attention:,

17 Sept 2018
Ref: JA14465-D01

Dear XXXXXXX,

Thank you for the opportunity to evaluate with you, the application of DEXA x-ray scanning for measurement of lean meat yield at your facility. Your site has now been evaluated for the purposes of the costing exercise recently communicated by Meat and Livestock Australia (MLA).

An analysis, including the cost of implementation plus the cost of making data available to the point of kill has been concluded and is summarised below. A copy of this costing and our findings has been provided to MLA and AMPC to assist with an industry level co-ordination of DEXA as a measurement tool. MLA will be in contact with you in the near future to provide details on what industry involvement and any funding that may be applicable.

From our discussions and inspection of your facility we believe that DEXA will integrate seamlessly with your existing process and can be constructed with minimal disruption to your normal production. The location identified will enable scanning of all dressed carcase inventory and is anticipated to provide the maximum benefit to your operations.

Costs that have been calculated include a full "Turnkey" implementation of the DEXA scanner, lean meat yield analysis and data traceability from the DEXA scanner to the point of kill. It is anticipated that at the time of implementation a scope of works can be agreed that will provide flexibility for your facility to "pick and choose" what supply arrangement is desired for each component identified. Further breakdown on the costs below can be provided to assist if desired.

| | | | | |
|---|---|---|---|---|
| **Establishment No** | | | **ABN** | |
| **Contact** | | | **Project Contact** | |
| **Phone** | | | **Trading name** | |
| **Email** | | | **Processor requests use of AMPC PIP funds** | |
| **Address** | | | | |

| Description | Estimate |
|---|---|
| Build an Ex-Works DEXA carcase scanning machine | $XXXX |
| Ship, Install and Commission the DEXA scanner | $XXXX |
| Scope and deliver site infrastructure works. | $XXXX |
| Traceability hardware to enable data from the DEXA scanner to be traced back to the point of kill. | $XXXX |
| Notes:<br>• Any applicable notes to pricing or implementation. | |

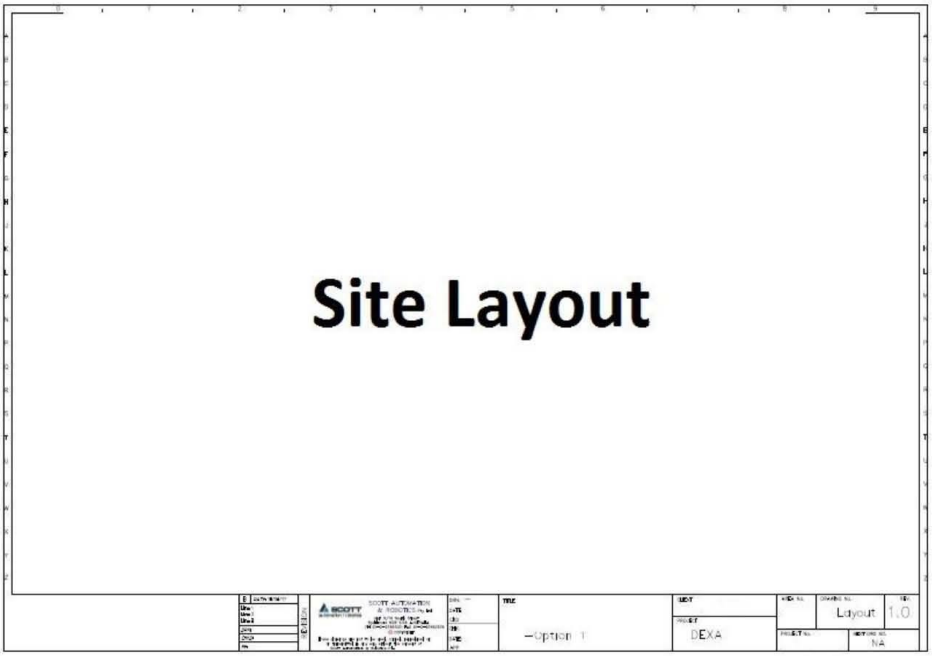


*Figure 1. Items shown in **GREEN** and suppled Ex works. Items shown in **ORANGE** are changes to the site infrastructure*

*Note: Refer to drawing in attachment*

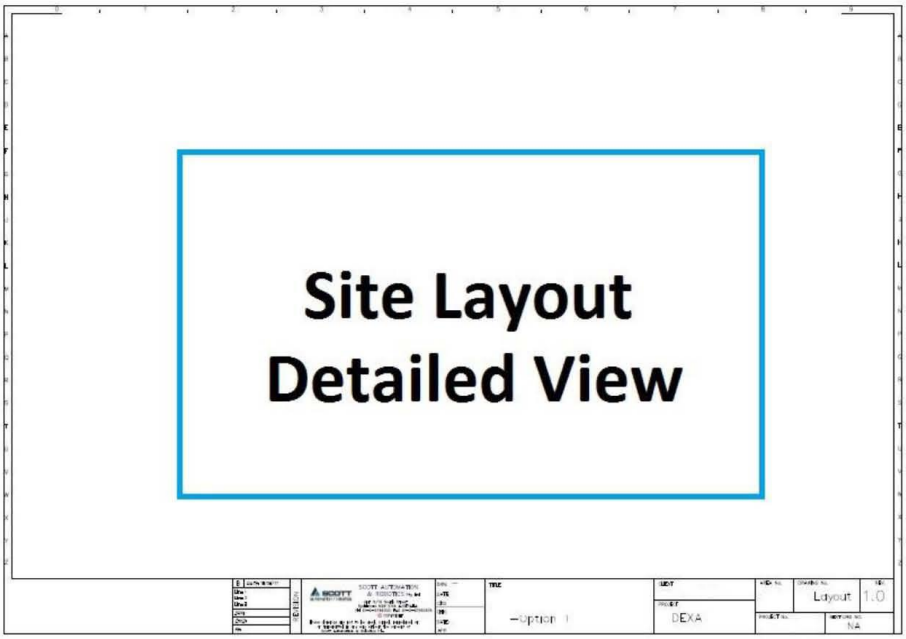


*Figure 2. Items shown in **GREEN** and supplied Ex works. Items shown in **ORANGE** are changes to the site infrastructure*

*Note: Refer to drawing in attachment*

It is noted that the costing above will includes an allowance for project management of site infrastructure works and contains items costed on the basis of engaging external contractors to perform work that your facility may want to complete "in-house". It is noted that the costs and final layout will be confirmed at the time of contracting where a scope and final cost can be agreed. Some assumptions have been made regarding existing infrastructure being fit for purpose and may need a detail analysis before contracting any works.

**Next Steps:**

This costing and layout have been provided to MLA and AMPC for determination of an industry wide funding arrangement and to determine what considerations and systems need to be put in place to enable the DEXA to be use as a "standard" measuring tool for meat yield.

MLA will be in contact with any applicable funding and implementation considerations shortly.
Scott can provide a further breakdown of the costing on request to assist with planning.
Scott will continue discussion on the alternative locations identified to ensure that no additional scoping is required.

**Meat and Livestock Australia statement:**

*"MLA is happy for processors not wanting to wait for an industry agreement on a potential industry funding model, to progress this opportunity for your facility immediately. Please contact Sean Starling to initiate that process, where you have not done so already."*

Sean Starling
Sean Starling - General Manager - Research, Development and Innovation
P: +61 (2) 9463 9307
M: +61 419 891 950
Meat & Livestock Australia

**Kind Regards,**

**Nick Stanford**
**SCOTT - Automation & Robotics**
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nstanford@scottautomation.com
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*Figure 4-1-Example letter with DEXA cost estimates to abattoirs*

Each participant was provided a letter similar to that shown above containing the estimates for the DEXA implementation as well as considerations that needed to be noted if and when a DEXA was to be considered.

Considerations included some of the key assumptions made when constructing the estimates as well as any processing considerations that may need to be taken into account.

### 4.1.2 Feedback from processors

Participants were asked to provide a range of information that may have some effect on the implementation of the DEXA and ultimately effect the cost of implementation. Of particular note was the processing that occurs after the HSCW scales and the proposed location of the DEXA.

It was found that there were a few important processing differences in lamb and many differences in Beef. These are summarised in the table below.

| **Variances in processing that occurs across sites between HSCW and proposed location of DEXA** | |
|---|---|
| **Lamb** | **Beef** |
| Aorta left in | Chine out |
| Kidneys left in | Tender stretch |
| Tenderloins taken out | Neck boned out |
| Excessive kidney fat left in | Feather bones off |
| Contamination trim | longissimus colli removed or dropped |
| Necks tipped on slaughter floor | Metal hook to hold leg, neck and/or skirt |
| Significant portions removed because of disease | Inside skirt removed |
| Spray chill | Quartered |
| Skin on goat | Hot wash |
| Hot wash | Spray chill |
| Stimulation | Back scribes |
| Flaps dropped | Rib Scribes |
| Boning room pre-trim | Brisket released |
| Spray chilling | Air release of fore and butt |
| Stimulation | Knuckle released |
| Strung and unstrung | Banjo leg deboned |
| Hot and cold side DEXA | 5/6th or 11/12th Grading separation cut |
| | Rump released |
| | Tenderloin released |
| | Aitchbone marked/released |
| | Stimulation |
| | Hot and cold side DEXA |

*Table 4-1- Processing differences site to site*

It is noted that these factors may affect how the DEXA is implemented and may require further development of the DEXA unit.

## 4.2 Results to industry

### 4.2.1 Costings

The following participating abattoirs have a costing completed.

SCOTT automation + robotics

mla MEAT & LIVESTOCK AUSTRALIA

**DEXA Scanner Rollout Costing Projects**

| Site # | Client | Location | Hot or Cold DEXA | Lamb or Beef |
|---|---|---|---|---|
| 1 | Red Meat Processing Plant No # 1 | NSW | Hot | Lamb |
| 2 | Red Meat Processing Plant No # 2 | VIC | Hot | Lamb |
| 3 | Red Meat Processing Plant No # 3 | NSW | Hot | Lamb |
| 4 | Red Meat Processing Plant No # 4 | SA | Hot | Lamb |
| 5 | Red Meat Processing Plant No # 5 | VIC | Cold | Lamb |
| 6 | Red Meat Processing Plant No # 6 | NSW | Hot | Lamb |
| 7 | Red Meat Processing Plant No # 7 | WA | Hot | Lamb |
| 8 | Red Meat Processing Plant No # 8 | VIC | Hot | Lamb |
| 9 | Red Meat Processing Plant No # 9 | WA | Hot | Lamb |
| 10 | Red Meat Processing Plant No # 10 | NSW | Hot | Lamb |
| 11 | Red Meat Processing Plant No # 11 | WA | Cold | Beef |
| 12 | Red Meat Processing Plant No # 12 | VIC | Cold | Lamb |
| 13 | Red Meat Processing Plant No # 13 | VIC | Hot | Beef |
| 14 | Red Meat Processing Plant No # 14 | VIC | Hot | Lamb |
| 15 | Red Meat Processing Plant No # 15 | VIC | Hot | Beef |
| 16 | Red Meat Processing Plant No # 16 | VIC | Hot | Lamb |
| 17 | Red Meat Processing Plant No # 17 | VIC | Hot | Beef |
| 18 | Red Meat Processing Plant No # 18 | VIC | Hot | Beef |
| 19 | Red Meat Processing Plant No # 19 | VIC | Hot | Lamb |
| 20 | Red Meat Processing Plant No # 20 | VIC | Hot | Lamb |
| 21 | Red Meat Processing Plant No # 21 | VIC | Hot | Lamb |
| 22 | Red Meat Processing Plant No # 22 | VIC | Hot | Lamb |
| 23 | Red Meat Processing Plant No # 23 | VIC | Hot | Beef |
| 24 | Red Meat Processing Plant No # 24 | VIC | Hot | Lamb |
| 25 | Red Meat Processing Plant No # 25 | QLD | Cold | Beef |
| 26 | Red Meat Processing Plant No # 26 | QLD | Cold | Beef |
| 27 | Red Meat Processing Plant No # 27 | NSW | Cold | Beef |
| 28 | Red Meat Processing Plant No # 28 | QLD | Cold | Beef |
| 29 | Red Meat Processing Plant No # 29 | QLD | Hot | Beef |
| 30 | Red Meat Processing Plant No # 30 | VIC | Hot | Lamb |
| 31 | Red Meat Processing Plant No # 31 | QLD | Hot | Beef |
| 32 | Red Meat Processing Plant No # 32 | NSW | Hot | Lamb |
| 33 | Red Meat Processing Plant No # 33 | QLD | Hot | Lamb |
| 34 | Red Meat Processing Plant No # 34 | VIC | Hot | Beef |
| 35 | Red Meat Processing Plant No # 35 | NSW | Hot | Beef |
| 36 | Red Meat Processing Plant No # 36 | NSW | Cold | Beef |
| 37 | Red Meat Processing Plant No # 37 | WA | Hot | Lamb |
| 38 | Red Meat Processing Plant No # 38 | VIC | Cold | Beef |
| 39 | Red Meat Processing Plant No # 39 | QLD | Cold | Beef |

*Figure 4-2- DEXA rooms costed - summary*

### 4.2.2 Considerations

As a result of the information collection and pricing exercise there are a few notable considerations that would have impact on how DEXA could be implemented across industry and as such the costs of implementation:

1. Location of the DEXA
    a. Processors would nominate a wide range of locations between the HSCW scales and the boning room. This is driven by:
        i. Space available
        ii. How processors see that they could attain maximum benefit
        iii. Minimising disruption to processing
        iv. Ability to scan all product before splitting to multiple end destinations
        v. Access to install
    b. As noted in section 4.1.2 various processes occur at different locations across sites.
        i. A method to standardise the result across sites would need to be considered
        ii. It is likely that processing methods will change with time at each site and a method to enable the DEXA results to correlate over time would be beneficial
    c. The costing was completed using a best information at the time footprint. As the DEXA technology matures the footprint and arrangements available may increase the options available for the install location
2. There is further development of the DEXA solution to suite some plants
    a. Quarter beef is not currently supported on the existing design
    b. Tenderstretch would need to modified for
    c. Significantly processed sides would need to be modified for
    d. The current concepts for small throughput plants needs to be detail designed and verified.
    e. Carcases processed on traditional dressing chains would need to be modified for
3. Processors are in some instances are reluctant to share data with saleyard suppliers
    a. Often not the actual producer
    b. Often not a good market signal mechanism
4. Technical risks
    a. Every plant has a different capacity to maintain equipment
    b. There will need to be a system to track DEXA system updates and revisions
        i. Software updates
        ii. Hardware modifications and repairs that may affect result
        iii. Component redundancy and replacements
    c. Each plant will have a different requirement around data storage and transfer.
        i. Some plants may have limited storage available
        ii. Some plants do not have an advanced IT system
        iii. Many plants do not have onsite IT capability in case of remote dial in support.
5. Security
    a. System security from the perspective of damage or tampering
    b. Security to ensure that operators are not able to affect the result or mis-use the system by accident.

# 5 Discussion

## 5.1 Notes from the process of data collection

More than 60% of companies that hold an AUSMEAT accreditation responded to MLA's call to participate. 36 Australian sites constituting 45 abattoirs were identified as participating abattoirs and a total of 39 costings were completed. Within this range of costings examples of installations on single and multi-story implementations exist, examples of installations inside and outside existing plant building exist, for beef a low throughput room was costed and an extensive range of locations within the processing chain (including hot and cold for both species.

It is believed that the sample set of costings will be a good indication of the cost to implement DEXA across industry.

Of the AUSMEAT accredited abattoirs it became apparent that a number of sites were closed permanently, closed looking for a new operator or still being built.

There was one preliminary AUSMEAT accreditation which was treated for this exercise as an accredited site.

It was noted that there are three AUSMEAT accreditations categorised as "beef" that were in actual fact able to process veal across an existing small stock chain. There is no consideration of a separate DEXA for veal in this project and it is assumed that veal run on small stock chains will be capable of utilising the lamb DEXA.

### 5.1.1 Dynamic methodology

It should be noted that during the course of this project that a number of outside influences led to a dynamic methodology.

1. Small and medium throughput room concepts were developed mid-way through costing
    a. Some of the known low throughput sites have been assumed a cost of a smaller room.
    b. Sites that were priced with a full size room have remained with this cost.
2. The Beef DEXA has continued to develop based on the first commercial prototype being constructed in Rockhampton.
    a. The size, specifications and operation have all been refined during this time
    b. Each time a Beef plant was priced the latest specifications and sizes were used.
    c. For previously costed rooms there may be some additional location options that would become available or some changes to the infrastructure that would not have been taken into account.
3. The Lamb DEXA room has continued to progress as the first few rooms are rolled out to processors in Australia.
    a. Similarly there are some items that would change on rooms that were costed earlier on in this project.
    b. As we start to understand what is required to ensure data is effectively captured and transferred to the value chain there are some additional pieces of hardware and costs not accounted for in this project. Most all of these are not high cost items eg. Storage, calibration hardware, software platforms and it believed these will not affect the total rollout costs to industry significantly.

4. As progressive sites were analysed and costing information was refined there were improvements to the costing methodologies for individual tasks/components to make the costing more accurate. For example when pricing conveyors using a pre-defined costing algorithm, the algorithm was further improved based on additional metrics that could be measured at site such as incline/declines, corner radius etc. Again it is not anticipated this will have a significant effect on the overall rollout costs to industry.

All these will have some impact on the accuracy of the priced result however in reviewing each of these changes it would appear that the estimates obtained should still be a very good indication of the total cost to implement DEXA across industry.

### 5.1.2 Changing environment

It should be noted that as processors, producers and the industry become more aware of the uses of the DEXA technology the implementation will progressively change to reflect this.

Similarly as additional DEXA opportunities are developed the DEXA cost and cost of implementation may change to reflect new configurations.

There is scope to develop variations of the current DEXA system to suite specific requirements and these changes will have some cost implication.

It is without question that as processors and producers have a greater level of control over the production of beef and lamb that the methods used to dis-assemble carcases will change significantly.

### 5.1.3 Assumptions

Within the limits of this project the costing exercise made a number of assumptions that will affect the accuracy of the results.

Given the level of work allowed for under this project some of the more significant factors that estimations are based on:

1. non-destructive examination of the existing infrastructure
2. a single site visit for each abattoir
3. costs for component hardware from similar installations previously
4. industry standard costing rates
5. Costing rate formula’s provided to Scott by third part OEM manufacturers for components.
6. Assumption that existing infrastructure meets all codes and regulations
7. The plants provide access, lifting equipment and assistance in installing the equipment
8. Pricing stays consistent over time
9. Exchange rate movement is not taken into account

## 5.2 Cost of implementation

39 of 45 abattoirs (17 Beef and 22 lamb) have been priced from a group of 36 participants. From these 39 abattoirs the following extrapolation applies:

Total cost extrapolated for all AUSMEAT accredited abattoirs (operating and not)

| | Beef | Lamb |
|---|---|---|
| Total cost all AUSMEAT abattoirs | $180M | $67.7M |
| Total cost operating abattoirs | $168.4M | $60.1M |

*Table 5-1- Cost of implementation into AUSMEAT abattoirs*

It has been found that to implement DEXA across industry a total investment of AUD247.7M for all AUSMEAT accredited abattoirs or AUD228.5M for operating AUSMEAT accredited abattoirs.

## 5.3 Considerations for implementation

Location Lamb

| Hot carcase scan | Cold carcase scan |
|---|---|
| 20 | 2 |

Location Beef

| Hot carcase scan | Cold carcase scan |
|---|---|
| 9 | 8 |

*Table 5-2 - DEXA Locations*

The results from feedback show that some consideration will need to be given to the standardisation and control of data generated by the DEXA systems when installed as well as how the systems can be maintained and secured.

# 6 Conclusions/recommendations

## 6.1 Conclusion

It has been found that to implement DEXA across industry a total investment of:

**AUD247.7M** for **all AUSMEAT** accredited abattoirs or
**AUD228.5M** for **operating AUSMEAT** accredited abattoirs.

If DEXA is to be installed as a measurement tool for industry there are a number of factors that will need to be considered to ensure maximum benefit is attained for industry stakeholders.

## 6.2 Recommendation

There are a few finite recommendations that may have a bearing on the cost of implementation if the DEXA is to be rolled out to all AUSMEAT accredited abattoirs in Australia:

1. Further development will be required for the DEXA technology to suite every application
    a. Veal needs to be accounted for
    b. Tenderstretch needs to be accounted for
    c. All the processing variables mentioned in this report need to be verified
    d. There is a need to ensure that the DEXA result is not able to be effected by mis-use or operator fault.
    e. Significant cost reduction may be achievable if a low throughput DEXA can be fully verified
2. A method to standardise and control the measurement data integrity will need to be devised given the variations in proposed locations.
3. With implementation at a number of sites there will be a need to train sites to operate and maintain the equipment.
4. There will be a need to ensure that the internal hardware and software configuration of the DEXA machines is controlled and tracked particularly as the system develops further and hardware and software becomes redundant and replaced or upgrades occur.

It is also advised that while a great deal of care was taken to gauge an accurate estimate that there are a number of factors that will change with time and/or won't be known until a more detailed (and often destructive) analysis is performed. It is advised that at the time of implementation, each room be analysed in greater depth so that a true cost can be determined.

# 7 Key messages

## 7.1 Some considerations for rollout of DEXA

### 7.1.1 Location

It appears from the results that if a single DEXA unit is to be installed at lamb or beef abattoir then the location within each abattoir will vary depending on a number of factors.

Even if a decision was made to install all DEXA units in a common location this will have its own restrictions with regards to the technology as it exists today.

### 7.1.2 Pre-processing

It is acknowledged that across processors that the processing methodologies vary significantly. Many processors view these processing methods as part of their competitive business advantage.

It would seem that there is a need to determine a method of standardising the DEXA outputs taking into account these variations.

It is also noted that some further development of the DEXA will be required to ensure that all processing variables are able to be scanned reliably.

It is possible this may have a resultant impact on the cost of implementation

### 7.1.3 Engagement

There are 24 companies that have not responded to the call to participate in this project. It is anticipated that man of these companies operate with an even greater level of variation in size, throughput, processing methods and capital budget than the companies that have been involved.

It is possible that these abattoirs may require a different approach or additional considerations.

### 7.1.4 Standardisation and measurement methodology

Standardising the measurement method, hardware, software and data management will be key to gaining maximum benefit to industry from the implementation of the DEXA units.

It may be worth using a certification body such as is done by Weights and measures under the National Measurement Institute (Australian government)

If there is additional development of the DEXA required or a change to the implementation then this may have an impact on the total costs.

### 7.1.5 Control and repeatability

Having a level of control and repeatability in measurement across sites will undoubtedly have a significant benefit to the Australian red meat industry.

Processors will benefit from the level of control the system gives over their decision making processes.

Producers will benefit from the level of trust that will be established as well as the level and quality of data available to drive on-farm decision making.

Consumers will benefit from a value chain that has a higher level of control over the total process and as such will see an industry that can react to their demands faster and with greater accuracy.

# 8 Bibliography

1. Australian Construction Handbook, *Rawlinson 2010*

2. AUSMEAT Accreditation Listing, *2017 https://www.ausmeat.com.au/links-tools/accreditation-search/*

3. Cattle and beef market study—Final report, *Australian Competition and Consumer Commission 2017*

# 9 Appendix

## 9.1 AUSMEAT Listing

| | Abbatoir | State | Species | AUSMEAT # | | Notes |
|---|---|---|---|---|---|---|
| 1 | AMG Deniliquin | NSW | lamb | 2488 | | |
| | AMG Deniliquin | NSW | beef | 2488 | | Slaughter registration for calves, sheep (small stock) |
| 2 | Bindaree | NSW | beef | 218 | | |
| 3 | E C Throsby | NSW | beef | 486 | | |
| 4 | Fletcher Dubbo | NSW | lamb | 0185N | | |
| 5 | Gundagai Meat Processors | NSW | lamb | 106 | | |
| 6 | Hilltop Meats B E Campbell | NSW | lamb | 128 | | |
| | Hilltop Meats B E Campbell | NSW | beef | 128 | | |
| 7 | JBS Riverina | NSW | beef | 517 | | |
| 8 | JBS Scone | NSW | lamb | 262 | | Slaughter registration for cattle only |
| | JBS Scone | NSW | beef | 262 | | |
| 9 | Junee | NSW | lamb | 90 | | |
| 10 | Manildra | NSW | lamb | 87 | | Plant currently Closed |
| | Manildra | NSW | beef | 87 | | Plant currently Closed |
| 11 | Monbeef | NSW | beef | 952 | | |
| 12 | NCMC | NSW | beef | 239 | | |
| 13 | NH Wingham Beef | NSW | beef | 154 | | |
| 14 | Southern Meats | NSW | lamb | 217 | | |
| 15 | TEYS Tamworth | NSW | beef | 249 | | |
| 16 | TEYS Wagga | NSW | beef | 291 | | |
| 17 | Thomas Foods Tamworth | NSW | lamb | 394 | | |
| 18 | AACo N A Beef Co | NT | beef | 800 | | |
| 19 | ACC | QLD | beef | 1620 | | |
| 20 | Ballyhigh Carey Brothers | QLD | lamb | 107007Q | | |
| | Ballyhigh Carey Brothers | QLD | beef | 107007Q | | |
| 21 | Biggenden Meat Works | QLD | lamb | 3072Q | | |
| | Biggenden Meat Works | QLD | beef | 3072Q | | |
| 22 | Blenners Wholesale | QLD | beef | 103143Q | | |
| 23 | Churchill | QLD | beef | 8Q | | |
| 24 | Greenmountain Food | QLD | beef | 194 | | |
| 25 | Highchester Meats | QLD | lamb | 60Q | | |
| | Highchester Meats | QLD | beef | 60Q | | |
| 26 | JBS Beef City | QLD | beef | 170 | | |
| 27 | JBS Dinmore | QLD | beef | 235 | | |
| 28 | JBS Rockhampton | QLD | beef | 384 | | |
| 29 | JBS Townsville | QLD | beef | 4 | | |
| 30 | John Dee | QLD | beef | 243 | | |
| 31 | Kilkoy | QLD | beef | 640 | | |
| 32 | Meramist | QLD | beef | 3416 | | |
| 33 | NH Oakey Beef | QLD | beef | 558 | | |
| 34 | NH Thomas Borthwick | QLD | beef | 67 | | |
| 35 | Nolan Meats | QLD | beef | 80 | | |
| 36 | Stanbroke | QLD | beef | 203 | | |
| 37 | TEYS Beenleigh | QLD | beef | 294 | | |
| 38 | TEYS Biloela | QLD | beef | 399 | | |
| 39 | TEYS Rockhampton | QLD | beef | 7 | | |
| 40 | Western Meat Exporters | QLD | lamb | 101 | | |
| 41 | JBS Bordertown | SA | lamb | 1614 | | |
| 42 | TEYS Naracoorte | SA | beef | 423 | | |
| 43 | Thomas Foods Lobathel | SA | lamb | 866 | | |
| 44 | Thomas Foods Murray Bridge | SA | lamb | 533 | | |
| | Thomas Foods Murray Bridge | SA | beef | 533 | | |
| 45 | Greenham Tasmania | TAS | beef | 716 | | |
| 46 | JBS Davenport | TAS | lamb | 13T | | |
| | JBS Davenport | TAS | beef | 13T | | |
| 47 | JBS Longford | TAS | lamb | 195 | | |
| | JBS Longford | TAS | beef | 195 | | |
| 48 | Tasmanian Quality Meats | TAS | lamb | 19 | | |
| 49 | Aararat | VIC | lamb | 298 | | |
| 50 | ALC Colac | VIC | lamb | 282 | | |
| | ALC Colac | VIC | beef | 282 | | Slaughter registration Calves,Sheep (small stock) |
| 51 | Ashton Swan Hill Abattoirs | VIC | lamb | 2306 | | |
| | Ashton Swan Hill Abattoirs | VIC | beef | 2306 | | |
| 52 | AMG Dandenong | VIC | lamb | 3085 | | Slaughter registration cattle only, boning registration for small stock |
| | AMG Dandenong | VIC | beef | 3085 | | |
| 53 | Cedar Meats | VIC | lamb | 206 | | |
| | Cedar meats | VIC | beef | 206 | | |
| 54 | Frewstall | VIC | lamb | 53 | | |
| 55 | Game Meats Company | VIC | lamb | 2019 | | |
| 56 | Gathercole Wangaratta | VIC | lamb | 62V | | |
| | Gathercole Wangaratta | VIC | beef | 62V | | |
| 57 | Gbp Australia | VIC | beef | 224 | | |
| 58 | Greenham Sons | VIC | beef | 234 | | |
| 59 | Hardwicks Meats | VIC | lamb | 43 | | |
| | Hardwicks Meats | VIC | beef | 43 | | |
| 60 | Hy Moe Meat | VIC | beef | 205 | | |
| 61 | JBS Brooklyn | VIC | lamb | 688 | | |
| | JBS Brooklyn | VIC | beef | 688 | | |
| 62 | JBS Cobram | VIC | lamb | 397 | | |
| 63 | M C Herd | VIC | lamb | 13 | | |
| | M C Herd | VIC | beef | 13 | | |
| 64 | Midfield | VIC | lamb | 180 | | |
| | Midfield | VIC | beef | 180 | | |
| 65 | OConnor G K | VIC | beef | 1265 | | |
| 66 | Radford | VIC | lamb | 2877 | | |
| | Radford | VIC | beef | 2877 | | |
| 67 | Ralphs Seymour | VIC | beef | 260 | | |
| 68 | Ryan Meats Co | VIC | lamb | 22 | | |
| | Ryan Meats Co | VIC | beef | 22 | | |
| 69 | Tabro Meat | VIC | beef | 1912 | | |
| 70 | Tallangatta Meat Processor | VIC | lamb | 2550 | | |
| 71 | Tatura Abattoirs | VIC | lamb | 2261 | | |
| 72 | Wagstaff Cranbourne | VIC | lamb | 46 | | |
| | Wagstaff Cranbourne | VIC | beef | 46 | | Slaughter registration Calves,Sheep (small stock) |
| 73 | Wodonga Rendering | VIC | lamb | 612 | | |
| | Wodonga Rendering | VIC | beef | 612 | | |
| 74 | D K Hagan Bros | WA | lamb | 41W | | |
| | D K Hagan Bros | WA | beef | 41W | | |
| 75 | Dardanup Butchering Co | WA | lamb | 26W | | |
| | Dardanup Butchering Co | WA | beef | 26W | | |
| 76 | Fletcher Albany | WA | lamb | 8 | | |
| 77 | Goodchilds Abattoir | WA | beef | 15W | | |
| 78 | Harvey Beef | WA | beef | 648 | | |
| 79 | Hillside Processors | WA | lamb | 83 | | |
| 80 | V V Walsh | WA | lamb | 686 | | |
| | V V Walsh | WA | beef | 686 | | |
| 81 | WAMMCO | WA | lamb | 572 | | |
| 82 | Wellard Animal Production | WA | lamb | 369 | | |
| 83 | Western Meat Processors | WA | lamb | 968 | | |
| | Western Meat Processors | WA | beef | 968 | | |
| 84 | Westone Abattoir | WA | lamb | 119 | | |
| 85 | Witan Holdings | WA | beef | 113 | | |
| 86 | Tasmanian Quality Meats | | beef | 19 | | |
| | | | | | | |
| 87 | Geraldton Meat Exporters | WA | lamb | | | Plant currently Closed |
| 88 | Kimberly Meat Co | WA | beef | 2588 | | Provisional accreditation |
| 89 | Wagstaff Garfield | VIC | beef | 587 | | Plant currently Closed |
| 90 | Victoria Vallet Meats Exports | VIC | Beef | 3888 | | Provisional accreditation |