Independent Review of the proposed installation of DEXA in AUS-MEAT registered processing facilities

Issues Paper #2

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In carrying out our work and preparing this document, Ernst & Young (EY) is conducting an Independent Review on the instructions of the Client. As a result, this document specifically has taken into account the views and considerations of a range of industry, local and international subject matter experts as part of its observations. The document has been constructed based on information current as of 2 May 2017, and which have been provided by the Client and other stakeholders. EY also accessed media articles from external sources. EY have relied on this information for the purposes of preparing this Issues Paper. Beyond 2 May 2017, material events may occur, which are not reflected in the document.

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Foreword

In February, 2017 EY was asked by the Australian Meat Processor Corporation (AMPC) and the Australian Meat Industry Council (AMIC) to undertake an Independent Review of the November 2016 proposal by Meat and Livestock Australia (MLA) for the investment of $150 million to install Dual Energy X-ray Absorptiometry (DEXA) units into up to 90 AUS-MEAT registered processing plants (herein referred to as "The Proposal", "Project 150" or "the funding proposal"). MLA has recently advised the Review that they are exploring alternative funding models to those originally proposed.

The purpose of the Independent Review (herein referred to as 'The Review') is to provide an independent assessment for the AMPC and AMIC of whether The Proposal is a prudent operational and commercial decision for the industry at this time. This involves evaluating the strategic, financial, technical, commercial, operational, governance and implementation aspects of what has been proposed.

The purpose of this 2nd Issues Paper is to seek further input from the industry regarding The Proposal. In order to facilitate this, this Issues Paper provides a broad context of the Australian Red Meat Industry, examines aspects of The Proposal for the installation of DEXA in AUS-MEAT registered processing facilities, and outlines key areas being considered by The Review. Details of the key areas that The Review is considering are set out in Section 1.3, below.

Part of our work includes listening to "the voice of the industry", to hear from you directly on these matters. This is being done through discussions that my team and I have had with peak bodies, and work being undertaken by our market research arm, EY Sweeney, who have conducted a series of in-depth interviews with a number of producers and processors. This Issues Paper provides initial feedback to the wider Industry on what you have told us.

We are seeking further input from the Industry, to build on the considerable information that we have already obtained. We therefore welcome your views on the issues raised in this paper, and any other comments that you have on the matters raised by The Proposal.

Please address your comments to: dexa.independent.review@au.ey.com, by 12 May 2017.

I plan to issue a final report of The Review prior to the end of this month.

Andrew Metcalfe AO

Federal Government Lead Partner | Oceania Central Agencies Lead Partner
Independent Review Leader

3 May 2017

1. Approach to The Review, and the matters being examined

1.1. Background

On 10 November 2016, MLA announced[1] a plan to install Objective Carcase Measurement (OCM) technology across the red meat industry. The announcement indicated that "this initiative would pave the way for scientific measurement of saleable meat yield (SMY), future value based marketing and industry-wide productivity gains through processing automation, genetic improvement and data-based on-farm decision making" (MLA announcement, 10 November 2016). The announcement further indicated that MLA "would acquire a commercial loan on behalf of industry to finance the $150 million one off cost of installing Dual Energy X-ray Absorptiometry (DEXA) technology in up to 90 AUS-MEAT registered slaughter facilities" (MLA announcement, 10 November 2016) (MLA recently advised The Review that they are exploring alternative funding models to those originally proposed).

In February 2017, the Australian Meat Processor Corporation (AMPC) and Australian Meat Industry Council (AMIC) appointed Ernst & Young (EY) to undertake an independent Review of MLA's proposal which specifically focused on the installation of DEXA technology in AUS-MEAT registered processing facilities. This Review aims to present relevant information and considerations regarding whether investment in DEXA technology is an appropriate and prudent operational and commercial decision for the industry at this time.

This Review is being led by Andrew Metcalfe AO, a Partner in EY, and a former Secretary of the Commonwealth Department of Agriculture, Fisheries and Forestry.

1.2. Methodology

EY is approaching The Review in a consultative, collaborative and transparent manner. We are listening to and understanding the viewpoints from industry stakeholder groups in addition to conducting our own research and analysis. Stakeholder engagement is being managed through interviews, surveys, communication of matters under consideration through Issues Papers and submission of feedback and suggestions to The Review mailbox (dexa.independent.review@au.ey.com).

Stakeholders engaged thus far include:

▶ **Peak industry councils**[2] [i.e. Red Meat Advisory Council (RMAC), Cattle Council of Australia (CCA), Sheepmeat Council of Australia (SCA), Australian Lot Feeders' Association (ALFA), Australian Livestock Exporters' Council (ALEC), LiveCorp and the Australian Meat Industry Council (AMIC)]

▶ **Research and Development Corporations** (RDCs) [i.e. MLA and AMPC]

▶ **Producers and processors** of varying size and geographic locations

▶ **Academic and independent experts** in food quality and meat sciences and technology specialists

▶ **Providers of OCM technology** e.g. DEXA and related technology solutions

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[1] *Media release, 10 November 2016: MLA to install objective measurement across industry*
[2] *LiveCorp has yet to be interviewed as part of this process*

▶ **Interested parties** via the dedicated independent Review mailbox

We have also undertaken site visits to related technology facilities.

There are a wide range of research and consultancy reports relevant to The Proposal that EY has been provided with as part of this review. The Review is also mindful of recent/ ongoing inquiries into these matters and the recent Australian Competition & Consumer Commission (ACCC) report; *Cattle and beef market study – Final report, 2017*.

On 27 March 2017, The Review's 1st Issues Paper was published on the AMPC website where, based on initial consultation with the industry, independent subject matter experts and EY's research, a number of initial questions were raised. The findings and conclusions relating to these questions will be compiled into the final report.

The purpose of this 2nd Issues Paper is to provide a broad context of the Australian Red Meat Industry, examine aspects of The Proposal for the installation of DEXA in AUS-MEAT registered processing facilities and identify a series of further considerations. To that end, we warmly welcome feedback and contribution from the industry and interested parties in response to the matters being examined.

1.3.   Matters being examined by The Review

How may the proposed application of DEXA meet the needs of the red meat industry?:

▶ How may the proposed application of DEXA meet the needs of the industry, including research needs?

▶ Should alternative OCM technologies also be considered?

What are the associated costs which can be expected with the proposed DEXA implementation and operations, and how appropriate and viable are the proposed funding arrangements?

▶ What are the range of costs associated with the proposed implementation and operation of DEXA?

What are the commercial, contractual and financial considerations relating to The Proposal?

▶ What are the commercial, contractual and financial considerations relating to The Proposal (including intellectual property rights, data ownership, and governance of maintaining an industry standard use of DEXA and facilitating data access for the industry)?

▶ What are the project management and ongoing governance considerations relating to the roll-out of DEXA across AUS-MEAT registered processing plants?

What benefits may arise from The Proposal for the industry?

▶ What industry benefits may arise through the collection, storage and analysis of DEXA scan data from the proposed rollout (for example, the accurate value of carcase)?

▶ What benefits may arise from the use of DEXA by processors in automation, planning and sortation (including the impact of hot vs cold placement)?

▶ What are the key implementation and operational considerations for smaller versus larger processing plants?

▶ What is the suitability of an expedited roll-out, after considering the various options and associated risks?

Further details regarding these matters are highlighted in this document.

As a result of these inquiries, The Review aims to provide an informed and independent view to the AMPC and AMIC as to whether adopting The Proposal represents a prudent decision at this point in time. The Review will also identify whether there are other arrangements that should be examined prior to decisions being made for a whole-of-industry investments in OCM technology. Additionally, The Review will consider the options that are available to the industry to move forward and which of these present the most prudent direction to take.

We continue to actively seek the feedback and comments from the broader red meat industry to further shape and inform the final report – in relation to the matters listed above or any other issues that the industry wishes to draw to our attention. Please forward your response to this Issues Paper, or on any other issues relevant to The Review, via dexa.independent.review@au.ey.com by 12 May 2017.

2.   The Australian Red Meat and Livestock Industry

This section is contextual and provides an overview of the size and scale of the red meat and livestock industry, key industry participants and highlights the significant challenges and opportunities facing the industry.

2.1.   Overview

The Australian Red Meat and Livestock Industry contributes approximately $7bn a year to Australia's Gross Domestic Product (GDP). It is Australia's largest food manufacturer, and a significant employer in rural and regional areas, employing some 200,000 Australians on farm, in meat processing and at wholesale and retail businesses (illustrated in Figure 1 below). Thousands more people are involved in supplying the industry with services such as transport, supply of merchandise and other professional services (Meat Industry Strategic Plan (MISP) 2020, 2015, pg.6).

Figure 1: Australian Red Meat Industry Value Chain

Source: EY analysis of MISP 2020

2.2.   The red meat producing industry

> *"[the industry is]…the single largest contributor to the annual value of Australian agricultural production: more than half of Australian farms produce beef cattle, representing $11 billion (or approximately 21 per cent) of agricultural production value in 2014-15" - (ACCC Cattle and beef market study* – Final report, 2017, pg.3)

The red meat producing industry is made up of beef, sheepmeat and goatmeat sectors. There are approximately 71,659 cattle production businesses in Australia with a 58% representation of all farms with agricultural activity (ABS Agricultural Commodities factsheet, 2014-15) and 39,512 agricultural businesses with sheep and lambs (ABS Agricultural Commodities factsheet 2014-15). While Australia is a relatively small producer of goatmeat, it is still the world's largest exporter of goatmeat.

The sectors noted above are exposed to a range of uncontrollable factors such as weather patterns, downstream demand and price variations. Varying rainfall has played a significant role in the industry's performance over the past five years influencing operational decisions such as when to sell livestock and expand herds. Extreme examples include droughts and floods, but even modest temperature variations or the timeliness of rainfall can have a significant effect on pastures and crops used to feed livestock. In response to changes in feed availability, cattle producers (for example) will turn off or purchase stock to increase or decrease stocking rates, resulting in fluctuations in cattle supply (ACCC Cattle and beef market study – Final report, 2017, pg.39).

Revenue growth from 2012-17 has fluctuated with an annualised growth of 2.0%, with 2015-16 being particularly strong largely due to rapidly rising demand for Australian beef in export markets (IBIS World Sheep-Beef Cattle Farming in Australia, 2017, pg.4).

While revenue in 2016-17 is estimated to reach $4.9bn this is expected to fluctuate in the next five years, influenced by weather patterns and herd rebuilding activities. Additionally, the sheep and beef cattle farming industry is expected to be composed of fewer large farms (IBIS World Sheep-Beef Cattle Farming in Australia, 2017, pg.4). This is reflected in the forecast decline in the number of enterprises and establishments. This decline is influenced by technology which is anticipated to play a greater role in the expansion of farms, allowing farmers to become more efficient and improve their economies of scale.

The producing value chain is comprised of primary producers and feed lotters. Each have a similar but distinctive role in raising animals up to the point of slaughter.

2.2.1. Primary producers

The term 'primary producers' in the Australian Red Meat Industry is used to describe the grass fed beef cattle, sheep and goat farms. In Australia, cattle spend 85-90% of their lives in an extensive pasture environment feeding on grass prior to being sent to feedlots to raise livestock to marketable weight (ALFA website - Myths and Facts about the Australian Feedlots Industry, accessed April 2017).

The majority of beef cattle farms can be separated into two production regions, northern and southern Australia; reflecting differences in climate, pasture, industry infrastructure and proximity to markets. Average herd size differs significantly between farms in northern and southern Australia. In northern Australia average herd size is 1,576 head per farm, with the majority of cattle held on a relatively small number of very large properties. For southern Australia, a large number of relatively small-scale farms results in average herd size of 412 head per farm (ACCC Cattle and beef market study – Final report, 2017, pg.6).

The majority of Australian beef cattle producers are cow-calf operators, maintaining a herd of breeding cows and a relatively small number of bulls for the production of calves (ACCC Cattle and beef market study – Final report, 2017, pg.17).

The prime lamb producers however are predominately located in the Riverina, the wheat-sheep zone of New South Wales (NSW), the Victorian and NSW Murray region and the high rainfall areas in south-west Victoria and eastern South Australia (MLA website - Fast Facts Australia's sheep industry, 2016, pg.1).

2.2.2. Feedlotting

A feedlot is a type of animal feeding operation which is used for intensive animal farming. In Australia, feedlots are only used to bring livestock to marketable weights (ALFA website - Myths and Facts about the Australian Feedlots Industry, accessed April 2017). The main benefits of lot feeding are greater control and flexibility in the production and marketing of livestock (MLA website - Lotfeeding and intensive finishing, accessed April 2017).

The cattle feedlot sector has a value of production of approximately $2.5bn and employs some 28,500 people directly and indirectly. The ability to deliver consistency with respect to cattle quality and quantity (regardless of seasons) is a desirable trait for customers in both domestic and international markets. Approximately 40% of Australia's total beef supply and 80% of beef sold in major domestic supermarkets is sourced from the cattle feedlot sector (ALFA website - About the Feedlot Industry, accessed April 2017).

There are approximately 450 accredited feedlots throughout Australia with the majority located in areas that are in close proximity to primary producers and grain supplies. Queensland is the largest state in terms of cattle numbers on feed with approximately 60%, followed by NSW with 30%, Victoria with 7% and the remainder shared between South Australia and Western Australia (ALFA website - About the Feedlot Industry, accessed April 2017).

2.3. The red meat processing industry

The processing value chain in the Australian Red Meat Industry is comprised of live transport, processors (abattoirs), cold transport, marketing and distribution, and wholesale and retail distribution channels.

In 2015-16 the red meat processing industry generated $18.8bn for the Australian economy and $13.3bn in exports (IBIS World Meat Processing in Australia, 2015, pg.21). There are approximately 135 processing plants (89 of which are AUS-MEAT certified) representing a 97% of the total processing capacity (AMPC Annual Report 2015-16, pg.1). This equated to 8.1m heads of cattle in 2014-15 (ABS Agricultural Commodities, 2014-15).

The red meat processing sector is Australia's 2nd largest manufacturing industry by revenue, the largest contributor of industry value-add and the 2nd largest employer (35,291 people) by sector (IBIS World - Meat Processing in Australia, 2015, pg.33).

2.3.1. Live transport

Live transport encompasses the transportation of red meat livestock from farms to other farms, feedlots, saleyards, and meat processing facilities and for live export. Most domestic livestock are transported by land, while exports are predominately transported by sea and air. To ensure the welfare of livestock on these journeys, and to maintain the quality of the red meat product, a national guide and quality assurance system has been developed. Red meat producers are provided with the national guide to assist them with the transportation of livestock (MLA website - Animal Welfare, accessed April 2017).

The costs of transport significantly influences the profitability of the livestock transported. The weight and condition of livestock deteriorates with distance and time travelled. This increases the likelihood that the eating quality of the animal will be lower, impacting a processor's ability to fulfil its supply contracts with certainty and the prices paid to producers (ACCC Cattle and beef market study – Final report, 2017, pg.44).

Climate change is increasingly having an impact on livestock transportation with flood disrupting major logistics networks in the northern states' and reduced stock grazing areas in Queensland caused by drought. Should temperature change continue in drought affected states such as Queensland, a proportion of current grazing land may become unsuitable for the same type or density of production currently employed. This may necessitate a reduction in stock numbers or the use of more heat and drought tolerant breeds. Movement of stock to more temperate locations may take livestock away from the current supporting and processing infrastructure, necessitating increased transport time, cost and may negatively impact cattle conditions (AMPC Strategic risks facing the Australian Red Meat Industry, 2016, pg.24).

2.3.2. Processors

Processors in the Australian Red Meat Industry primarily slaughter livestock; bone, freeze, preserve or pack red meat; pack meat into tins; manufacture meals from abattoir by-products; and render lard or tallow (IBIS World Meat Processing in Australia, 2015, pg.2).

Meat processing costs in Australia are high by world standards due to the comparatively expensive regulatory compliance requirements, labour and energy costs. The industry is capital intensive, limited by operating inefficiencies, such as abattoirs operating on a single shift schedule instead of double shifts, and less opportunities locally to achieve significant economies of scale (IBIS World Meat Processing in Australia, 2015, pg.21).

The industry operates with low to medium profit margin, which is expected to decrease over the five years through to 2020-21; with the expected fall in global prices (IBIS World Meat Processing in Australia, 2015, pg.8) (and exchange rate fluctuations) being the key factor. Meat processors previously benefiting from lucrative export markets will face higher levels of competition as global supply increases. Despite the fall in global prices hurting exporter profit margins, investment in plant upgrades and advancements in technology are expected to improve industry efficiency (IBIS World Meat Processing in Australia, 2015, pg.9).

Over the past five years, many industry players have invested in processing plant upgrades and expansions, such as new slaughter floors and boning rooms, and improved chillers and freezers (IBIS World Meat Processing in Australia, 2015, pg.7).

However, the capital intensive and low margin nature of the industry suggests that the choice to adopt new technology needs to be carefully considered against a range of key factors. Such as, business model, plant size, production capacity, potential benefits, risk appetite, the ability to impact margins and overall market conditions.

2.3.3. Cold transport

Cold transport refers to the transportation of slaughtered livestock from the processor to the wholesaler and retail distribution sales channels. The primary objective is to uphold the safety and quality of the meat while being transported. Cold meat temperature needs to be maintained at certain levels to reduce the deterioration process, particularly microorganism development, throughout the processing and transportation value chain (Food and Agriculture Organisation of the United Nations (FAO) website - Cold preservation of meat products, accessed April 2017).

2.3.4. Industry marketing arrangements

The Australian Red Meat Industry marketing arrangements are established by the *Australian Meat and Livestock Industry Act 1997*, under which the government, by legislative instrument, has assigned MLA, AMPC and LiveCorp certain governing responsibilities. MLA is the marketing body for the Australian meat producers industry, AMPC is the marketing body for the Australian meat processing industry, while LiveCorp is the livestock export marketing body. All bodies coordinate marketing efforts with the objective of securing the best outcomes for the industry as a whole. Relationship agreements outline agreed roles and responsibilities, funding planning and service delivery arrangements (Department of Agriculture and Water Resources website - Red meat industry structure, accessed April 2017).

The coordinated marketing approach, as set out in the MISP 2020, key objectives are to improve attitudes towards Australian red meat and livestock, and increase wholesale demand in red meat and livestock (MISP 2020, 2015, pg.21). These marketing objectives are focused on three markets: developing export markets, developed export markets and the domestic market.

Marketing and promotions in the domestic market focus on increasing sales volumes and shifting consumer attitudes to beef and lamb (MISP 2020, 2015, pg.21). Domestic marketing activities are focused on increasing consumer demand, particularly where it is unfeasible for individual enterprises to take the initiative, either through lack of commercial incentive or insufficient resources (MLA website - Domestic Marketing, accessed April, 2017).

The Australian community is becoming more interested in the production of beef, lamb and food. However, many Australians living in major cities have little direct knowledge of farm operations. To address this, programs have been created to (MLA website - Promoting the Industry, accessed April 2017):

▶ Support cattle and sheep industries to maintain the community's trust in their integrity and ethics by building understanding

▶ Support industry to prevent consumers reducing their beef and lamb consumption for perceived environmental or animal welfare reasons

▶ Create a human bond between cattle and sheep producers and the community

Exports are a major focus for marketing efforts due to over 70% of the industry's production being exported (ACCC Cattle and beef market study – Final report, 2017, pg.7). Marketing and promotions in the export market are focused on underpinning the quality and safety systems in export markets (MISP 2020, 2015, pg.20). The industry conducts customised marketing and market access activities in conjunction with a range of programs and activities across the globe. Recent export marketing campaigns have focused on building the integrity of Australia's red meat products (AMPC – Annual Report, 2015-16, pg.22).

AMPC have highlighted that consumers, broadly, have become increasingly aware of social license factors such as animal welfare, water consumption and scarcity of clean water, greenhouse gas emission particularly from beef, erosion production and biodiversity impacts of expanded cattle territories, and increasing concerns over global food security and efficiency of production (AMPC 2025 Strategic Plan, 2016, pg.26). AMPC have expressed a growing need to increase industry awareness of animal welfare matters and potential to leverage this as a marketing differentiator (AMPC strategic risks facing the Australian red meat industry, 2016, pg.48).

2.3.5. Wholesale and retail sales channels and distribution

Livestock are primarily sold from primary producers to lot feeders, restockers, major supermarket chains, live exporters and processors (ACCC Cattle and beef market study – Final report, 2017, pg.18). Producer location, climate, farm size, production system and access to sales channels and industry infrastructure have a significant influence on farmers' production and sales decisions. The following points outline aspects of the wholesale and retail sales channels and distribution.

▶ *Lot feeders*: generally purchase relatively lightweight livestock, to meet customer needs and maximise the margin captured from feeding cattle to slaughter ready weight

▶ *Restockers*: this is a producer or agent who purchases cattle/sheep/lambs and returns them to the farm. They purchase livestock of various weights to meet different needs. If intending to feed livestock to slaughter weight, restockers are likely to purchase relatively light animals

▶ *Major supermarket chains*: purchase relatively lightweight young livestock of specific weight and quality characteristics, largely from feedlot operators. Cattle are slaughtered by accessing service kills from major processors

▶ *Live exporters*: operators supplying Australia's largest market, Indonesia, are restricted by a live weight imposed by the importing government. However, smaller volumes of heavier cattle are purchased for export to markets without weight restrictions, such as Vietnam, the Philippines and Malaysia

▶ *Processors*: purchase livestock of various weights and, other carcase characteristics to meet customer needs. Abattoirs operated by major processors are able to slaughter cattle of all weights; allowing them to adapt to changes in market demand and cattle supply

▶ *Producers:* may also retain ownership of finished cattle, accessing service kills offered by some processors, before selling beef to wholesalers and exporters or directly into domestic or export markets

▶ *Butchers:* source beef directly from processors and/or wholesalers, in the form of carcases or primal cuts, or access service kills from processors for the slaughter of cattle purchased in saleyards or directly from producers. Further processing for shelf-ready cuts, including manufactured products and ready meals, generally occurs onsite (ACCC Cattle and beef market study – Final report, 2017, pg.34)

Producers sell through a number of channels, including direct arrangements with purchasers (e.g. over the hook, paddock sales and forward contracts), saleyards and sales/auctions (ACCC Cattle and beef market study – Final report, 2017, pg.26). Major sales channels include:

▶ *Over the hooks (OTH):* Livestock are delivered by producers directly to processors, with change of ownership occurring when carcases are weighed shortly after slaughter and trimming. The carcase is then graded by a processor employee, using both standard industry grading and specific proprietary grading standards. The price received by the seller depends on the carcase weight and grade. This is calculated by referencing the price grid that was offered to the cattle producer at the time the sale was agreed (ACCC Cattle and beef market study – Final report, 2017, pg.26). As outlined in section 4.2.1 OTH is the most common direct sales method with approximately 90 per cent of the cattle purchased by processors and supermarkets acquired directly from producers using OTH

▶ *Paddock sales*: Livestock are inspected on the producer's property by a buyer or agent and sold from the paddock. The change of ownership occurs as per the agreement made between the seller and buyer, with cattle generally purchased on a dollars per head basis (ACCC Cattle and beef market study – Final report, 2017, pg.26)

▶ *Forward contracts*: Arrangements to supply cattle of a particular quality and number to a buyer at a given time for an agreed price. Forward contracts can include various terms defining delivery, change of ownership and pricing mechanisms, such as a pre-agreed price or price grid (ACCC Cattle and beef market study – Final report, 2017, pg.27)

▶ *Saleyard auctions:* While most slaughter-ready livestock in Australia are sold OTH (as outlined above), saleyard auctions are also a major and important sales method. Producers transport the animal to a saleyard for sale (to the highest bidder) on any given day with the change of ownership occurring at the conclusion of bidding (ACCC Cattle and beef market study – Final report, 2017, pg.26). Sale yards tend to be most favoured by producers who have small herds and sell in small lot sizes, but are occasionally used by larger producers when saleyard prices offer higher returns. An animal may pass through the saleyards more than once during its lifetime as it changes hands from a breeder, to being fattened, to being sold for slaughter (ACCC Cattle and beef market study – Final report, 2017, pg.78)

▶ *Online sales*: Livestock can be sold through an online auction platform, such as AuctionsPlus, livestreaming of physical saleyard auctions or direct purchases from producers, primarily stud sales. Direct purchases from producers and livestreamed saleyard auctions are extensions of saleyard auctions and paddock sales processes. However, AuctionsPlus differs from these two methods because cattle are assessed prior to sale by accredited personnel who provide a description and photographs of livestock for display online. The seller outlines sale terms prior to auction, including bidding and collection conditions, with results posted online immediately after completion (ACCC Cattle and beef market study — Final report, 2017, pg.27)

In general, producers use the sales channel they believe will maximise the return on their livestock. However, this is influenced by access to the selling method, the sale process, market specifications and buyer preferences. In recent years, cattle and beef industry participants have voiced concerns about anti-competitive conduct and market structures. Including complaints and allegations about anti-competitive behaviour at saleyards, misuse of buyer power, and an unfair distribution of profits in the supply chain (ACCC Cattle and beef market study — Final report, 2017, pg.3).

Concerns about industry practices and the impact on farm profitability tend to vary between small-scale and large-scale producers. For instance, small-scale producers have a greater reliance on saleyards than large-scale producers, who often sell direct to abattoirs. This can result in small-scale producers having fewer options when selling prime cattle (ACCC Cattle and beef market study — Final report, 2017, pg.3).

There are several characteristics of saleyard auctions which make them susceptible to anti-competitive conduct. For example, as identified in the *ACCC Cattle and beef market study – final report* (2017, pg.10), repeated interactions between regular buyers provides an opportunity to develop shared strategies and influence the outcome of an auction, quickly dealing with those who break away from these strategies. Weak saleyard competition will have a broad impact on the industry, as auction prices act as an important price benchmark for other saleyards and for other sales channels. There is significant concern in the industry, mainly from cattle producers, about pre-sale versus post-sale weighing of cattle at saleyard auctions and how this affects commercial outcomes (ACCC Cattle and beef market study — Final report, 2017, pg.10).

2.4.   Supporting industries

Supporting activities in the Australian Red Meat Industry value chain are comprised of animal health services, scientific and technical services, financial services and insurance, health care and social assistance, and accommodation and food services. They underpin continual improvement in the quality of animals produced and operational viability of the industry.

2.4.1.   Animal health

Animal health refers to well-being and physical development of Australian beef cattle, sheep and goat livestock. The MISP 2020 outlines the core priorities of animal health are continuous improvement of animal welfare, minimising risk and impact of emergency disease and minimising the impact of endemic disease (MISP 2020, 2015, pg.18). The Australian Animal Welfare Strategy (AAWS) provides a national framework to identify priorities, coordinate stakeholder action and improve consistency across all animal use sectors. There are a number of industry bodies that contribute to the MISP 2020 and AAWS animal health objectives including AMPC, MLA, LiveCorp and ALEC.

MLA's Animal Welfare Program focuses on livestock production, including on-farm management, livestock handling, transport and product quality. Animal welfare R&D is undertaken on the farm, at feedlots, and the various stages of livestock exports and red meat production. This program is in line with the International priorities of the Office International des Epizooties (OIE), the world animal health organisation, and the Australian Government's national strategic framework - the Australian Animal Welfare Strategy (AAWS) (MLA website - Animal Welfare, accessed April 2017).

AMPC works with processors to ensure that their employees are trained and competent when handling livestock, as well compliance with the National Animal Welfare Standards.

LiveCorp works closely with industry stakeholders to continuously improve performance in animal health and welfare through the provision of technical services and Research, Development and Extension (RD&E) (LiveCorp website - About us, accessed April 2017).

ALEC also plays an active role in promoting the interests of the livestock export sector including; industry's investment in improving animal welfare, encouraging the adoption of best practice across the industry and advising members on challenges and changes to the operating environment (ALEC website - About ALEC, accessed April 2017).

2.4.2. Scientific and technical services

Scientific and technical services refers to R&D activities in the Australian Red Meat Industry. As previously mentioned, MLA is the RD&E body for the Australian meat producers industry, while AMPC is the RD&E body for the Australian meat processing industry and where LiveCorp is the livestock export RD&E body. All bodies coordinate R&D efforts with RMAC, Peak Industry Council members, producer groups, Commonwealth Scientific and Industrial Research Organisation (CSIRO), leading Australian universities and international research (MISP 2020, 2015, pg.29).

The R&D program is largely funded by producer levies, with matched funding from the Federal Government. Levies are also collected by the processing, lot feeding and live export sectors, for investment in projects that support the red meat supply chain beyond the farm gate. In 2014-15 MLA invested $92.9m in red meat R&D projects, covering areas as diverse as genetics, environmental sustainability, feeding and finishing and meat safety (MLA Website – Research and Development, accessed April 2016).

The programs are broad and cover areas including:

- ▶ Animal health

- ▶ Welfare and biosecurity

- ▶ Grazing and pasture management

- ▶ Genetics and breeding

- ▶ Feeding, finishing and nutrition

- ▶ Environment and sustainability

- ▶ Human nutrition

- ▶ Business management

- ▶ Automation and value chain technologies

AMPC is the Rural Research & Development (RDC) that represents the red meat processing industry throughout Australia. The Core Program represents AMPC's primary RD&E program, focused on addressing key issues facing the processors in terms of productivity, profitability, sustainability, integrity and capability. The Core Program is divided into five distinct program streams: processing technologies, environment and sustainability, processing hygiene, quality and meat science, capability, extension and education, and industry improvement and economic analysis (AMPC website – Research Development and Extension, accessed April 2017). AMPC note the Memorandum of Understanding (MOU) and MLA relationship constrains resulting from overlapping R&D roles and responsibilities in the industry, and lack of clear definition in the relationship agreements (AMPC 2025 Strategic Plan, 2016, pg.26).

The AMPC 2025 Strategic Plan focuses on resolving these restraints and defining of roles in the relationship agreements over the next few years.

LiveCorp through the Livestock Export Program (LEP) invests in RD&E to enhance the productivity, sustainability and competitiveness of the livestock export industry and to support an industry culture of continuous innovation, improvement and growth. Over 70% of the LEP's investment in RD&E is in animal welfare and targeted at supporting the continuous improvement of livestock health, welfare and management throughout the supply chain.

Approximately 20% of the RD&E investment is targeted at projects that aim to enhance the livestock export industry's supply chain capability and risk management profile. The remaining investment is targeted towards projects that support improved market access and development for Australian livestock (LiveCorp Website – About R&D, accessed April 2017).

2.4.3.   Other activities

Other activities refers to welfare and support services for producers and processor and their workers. These encompass financial services and insurance, health care and social assistance and accommodation and food services.

Financial service and insurance includes, though not limited to, personal and commercial loans, overdrafts facilities, trade finance, wealth management services, and general insurance policies.

Health care and social assistance primarily refers to measures provided by the Australian Government which support farm families, farm businesses and rural communities to prepare for, manage through and recover from hardships. Services include (though not limited to); farm business concessional loans scheme, farm household allowance, managing farm risk program, managing weeds and pest animals, rural financial counselling services and drought communities program (Department of Agriculture and Water Services website - Supporting farmer and rural communities, accessed April 2017).

2.5.   Opportunities and trends

The world's population growth forecast presents a significant opportunity for the Australian Red Meat and Livestock Industry. By 2030, the Asia-Pacific population specifically, is expected to increase by 700m people to 4.6bn (MISP 2020, 2015, pg.8). Meanwhile the global real per capita incomes are expected to increase by 60% to 2030. As population and per capita income growth are closely correlated, it is estimated that an increase in red meat demand of 25% will occur between now and 2030, as well as an increase in demand for markets specifically seeking high quality red meat and livestock products (IBIS World, Meat Processing in Australia 2015, pg.20).

"These forecasts present an enormous opportunity for Australia's red meat and livestock industry in terms of geographical proximity to key markets, and as a recognised supplier of safe, nutritious and ethically-produced products" - MISP 2020, 2015 pg.8
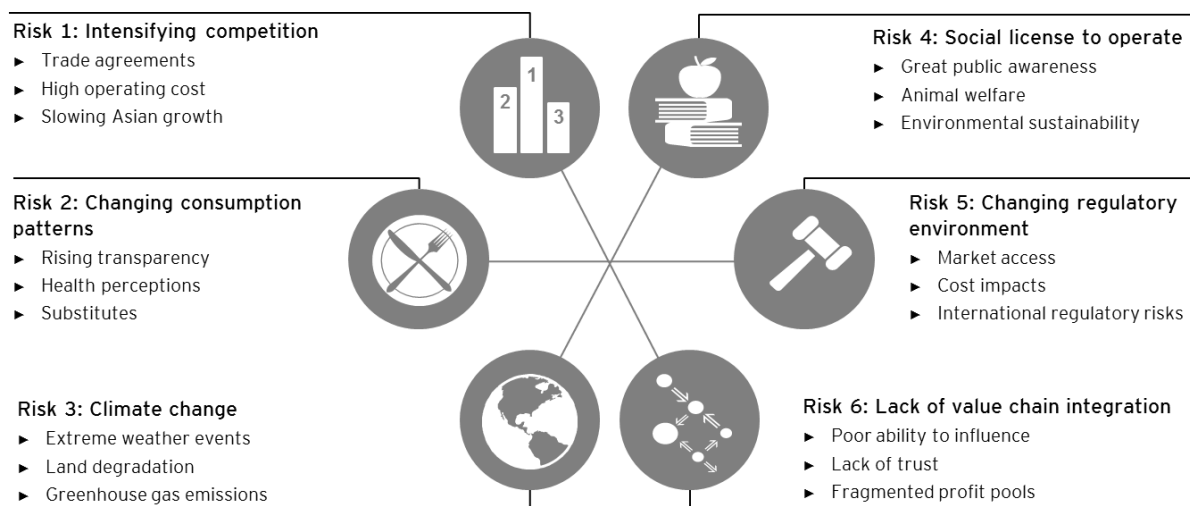
However, these opportunities are also accompanied by several industry trends, including:

Increasing consumer awareness and change in consumer demands	Increasingly challenged resource environment	Improved trade and market access	Strong emerging market growth
▶ Changes in consumer protein preferences ▶ Focus on provenance and supply-chain traceability ▶ Organic and 'disease-free' ▶ High-quality and healthy consumption ▶ Changing demographics ▶ Increasing demand for convenience foods	▶ Agricultural resource depletion ▶ Decreases in biodiversity ▶ Increasing water demand and constraints	▶ Increasing amounts of Free Trade Agreements ▶ Simpler and more direct distribution channels ▶ Greater demand for Australian produce ▶ Technical trade barriers and biosecurity ▶ Increasing competition between Australian and international industry ▶ Emergence of global corporate players in the protein supply industry	▶ Increasing size of middle class and wealthy ▶ Higher disposable incomes ▶ Greater demand for western and luxury goods

Ongoing climate change	Increased regulatory complexity	Increased use of technology, data and R&D	Rising export dependence
▶ Changes to weather patterns ▶ Increased severity and incidence of extreme weather ▶ Salinisation and acidification of soil	▶ Enhanced regulatory standards ▶ Increasing levels of self-regulation ▶ Increasing requirement for economic stewardship	▶ Increased automation through supply chain ▶ Increasing opportunities to use data to drive efficiencies ▶ R&D to boost productivity	▶ Increasing amounts of FTAs ▶ Simpler and more direct distribution channels ▶ Greater demand for Australian produce

Source: EY analysis

In addition, the strategic risks (illustrated in Figure 2 below) facing the industry will only compound today's trends.

Figure 2: Industry strategic risks

Risk 1: Intensifying competition
► Trade agreements
► High operating cost
► Slowing Asian growth

Risk 2: Changing consumption patterns
► Rising transparency
► Health perceptions
► Substitutes

Risk 3: Climate change
► Extreme weather events
► Land degradation
► Greenhouse gas emissions

Risk 4: Social license to operate
► Great public awareness
► Animal welfare
► Environmental sustainability

Risk 5: Changing regulatory environment
► Market access
► Cost impacts
► International regulatory risks

Risk 6: Lack of value chain integration
► Poor ability to influence
► Lack of trust
► Fragmented profit pools

Source: AMPC Strategic Risks Facing the Australian Red Meat Industry, 2016

All these risks have the potential to exacerbate the productivity challenge that the Australian industry has both on- and off- farm. Off-farm costs are consistently higher than all major competitors, while on-farm productivity performance is now below productivity improvement being secured by major competitors (MISP 2020, 2015, pg9).

However, it has been suggested that integration of the value chain has the potential to address some of these productivity issues by:

► Promoting a clear, concerted and consistent effort across the industry to identify upcoming opportunities (MISP 2020, 2015)

► Encouraging pooled investment in systems that underpin Australia's reputation as high quality, safe, ethical and sustainable red meat provider, and;

► Allowing greater sharing of information and promoting economies of scale, driving down cost (AMPC Strategic Risks Facing the Australian Red Meat Industry, 2016, pg.9)

Without closer integration the industry will be operating with a higher degree of fragmentation than its peers, it will not be able to market as effectively, nor be as responsive to customer demands (AMPC Strategic risks facing the Australian Red Meat Industry, 2016, pg.32).

The Australian Red Meat Industry is now part of a global industry, with more than 70% of local production exported to international markets (ACCC Cattle and beef market study – Final report, 2017, pg.7). Business models that have been productive in the past are being disrupted and the industry is having to change and adapt to ensure continued profitability and sustainability.

In section 4 of this document, we discuss MLA's proposal to install new technology into selected processing facilities with the objective of enhancing the long term productivity of the Australian Red Meat and Livestock Industry.

2.6. Industry structure

2.6.1. Overview

The Australian Red Meat Industry is comprised of a number of policy, strategy and advocacy bodies and Research and Development Corporations (RDCs). These parties are supported by the Australian Government and State and Territory Governments. The structure and interactions of each agency within the industry is illustrated in detail in Figure 3.

Figure 3: Detailed structure of the Australian Red Meat Industry
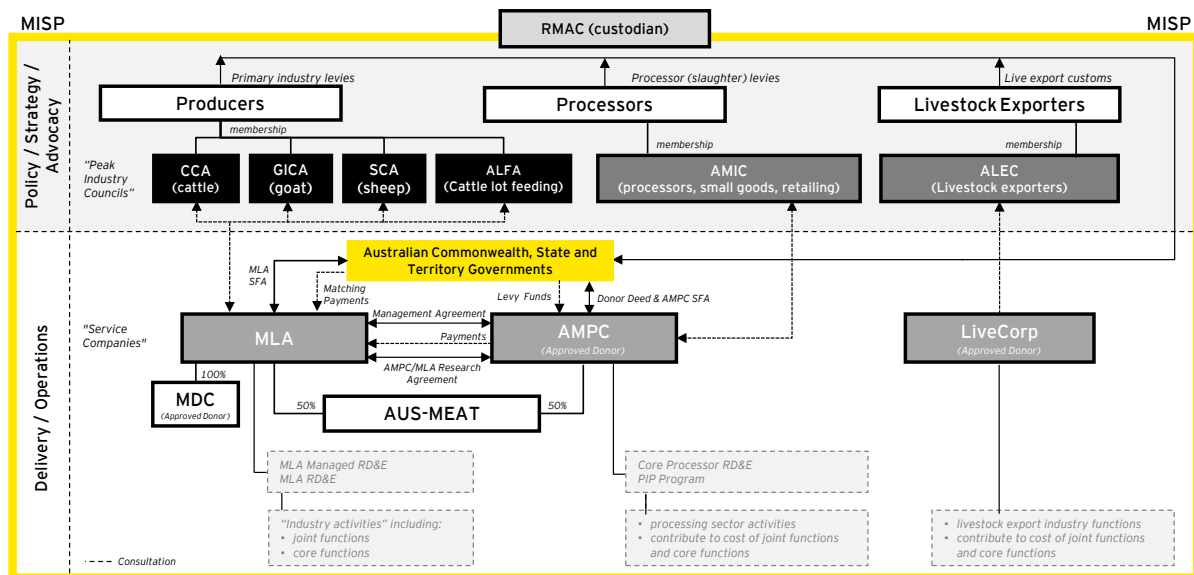
Source: EY analysis

2.6.2. Red Meat Advisory Council (RMAC)

RMAC provides leadership on cross-sectoral issues and consults with the Minister for Agriculture and Water Resources on agreed whole of industry matters. RMAC is the custodian of the MOU, MISP and industry reserves.

RMAC administers and uses income from the reserves to: cover peak council participation costs; coordinate maintenance of the MISP; review and provide support to industry relationships.

The MISP, developed by RMAC, frames the overarching strategic priorities for Australia's red meat and livestock industry. This comprises of the production, processing and live export sectors of Australia's beef, sheep meat and goat meat supply chains (MISP 2020, 2015, pg. 3).

MISP 2020 was developed in 2015 with the direct input from major red meat and livestock co-investors including levy payers, Federal, State and Territory Departments of Agriculture, CSIRO, the University sector and agribusiness (MISP 2020, 2015, pg.3).

The MOU sets out the Industry Partnership between the signatories and incorporates the definition of agreed roles and responsibilities; funding, planning and service delivery arrangements; the MISP; industry reserves and R&D.

2.6.3.   The industry peak bodies

The Australian Red Meat Industry peak bodies represent the producers and processors, including; the Cattle Council of Australia (CCA), Sheepmeat Council of Australia (SCA), Goat Industry Council of Australia (GICA), Australian Lot Feeders' Association (ALFA), Australian Meat Industry Council (AMIC), and the Australian Livestock Exporters Council (ALEC). Their roles are to:

▶   Provide leadership, set strategic direction and formulate policies

▶   Respond and provide policy advice to the Minister on whole of industry issues and on the sector it represents

▶   Cooperate through RMAC with other Peak Industry Councils in developing MISP vision and imperatives

▶   Develop jointly with the industry service companies goals for achieving MISP strategic imperatives

▶   Consult with other Peak Industry Councils to ensure consistent MISP approaches

▶   Assess the performance of industry service companies in service delivery and goal achievement

▶   Consult widely and propose levy motions for member consideration at service company meetings and advise the Minister.

2.6.4.   Government

The Australian Red Meat Industry has primary responsibility for its own affairs and strategic direction. The Commonwealth, State and Territory Governments primarily contribute to the industry through existing industry forums and bodies, and administering the legal frameworks within their jurisdictions. Further details of the roles and responsibilities of the government parties are outlined below.

Commonwealth Government

The Commonwealth Government administers assistance and support through the Department of Agriculture and Water Resources (The Department). The Department's role is to implement policies and programs that build a more profitable, resilient and sustainable sector. These include research and development funding, setting and maintaining of laws and regulation, biosecurity, facilitating industry partnerships and expanding market access and trade opportunities.

Biosecurity is a critical part of the Commonwealth Government's efforts to prevent, respond to and recover from pests and diseases that threaten the Australian economy and environment. These practices include: disinfecting, signage, maintaining boundary fences, checking for strays, restricting visitor and vehicle movements, ensuring all machinery brought onto the property is cleaned, good husbandry, ensuring purchases are from reliable sources, inspecting the flock or herd regularly, quarantining new stock (Department of Agriculture and Water Resources website - Animal Pests and Disease, accessed April 2017).

The Department works to protect the economy, environment, and the community from the negative impacts of pests, disease, weeds, and contaminants (Department of Agriculture and Water Resources website – Biosecurity, accessed April 2017).

The Department also works closely with the industry on market access and development opportunities and in furthering the interests of the industry in dealing with overseas governments and in multilateral negotiations (Department of Agriculture and Water Resources website - Red meat livestock industry infrastructure, accessed April 2017).

Furthermore, the Commonwealth Government maintains and administers the legal framework under which the red meat industry operates. The *Australian Meat and Live-stock Industry Act 1997* is the primary piece of legislation that governs the industry's legal and structural arrangements. A MOU underpins these arrangements.

Signatories to the memorandum include the industry peak bodies, R&D bodies and the Commonwealth Government (Department of Agriculture and Water Resources website - Red meat livestock industry infrastructure, accessed April 2017). The MOU sets out the Industry Partnership between the signatories. This incorporates the definition of agreed roles and responsibilities; funding, planning and service delivery arrangements; the MISP; industry reserves; research and development; and the schedules (Department of Agriculture and Water Resources website - Red meat livestock industry infrastructure, accessed April 2017).

The Commonwealth Government also provides matching R&D funding, collects and disperses levy monies and facilitates the management of issues of national importance.

State and Territory Governments

The State and Territory Governments are responsible for day to day production, operational and infrastructural matters in the red meat industry (Department of Agriculture and Water Resources website – Biosecurity, accessed April 2017). The focus of these matters primarily relate to animal health and the quality and safety of red meat for consumer consumption.

Animal health matters incorporate disease surveillance and control, chemical residues in animal products, livestock identification and traceability, and animal welfare within the borders of the State (Department of Agriculture and Water Resources website – Australia's animal health system, accessed April 2017). Additionally, red meat safety and quality covers the regulation and monitoring of meat safety across the entire food industry supply chain from producer to consumer.

The legislation and programs administered differ from state to state. For example, Queensland Government's *Biosecurity Act 2014* restricts geographical movements of animals to minimise the risk of disease or insect infestation (IBIS World – Beef Cattle Farming in Australia, 2017, pg.28).

The two main programs that all State and Territory Governments' are involved in are the SAFEMEAT and Animal Health Australia (AHA) partnerships. SAFEMEAT is a partnership established between the Commonwealth Government, State and Territory Governments' and the industry to ensure the integrity of Australia's Red Meat Industry. This is achieved by the provision of Government oversight and the promotion of management systems to deliver a safe and hygienic product (Department of Agriculture and Water Resources website - Red meat livestock industry infrastructure, accessed April 2017).

AHA is a partnership set up between the Australian Government, State/ and Territory Governments', major livestock industries and other stakeholders to strengthen Australia's national animal health system and maximise confidence in the safety and quality of Australia's livestock products in domestic and overseas markets (Department of Agriculture and Water Resources website - Red meat livestock industry infrastructure, accessed April 2017).

2.6.5.   Research and Development Corporations

MLA

MLA delivers research, development and marketing services to Australia's cattle, sheep and goat producers. With approx. 50,000 livestock producer members (with stakeholder entitlements) MLA seeks to be the recognised leader in delivering world-class research, development and marketing outcomes that benefit Australian cattle, sheep and goat producers (MLA website – About MLA, accessed April 2017).

MLA's stated mission is:

"Working in collaboration with the Australian Government and wider red meat industry, MLA's mission is to deliver value to levy payers by investing in initiatives that contribute to producer profitability, sustainability and global competitiveness." (MLA website – About MLA, accessed April 2017).

MLA is a company, limited by guarantee under the *Corporations Act 2001*. MLA membership is open to anyone who raises (producer), finishes (lot feeder) or trades (trader) in livestock (cattle, sheep, goats). MLA is funded by:

▶   Statutory levies from producers 49,845 members (MLA Website - About MLA, accessed April 2017)

▶   Statutory charges from livestock exporters and statutory levies from processors for joint activities

▶   Independent participants.

A Statutory Funding Agreement between MLA and the Australian Government facilitates R&D, matching funding and the management of levy monies.

AMPC

AMPC is the Rural RDC that supports the red meat processing industry throughout Australia, representing all beef, sheep and goat meat processors. Their mandate is to provide RD&E services that improve the sustainability and efficiency of the sector (AMPC website – About AMPC, accessed April 2017).

Committed to working with its stakeholders, AMPC seeks to achieve an efficient application of levy funds through its RD&E and marketing activities, enhanced by leveraging AMPC's investment through co-investment and collaboration (AMPC website – Stakeholders of AMPC, accessed April 2017).

AMPC is a company limited by guarantee incorporated under the *Corporations Act 2001*. There are 105 processor members, operating in 135 meat processing establishments. The AMPC represents over 97% of Australia's red meat processing capacity. Operating independently of, but in conjunction with MLA, AMPC receive funding through slaughter levies.

Red meat processor levies are strategically invested in RD&E services aligned to targeted marketing initiatives to deliver outcomes and benefits for both the Australian red meat processing industry and the broader Australian community.

LiveCorp

LiveCorp is a not-for-profit industry service provider with approximately 61 members and associate members involved in the export of Australian livestock. Operating independently of, but in conjunction with MLA, LiveCorp is owned and controlled by industry members with the principal function of managing industry funded programs and services.

Funded through statutory levies contributed by livestock exporters, LiveCorp works closely with industry stakeholders to continuously improve performance in animal health and welfare, supply chain efficiency and market access through the provision of technical services and RD&E.

LiveCorp

3. Understanding OCM and DEXA

This section aims to provide a basic overview of OCM, OCM technologies, DEXA and current research programs in the application to the Australian Red Meat Industry.

OCM refers to objective technology which can be used to specifically measure carcase traits more accurately.

It is important to recognise that further to the concept of OCM, which includes measurements of a carcase and its components, is the concept of Objective Measurement (OM). OM is inclusive of 'whole of value chain' measures.

The red meat industry's OM strategy aims to develop 'whole of value chain' measurement systems that ensure Australia's high cost production and processing sectors increase returns through improved efficacy and efficiency, and enable value chain alignment with customer's willingness to reward (MLA – Objective Measurement Strategy, accessed April 2017, pg.1).

The strategy focuses on a distinct objective for each stakeholder group:

▶ Producers – efficient and ethical livestock production

▶ Processors – efficient processing through new technology

▶ Consumers – meeting demand and driving confidence

For each stakeholder group, there are a number of broad measurement categories that form the basis for OM programs and initiatives.

3.1. Research and Development

The 'Advanced measurement technologies' for globally competitive Australian meat, or the 'ALMTech' project, was established in 2016 under the Commonwealth Government's Rural R&D for Profit program. This program is designed to 'enable beef, sheep and pig farmers to have access to more accurate descriptions of the key attributes that influence the value of their livestock including: carcase lean meat yield; eating quality; and compliance to market specifications' (ALMTech Operating Plan, 2016, pg.1).

This program is in partnership with RDCs, Commercial Companies, State Departments and Universities.

The ALMTech project has established a governance structure, see Figure 4 below, to ensure activities are executed in a timely manner within the guidelines of the ALMTech operational plan (Advanced measurement technologies for globally competitive Australian meat - Project Governance, 2016, pg. 6). The structure is comprised of the three committees: (1) steering, (2) executive and (3) the progress review and intellectual property and commercialisation committee.

The Steering Committee provides strategic directions and monitors the project. It is expected to ensure that the project is on-track to achieve its outcomes (Advanced measurement technologies for globally competitive Australian meat - Project Governance, 2016, pg.9).

The Executive Committee is responsible for delivering outputs as specified in the annual Operational Plan (Advanced measurement technologies for globally competitive Australian meat - Project Governance, 2016, pg.7).

The progress review and intellectual property and commercialisation committee acts an independent committee to review and provide input into the project. It also operates as a stakeholder/reference group (Advanced measurement technologies for globally competitive Australian meat - Project Governance, 2016, pg.8).

Figure 4: AMLTech existing governance structure
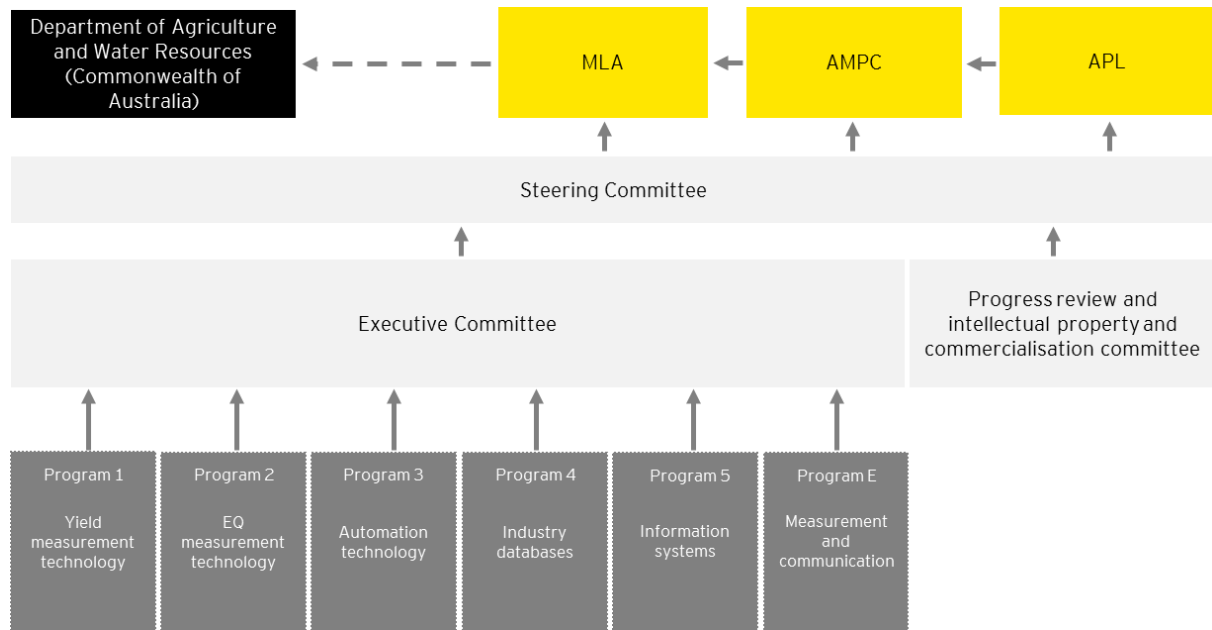
Source: Advanced measurement technologies for globally competitive Australian meat: project Governance, 2016, pg. 6

ALMTech includes dedicated research into five programs as outlined in Table 1 below over a five year period from 2016 to 2020. The sixth program 'Program E - Measurement and Communication' has been excluded for the purposes of highlighting programs which directly support the research and development of OM technologies and their use in the meat industry. Program 1 looks specifically at the 'Development of Lean Meat Yield (LMY) technology'. Under this is a sub-program 1.2: Design prototype technology for the direct measurement of LMY in an abattoir', which specifically relates to the Proposal by MLA to install DEXA in processing plants.

Table 1: ALMTech Programs		

Program 1 - Development of LMY technology

Program description	Key milestones due by Aug-17	Remaining milestones due by 2020
This program aims to develop technologies for measuring LMY of live animal's on-farm, and of carcase in abattoirs, enabling the prediction of specific cut weights. Specific OCM technologies being designed and tested as part of the ALMTech project include 'direct measurement' systems such as dual energy x-ray absorptiometry (DEXA) and 'predictive measurement systems' such as 3D imaging for OM of LMY. ▶ **Subprogram 1.1** – Design prototype technology for direct and indirect measurement of LMY on-farm and establish the business case for its measurement ▶ **Subprogram 1.2** - Design prototype technology for the direct measurement of LMY in an abattoir ▶ **Subprogram 1.3** – Design prototype technology for the indirect measurement of LMY in an abattoir	**Key milestones:** ▶ Provide summary of traits identified for calibration for LMY ▶ Report on outcome of 3D imaging measurement of beef carcase composition, and progress in development on farm and in a beef abattoir ▶ Create prototype design for walk through of DEXA on farm ▶ Report on improvements in DEXA precision based on sophisticated image analysis techniques and impact of processing factors on DEXA measurement of beef carcase composition ▶ Report on the outcome of the pre-engineering experimental work to design a prototype DEXA for commercial installation as Beef abattoir	▶ **17 August 2018** - 4.3* Provide an account of the design and testing of technologies for direct and indirect measurement of LMY in two abattoirs ▶ **17 August 2018** - 4.7* Provide an account of the viability and, if so, installation of prototype technology for the direct and indirect measurement of LMY in two abattoirs ▶ **15 December 2019** – 7.5* Provide an account of the calibration and accuracy of prototype technology for the direct and indirect measurement of LMY in two abattoirs ▶ **18 September 2020** - 8.10* Report on the development of direct and indirect measurement of LMY in abattoirs

Program 2 - Development of Eating Quality (EQ) technology

Program description	Key milestones due by Aug-17	Remaining milestones due by 2020
This program aims to provide value to the producer by: ▶ Improving the accuracy (beef) and/or developing measurement technologies (lamb, pork) for meat quality traits ▶ Allowing (lamb, pork) or improving (beef) the prediction of consumer sensory scores ▶ Allowing for greater segregation of product and extraction of value from consumer ▶ **Sub-program 2.1** – NIR/Boar taint ▶ **Sub program 2.2** – Imaging cut surface ▶ **Sub program 2.3** – Blue sky technologies	▶ Report on other technologies such as IMF measurement, boar taint measurement & NIR for fast (hot and cold) abattoir measurement ▶ Provide brief scoping report outlining design and laboratory testing of EQ measurement technologies	▶ **18 August 2018** - 4.9* Provide a brief account of the testing and calibration of prototype technology for measuring EQ in two abattoirs ▶ **15 December 2019** - 4.9* Provide a brief account of the calibration and accuracy of prototype technology for measuring EQ in two abattoirs ▶ **18 September 2020** – 8.11* Report on development technology to measure EQ in abattoirs

Table 1: ALMTech Programs		
Program 3 - Development of robotic technology		
Program description	**Key milestones due by Aug-17**	**Remaining milestones due by 2020**
This program focuses on value chain benefits for the producer sector. The design, development, and piloting of additional measurement instrumentation (i.e., in addition to eating quality and yield attributes), will be directed towards automated sorting systems applied on offal, or other carcase down-grading or condemnation factors, and application for robotic automation. ▶ **Sub program 3.1** – Developing an automation prototype for beef	▶ Organise workshop to scope automation opportunities in beef abattoirs and report on output ▶ Contract commercial automation company to commence prototype design for of an automated device and report on progress ▶ Provide a brief scoping report outlining testing and calibration of robotic technology	**Key milestones:** ▶ **15 December 2019** - 7.12* Provide a brief account of the calibration and accuracy of robotic technology measuring offal or carcase down-grading, or condemnation ▶ **18 September 2020** - 8.12* Report on the development of prototype robotic sorting systems for offal or carcase down-grading, or condemnation
Program 4 - Industry databases		
Program description	**Key milestones due by Aug-17**	**Remaining milestones due by 2020**
Through advanced measurement technologies, the project will deliver new OM data on LMY and EQ. This program will link these data up and down the value chain through existing industry platforms. ▶ **Sub program 4.1** – Data flow to industry information delivery systems ▶ **Sub program 4.2** – Data flow to industry genetic evaluation systems	▶ Liaise with MLA and processors to facilitate data flow to industry databases and feedback systems ▶ Provide summary of feedback systems in place which for each ▶ Progress report regarding development of data capture methodology for existing industry data platforms	▶ **15 December 2019** - 7.13* Provide a brief account of development of data flow to industry information delivery systems ▶ **15 December 2019** - 7.14* Provide a brief account of development of data flow to industry genetic evaluation systems ▶ **18 September 2020** – 8.13* Report on the development of data transfer systems to enable data flow from measurement devices to appropriate industry databases

Table 1: ALMTech Programs		
Program 5 – Data decision systems		
Program description	**Key milestones due by Aug-17**	**Remaining milestones due by 2020**
This program is about delivery of systems to utilise the data generated in Programs 1-3 and stored in Program 4 to improve supply chain efficiency and profitability. The strategy is to develop some tools to accurately value carcases. The tools will include feedback systems to producers and optimisation systems within processing companies. ▶ **Sub program 5.1 –** Carcase value tools ▶ **Sub program 5.2 –** Data decision tools ▶ **Sub program 5.3 –** Supply chain engagement	▶ Report on development of beef value calculator tool ▶ Report on prototype of a data decision tool ▶ Hold three engagement meetings with collaborating supply chains to discuss the use of carcase value tools and data decision tools	▶ **18 September 2020** – 8.5* Report of the design and development of algorithms to integrate with information systems to link LMY and EQ data with prototype business payment systems ▶ **18 September 2020** – 8.6* Report on the design and development of information systems for improved sorting and management of raw materials on the basis of LMY and EQ to meet customer specifications ▶ **18 September 2020** – 8.7* Report on the modelled impact of prototype value based payment options within the supply chain ▶ **18 September 2020** – 8.8* Report on development of information systems to improve feedback to producers on market compliance, carcase value and animal health

Source: EY consolidation of data within the ALMTech Operating Plan, 2016.
*Milestone numbering - relates to the KPI identifier as outlined in the Commonwealth Grant Agreement between the Department of Agriculture and Water Resources and Meat and Livestock Australia, June 2016

Matters being examined

As part of The Review, EY is working closely with ALMTech stakeholders and plan to further investigate areas such as the performance of DEXA, alternative OCM technologies as well as the relevance of this research to informing the decision to rollout DEXA. These findings will be articulated in more detail in the final report.

3.2. Standardised beef industry language

In 2016, an Australian beef language white paper[3] stated that 'beef language can play a role' in making available streamlined eating quality (EQ) and provenance information with flow-on benefits in simplified carcase sorting, boning and packaging. Further, the beef language can assist in providing a flow of information up and down the value chain – from consumer to conception – carrying market and other signals of benefit to each sector of the value chain' (Biddle, Pattison, Philpott et al, 2016, pg.7).

Since the 1980s, the industry has taken steps to formally describe beef products including the introduction of AUS-MEAT language and Meat Standards Australia (MSA). AUS-MEAT was introduced as a language drawn from industry best practice to classify beef carcases, dentition and gender as the basis for establishing a global trading platform used extensively within the processing and wholesale sectors. MSA was introduced in the 1990s, when the industry took a strategic decision to focus more on the consumer with the merging of meat science principles and consumer sensory behaviour to extend the meat language to include beef meal outcomes (Biddle, Pattison, Philpott et al, 2016, pg.7).

The beef language white paper outlined that whilst the existing beef languages have served the industry well over a 30 year period, the downfall is that it is restricted to carcases and cuts. The associated livestock components are far less standardised (or understood) and are not well linked to existing language (Biddle, Pattison, Philpott et al, 2016, pg.7). Additionally, several of the recommendations presented within the white paper make references to OM and standardisation as one of the fundamental enablers to progressive modifications and additions to the current beef language.

'OM & system integrity' is outlined as one of the recommendations in which to improve the beef language by increasing the accuracy of attributes of a carcase or its components. Additionally, 'many of the measurements currently recorded on the slaughter floor, or in the chiller, are subjective scores and as such are subject to variation and interpretation (Biddle, Pattison, Philpott et al, 2016, pg.24). Subsequently, objective technology that can measure beef carcase traits more accurately is stated as a way in which to generate greater confidence in the outputs such as predicted EQ and LMY.

In addition, OM is referenced in the recommendation to improve the 'Alignment of live animal and carcase languages' (Biddle, Pattison, Philpott et al, 2016, pg.24). This recommendation is aimed to link the live animal language to the 'meat' language, outlining that current seedstock and genetics are too far removed from the commercial cattle and carcase descriptors. The alignment of live animal and carcase languages is recognised to deliver improved communication up and down the value chain, provide greater clarity of market signals, support better decision making and accelerate efficiency gains.

These recommendations also sit alongside others such as to improve the beef language 'from carcase to a whole of chain language' and to 'transition out outcome based language' where individual traits should be defined in 'outcome terms' and linked to a common standards across the industry to achieve transparency and accuracy (Biddle, Pattison, Philpott et al, 2016, pg. 11 & 13).

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[3] *The Australian Beef Language White Paper, prepared by the Beef Language White Paper Consortium (Biddle, Pattison, Philpott et al, 2016). This paper is dated June 2016 but was published on MLA's website on 12th April 2017* *https://www.mla.com.au/Research-and-development/Search-RD-reports/RD-report-details/Market-Information/Australian-Beef-Language-White-Paper/3086*

3.3. Applications of OCM and DEXA

Based on The Review's understanding, there are three applications of OM technology in the red meat industry (Grading, Data Feedback, and Processing efficiencies and automation).

3.3.1. Grading

DEXA technology is designed to output an objective measure of carcase yield using the measure of LMY. LMY is important to the red meat supply chain as it can have an influence on the market value of a carcase (Edwards et al, 2015). Additionally, other carcase yield values such as SMY are also important in determining market value (Edwards et al, 2015).

SMY is the yield of bone-in or boneless cuts trimmed to a desired fat coverage as percentage of carcase weight (Edwards et al, 2015). SMY of a carcase can be a relevant commercial definition for processors to use in valuing the carcase, but it can vary widely according to trim specifications for a particular market. A more precise and less variable definition of carcase yield would be the lean tissue in the carcase as a proportion of weight (LMY) (JM Thompson, 2016).

The current method, using point measurements as part of the grading system, has been proven to be a 'less precise estimate of LMY' (Gardner et al, 2015) with approximately 30-40% accuracy (Johnson 1987, Perry et al 1993, and Thompson et al 2012). As such, 'whole carcase' measurement systems that do not rely on point measures are required, and they must be relatively easy to implement within the supply chain (Gardner, Starling, Brumby et al, 2016).

3.3.2. Data feedback

Through the application of OCM technology, MLA are aiming to establish an industry owned database of objective measures to be used for supporting both individual farm and whole-of-industry scale productivity improvements (MLA Draft Funding Proposal – herein referred to as Funding Proposal, accessed April 2017, pg.7). Both of these data applications have been outlined below.

Proposed individualised data feedback for livestock production

MLA's Proposal indicates that the data output from DEXA technology can act as valuable database of OM, which will be critical to supporting both individual farms and whole-of-industry scale improvements in the future (MLA Funding Proposal, accessed April 2017, pg.7). The measure of LMY has been identified in as a standard yield estimate that 'can be part of feedback to producers for use in genetic and management programs' (e.g. livestock production activities being feeding regimes, breeding methods or genetic selection) (Biddle, Pattison, Philpott et al, 2016). Additionally, the recommendations from the Australian beef white paper specifically call for an industry standard for LMY and additional measures such as EQ (Biddle, Pattison, Philpott et al, 2016).

Despite LMY being recognised as a key measure for producer feedback, it is understood that there also 'should be an accurate alignment of live animal fat and muscle descriptions' (Biddle, Pattison, Philpott et al, 2016) as this would assist in providing the potential for higher rates of genetic and herd improvement in beef cattle (Biddle, Pattison, Philpott et al, 2016).

The ACCC believes that the use of more objective carcase appraisal systems should be a high priority for the industry, and should be supported by industry leaders and relevant policy makers. The introduction of such technology, and the sharing of resulting objective data with livestock producers creates very important opportunities to capture accelerated productivity gains in the livestock production and processing sectors (ACCC Cattle and beef market study, 2017, pg. 77)

Further details of standardised data feedback to livestock production can be seen in section 4.2.2.

Proposed industry database for collective research and development

MLA has indicated that it is their view that, at an industry scale, the collection of data would act as a long lasting asset for the red meat industry, 'with the ability to use it for collective research and development, marketing or to provide to solutions providers more generally' (MLA Funding Proposal, accessed April 2017, pg.8).

Additionally, the ACCC report has recommended that 'data produced from objective carcase measurements will be of wider benefit to the industry if aggregated and shared' (ACCC Cattle and beef market study – Final report, 2017, pg.35).

Matters being examined

As part of The Review, EY will further investigate the needs of objective grading and standardised data feedback for livestock production, and how DEXA can be applied to meet these needs and the likely effects on the supply chain such as pricing and genetic herd improvement. Additionally, The Review will seek to understand the potential value of this data to the red meat industry, including opportunities for research and development and the use with third parties. These findings will be articulated in more detail in the final report.

3.3.3. Processing efficiencies and automation

The use of objective measures is able to benefit improved carcase sortation[4] to customer specifications to increase productivity within a processing plant and enable more accurate processor sales pricing decisions to extract increased value from a carcase (Development of supply chain OM strategy & value proposition to stakeholders, MLA, 2016, pg.5). This information, as proposed by MLA, can also be used to leverage boning room automation with DEXA technology (MLA Funding Proposal, accessed April 2017, pg.18).

A review into industry automation was conducted in 2012 (ACIL Tasman, Assessing the impact of: '3.2-Increasing cost efficiency & productivity', 2012), which outlined a number of reasons a meat processing plant may decide to install automation equipment. Including:

▶ Improving worker safety and reduce OH&S liability

▶ Increasing productivity where the machine can increase the SMY from the carcase or optimise the distribution of cuts across meat quality classes

▶ Increasing the throughput of SMY from the plant (providing options for reducing bottle necks where they exist by increasing the capacity

▶ Reducing the management of variability and associated costs in a processing plant (where sourcing, training and inducting labour costs rise)

In combination with other automation equipment and technology, OCM is used to direct the key elements of the processing chain (slaughter, boning, packaging and dispatch) in accordance with initial assessment of the animal and prevailing market conditions.

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[4] Sortation is to the process of sorting items into categories or into a set order, especially when done by machine or computer

The review into industry automation outlines the three components of automation in red meat processing:

1. **Information and guidance and sensing systems** that allow for machines to determine how to deal with each carcase

2. **The equipment (end effectors)** that engages with the carcase such as blades, cutters, saws, pullers, etc.

3. **The equipment (robots)** that presents the carcase engaging equipment to the carcase.

While there are efficiency gains to be achieved through a reduction in human involvement in the grading process there are further considerations to the removal of all human involvement. The Review understands that human involvement may still be required in the event of a failure of the DEXA system (or components of). Manual backup process/skills may need to be retained should there be a system fault.

Further details of the proposed processor benefits of DEXA and automation can be found in Section 4.6. DEXA can be a technology that supports the Information and guidance and sensing systems.

3.4. Technology comparison

There are a number of technologies which can be used to predict LMY with varying levels of investment and accuracy (J.M Thompson, 2016). For the purposes of this Review, the following technologies have been identified and considered in this document at a high level, the full comparison of these technologies will be available in the final report:

a) Point measurement and yield equations (current 'manual' grading methods)

There are various point measurement devices in lamb and cattle, including carcase rulers in advanced probe technology. The advantage of point measurement technologies are that they are simple and cheap techniques. However, they have varying levels of accuracy and are labour intensive which may only be suitable to abattoirs with smaller throughputs (J.M Thompson, 2016).

b) Ultra sound

Ultrasound has been used to measure eye muscle area and back fat in live animals. This technology requires sufficient contact between the transducer and the animal which generally involves shaving the animal hide and the use of oil (J.M Thompson, 2016). The disadvantages of using ultrasound on a carcase include the bubbles of air that may be trapped in fat after removing the hide, thus the most appropriate measure of fat depth would be immediately after knocking with hide on.

c) Video Image Analysis (VIA)

VIA works by capturing images either on the whole carcase or the chiller assessment system on quartered carcase to predict SMY. The advantage of the VIA system in Australia is that it provides a useful tool in predicting SMY. However, the disadvantage is that SMY is a method which varies widely according to the trim specifications for a particular market and therefore limits its ability to be used an industry standard.

d) Dual Energy X-ray Absorptiometry (DEXA)

DEXA is a low-radiation technology that beams x-rays with different energy levels through a body in which its resultant scans are much more accurate at discriminating between density and tissues than conventional x-ray technology i.e. Single Energy X-Ray (SEXA) technology (J.M Thompson, 2016). While DEXA has been proven effective in lamb, research is still being conducted in beef. Further details and analysis of DEXA technology is outlined in Section 3.4.1.

e) Computer Axial Tomography (CT)

CT uses a system where an emitting x-ray source is rotated around the body with the resultant x-rays collected by a ring of detectors after passing through the carcase. The advantage of CT scanning is it gives an extremely accurate prediction of carcase composition, and issued in R&D by the industry to train devices to predict carcase composition as the 'gold standard'. Despite it being one of the most accurate and suitability measures for the purposes of R&D, it is unable to operate at current chain speed within processing facilities with the machine needing a set time to cool down in between scans.

f) RGBD technology (Wii cameras)

The RGBD camera technology and data acquisition software is an advancement from VIA in which it uses a number of small cameras to collect a large number of images and integrate them into a three-dimensional image. The advantage of this technology is it is calibrated using CT composition (the gold standard), is cost-effective and will not require much space on slaughter floor. The disadvantages of this technology is still being analysed and tested. The results of which are yet to determine its accuracy and transportability across different datasets (J.M Thompson, 2016).

Matters being examined

As part of The Review, EY will further investigate technologies and options for use in the range of applications which have been identified, in an attempt to determine which option best addresses the proposed challenges and provides an acceptable return on investment. This investigation will consider the commercial and operational readiness of these options. These findings will be articulated in more detail in the final report.

3.4.1.   Current known DEXA industry performance

MLA's announcement to install DEXA in AUS-MEAT registered processing plants was preceded by a number of relevant events including industry R&D using x-ray technology, application for Government funding and the report by ACCC investigating the transparency and competition within the cattle and beef industry. These events have been outlined below in Figure 5 below.

Figure 5: Key industry milestones for x-ray technology R&D

2010
MLA release value proposition for using SEXA in lamb processing automation after success in New Zealand and SEXA is installed in Australian lamb abbatoirs for R&D

2014
DEXA is installed in lamb abbatoirs in Australia for processing automation and R&D

2016
June - Commonwealth grant is received and the ALMTech project is established

October – ACCC interim report is released investigating the transparency and competition in the cattle and beef market

2017
March – ACCC final report of the cattle and beef market study is released

2012
DEXA was introduced to replace SEXA for the dual purposes of lamb processing automation and grading in New Zealand

2015
R&D commences for the use of DEXA in beef.

MLA apply for grant through the Commonwealth Government's Rural Research & Development for Profit program

2016
November - MLA announce a plan to install objective carcase measurement (OCM) technology across the red meat industry

Source: EY Analysis

DEXA has previously been applied to the medical and fitness industry to measure body composition on humans and was introduced to the red meat industry in 2012 for the purposes of automated lamb boning in New Zealand. DEXA technology in the red meat industry was introduced as a modification to existing SEXA technology which was used in conjunction with a lamb robotic boning system (Scott Technology Ltd) to produce 2D x-ray images to identify cutting lines. DEXA was considered as a system that would not only meet robotic requirements for automated boning but it could also enable the determination of LMY (Gardner, Starling, Brumby et al, 2016).

In moving DEXA from human application in the fitness and medical industry to beef in the red meat industry there are considerations to be made. These include; need to increase size, need to operate at line speed, need to consider the fault tolerance of the system to operate in a real time processing system, support industries for the sector etc.

DEXA is successfully being applied in lamb for the purposes of predicting cutting lines and informing automation in major processors in Australia. Additionally, the ALMTech program includes prototyping and testing DEXA for the direct measurement of LMY in an abattoir for:

▶ **Lamb** – where installation will rely heavily on synergy with existing automation and upgrade from SEXA to DEXA (ALMTech Operational Plan, 2016, pg.25)

▶ **Beef** – where little automation exists, further clarity is required to demonstrate the value of measuring carcase composition to the supply chain (ALMTech Operational Plan, 2016, pg.25)

The Proposal to install DEXA is expected to provide an accurate measurement of carcase composition, involving dual X-ray beams to capture direct carcase measures. These measurements are then input into an algorithm to predict the percent of lean meat, bone and fat with high accuracy (Gardner, Starling, Brumby et al, 2016).

The algorithm translates the raw carcase measurement data into carcase composition data. The algorithm has been developed using assembly of a large data set of carcases that represent the range of weight and fat composition evident within the industry. These carcases are initially scanned using CT and the DEXA system to enable the generation of DEXA algorithms that can predict the percentage of CT LMY (Gardner, Starling, Brumby et al, 2016).

CT lean is a preferred method of calibration at it gives highly accurate and repeatable data which can be used to measure, and therefore predict, carcase composition with high accuracy. Alternative, and less accurate technologies, such as VIA currently uses SMY to train and predict carcase yield. The way in which processors determine saleable meat criteria and the variability in cutting specifications leads to unstandardised data which limits the ability for it to be used for predictive purposes (Johnson 1987, Perry et al 1993, and Thompson et al 2012)[5].

As previously mentioned, Program 1 of ALMTech is looking at the 'Development of LMY technology'. This program is developing technologies for measuring LMY in live animal's on-farm, and of carcase in abattoirs, enabling the prediction of specific cut weights (specifically DEXA). The outcome of KPI 2.12.5, design a prototype DEXA for commercial installation at beef abattoirs is due 30 June 2017.

Under this is a sub-program 1.2: Design prototype technology for the direct measurement of LMY in an abattoir', which specifically relates to The Proposal by MLA to install DEXA in processing plants. Figure 6 outlines the relevant KPIs and status of completion for Sub-Program 1.2.

Figure 6: ALMTech sub-program 1.2 KPIs and completion status

KPI	KPI description	Status of completion	Expected completion
2.1.2 Provide a brief account of the design and testing of technologies for direct/indirect measurement of LMY in abattoirs			
2.12.1	Report on the outcome of an experiment to assess the impact of processing factors on DEXA measurement of lamb carcase composition, and analysis of detector stability	10%	30 Aug 17
2.12.2	Report on experiment to assess the ability of DEXA to determine lamb age based on bone mineral content	80%	30 Jun 17
2.12.3	Report on improvements in DEXA precision based on more sophisticated image analysis techniques	75%	30 Jun 17
2.12.4	Report on the outcome of an experiment to assess the impact of processing factors on DEXA measurement of beef carcase	100%	Completed
2.12.5	Report on the outcome of the pre-engineering experimental work to design a prototype DEXA for commercial installation at beef abattoir	20%	30 Jun 17
4.3 Provide an account of the testing and calibration of prototype technology for the direct measurement of LMY in two abattoirs			
4.3.1	Preliminary testing and calibration research for prototyping technology	30%	30 Jun 17

Source: EY analysis based on ALMTech Operating Plan Quarterly status report

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[5] *As cited by J.M Thompson, 2016, Appendix C: Innovation in Carcase Yield and Eating Quality Measurement. Thompson is an academic from School of Environmental and Rural Science, University of New England and is involved in writing technical white papers for the Australian Beef Language.*

Based on R&D to date, the advantages of DEXA are a higher level of accuracy in predicting LMY in comparison to other OCM technologies. The results for DEXA's for prediction of LMY in beef have not been published, however based on reported testing of DEXA accuracy in lamb, 'a precise and accurate prediction of carcase composition enabling more accurate valuation of carcasses up on the basis of lean meat yield' (DEXA lamb eating quality and supply chain grading, 2016, pg.2). The accuracy of current carcase yield measurement has previously been evaluated, with an R2 (or coefficient of determination) typically between 30-40% (Johnson 1987, Perry et al 1993, and Thompson et al 2012).

ALMTech have also assessed the impact of processing factors such as spray chilling, carcase weight and carcase orientation during DEXA imaging have be assessed. This analysis is related specifically to KPI 2.12.4 and is 100% complete. This work has resulted in a prototype algorithm predicting carcase composition that, as stated by ALMTech, is ready for deployment when the first Beef DEXA system has been installed (ALMTech Operation Plan - Program Quarterly Report 2: Updated March 2017, pg.16).

There are more sophisticated image analysis methodologies to investigate the potential for bias across predictions, and this work is stated to be progressing well. However, the results have not yet been published. This relates specifically to KPI 2.12.3 in which a number of different approaches have been undertaken to increase the precision of DEXA predication of body composition. This KPI is 75% complete, with the final paper being submitted on this work before 30 Jun 17 (ALMTech Operation Plan - Program Quarterly Report 2: Updated March 2017, pg.16).

Currently, the 'proof of concept' DEXA system has provided valuable insight into the hardware specification that will be required to develop a production capable (in line) DEXA grading prototype for beef. However, due to cattle being a larger carcase size than previous applications in lamb, the work of ALMTech Operation Plan aims to complete an additional experimental engineering phase to establish the optimal hardware arrangement and product handling design of the final commercial prototype.

"This 'pre-engineering phase' will focus on dual hardware DEXA arrangement that will utilise two x-ray sources detected by a 'sandwich' dual energy detector. The dual hardware arrangement is required to achieve the desired hardware separation, power output, and machine footprint for the required length of scan at production line speeds" (ALMTech Operational Plan, 2016, pg.25).

This work relates to ALMTech KPI 2.12.5 in which it is currently 20% complete, with the final report due to be before 30 Jun 17 (ALMTech Operation Plan - Program Quarterly Report 2: Updated March 2017, pg. 16). Based on understanding to date, DEXA is able to operate at a capacity to scan 30 carcases per minute (Gardner, Starling, Brumby et al, 2016). As it is understood by The Review, the first beef DEXA system is planned to be installed in a large processing facility in July 2017. Therefore, no further calibration work will be completed on this device before this time (ALMTech Operation Plan - Program Quarterly Report 2: Updated March 2017, pg.25).

Matters being examined

As part of The Review, EY will be investigating the commercial and operational readiness of DEXA including speed, accuracy and reliability, operational requirements and risks. In addition, The Review will also seek to further understand the pathway for commercialising this technology. These findings will be articulated in more detail in the final report.

4. Proposal to install DEXA in AUS-MEAT processing facilities

This section aims to provide an outline of MLA's proposal which includes objective carcase measurement, the proposed DEXA technology solution, the rationale for an expedited rollout, the proposed financing arrangement, the expected benefits, costs and funding options, as well as the indicative technology installation schedule.

4.1. Proposed use of OCM

MLA stated their Proposal to be a potential first step towards addressing producer concerns in the current grading process (MLA Funding Proposal, accessed April 2017, pg.2) through the usage of OCM technology. The related producer concerns are outlined in more detail in the following sections.

As noted in the Section 3 above, OCM is not a universally defined term. However, MLA have made a concerted effort to adhere to a definition with the aim to provide a common industry understanding of what OCM is:

> *"OCM refers to the processes and technologies that have the potential to be used to better measure carcase attributes to predict eating quality, disease or contamination, precise boning cutting lines, and lean meat yield" (MLA website - Objective Carcase Measurement, accessed April 2017).*

4.1.1. Proposed industry need for OCM

MLA have stated that, in their view, the use of objective measures and removal of human involvement as part of the grading process, is anticipated to immediately address the concerns of producers (MLA Funding Proposal, accessed April 2017, pg.4).

As outlined in the funding proposal put forward by MLA, red meat producers and feedlot operators who sell livestock directly to processors have expressed concern towards the validity and accuracy of carcase measurements that determine the payment they receive (MLA Funding Proposal, accessed April 2017, pg.7).

MLA have stated that this has led to a specific distrust towards the objectivity of the carcase grading process (MLA Funding Proposal, accessed April 2017, pg.7) where the majority of carcase graders are employed by processors. The Review understands this may be a factor that contributes to perceptions of bias.

4.1.2.   Summary of current OCM R&D

MLA, along with other supply chain participants including AMPC and processors, have invested significantly in OCM research and technology for a number of years. This has included investment in the use of DEXA in lamb abattoirs for the purposes of driving automated boning. Additionally, the MLA Donor Company (MDC)[6] has also worked to secure private investment to progress the technology's development. Since 2012, MDC has been working with Scott Technology and a large processor to develop technologies to measure carcase traits to predict bone cutting lines, lean meat yield and eating quality.

Furthermore, in 2015, MLA and AMPC successfully received funding under the Commonwealth Government's Rural R&D for Profit program to further progress the technologies towards commercialisation (Department of Agriculture and Water Resources - Rural R&D for Profit program: approved round 2 projects, accessed April 2017). In 2016, this funding saw the establishment of the ALMTech project. For further details on the AMLTech programs please see Table 1.

4.2.   Proposed applications of DEXA as one part of OCM

MLA's proposal to install DEXA addresses one specific aspect of MLA's OCM definition. Specifically, DEXA technology is aimed at the OM of a carcase's composition through the output of LMY. The application of an OM of LMY in the context of MLA's proposal is outlined below.

4.2.1.   Addressing carcase grading complexities

The prices received by producers for livestock that are sold 'over the hooks' (a form of direct selling) are most often determined through a carcase grading process at the abattoir. 'Direct selling' refers to the sale of livestock via bilateral agreements directly to meat processing facilities.

In 2016, the ACCC cattle and beef market study report received submissions by major beef processors and supermarkets in Australia that approximately 90 per cent of the cattle they purchase are acquired directly from producers and using OTH. 'Making this the most important channel for information about prices and quality requirements of end customers to flow between processors and producers' (ACCC Cattle and beef market study – Final report, 2017, pg.70). The livestock are delivered to the abattoir, where the transfer of ownership takes place at the abattoir scales.

Once ownership of livestock is transferred and standard carcase trims undertaken, the carcases are graded against a 'price grid'[7]. These 'price grids' outline the various quality factors that the carcase must satisfy in order to achieve a certain price range. At present the grading occurs manually, whereby graders use a variety of measurements and observations to assess carcases. The grading specifications fit into one of three categories:

1. Specifications based on the AUS-MEAT language (a requirement for export beef)

2. MSA- defined specifications; or

3. Processor-defined specifications

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[6] The MLA Donor Company is a fully-owned subsidiary of Meat & Livestock Australia. The MDC facilitates voluntary investments in R&D innovations across the red meat supply chain.
[7] 'Price grids' are specific to each processors and in many cases each processing facility. Their composition is set by the processors, and will usually reflect the market specifications they require to meet customer requirements and prevailing market conditions.

Processors are able to determine the parameters they will use to grade a carcases, however usually this is dictated by their customers who require the use of AUS-MEAT or MSA grading (ACCC Cattle and beef market study – Final report, 2017, pg.71). MLA states that beef grading measurements are subjective and use rudimentary manual techniques and weighted averaging to grade and price carcase. After grading, producers are provided with the price grid, outlining the measurements and associated prices received for the livestock.

As outlined in MLA's funding proposal, producers feel they have few alternative sale options if they believe the grading process at one processor is not accurate. Furthermore, with a growing number of livestock being sold via the direct sales method, these concerns on the part of producers are expected to increase.

It is planned that the output of LMY data from a DEXA scan, which will include measurements for meat, fat and bone composition, will be used in addition to AUS-MEAT feedback.

As part of the grading process, there are additional measures which are collected including MSA and other processor specified measures. As part of the ongoing ALMTech research, technologies which provide additional measures to LMY are being investigated that could supplement DEXA in providing other objective measures such as EQ.

Matters being examined

As part of The Review, EY will be investigating the current grading methods, the application of DEXA to them, and how this could achieve the benefits of objective grading. This will involve looking into the dependencies of other grading measures such as EQ measures. These findings will be articulated in more detail in the final report.

4.2.2.   Standardising data feedback to livestock production

MLA have stated that installing DEXA technology throughout Australia's red meat industry has the potential to create a single scientific measurement of carcase meat, fat and bone (lean meat yield) and the opportunity to pass this information back along the value chain (MLA Industry News 08 December 2016).

Further, the March 2017 release of the Cattle and beef market study by the Australian Competition and Consumer Commission recommended that data produced from OCM should be shared for the benefit of the industry. It notes that the data produced as a result of objective carcase grading will be of wider benefit to the industry if aggregated and shared (ACCC Cattle and beef market study – Final report, 2017, pg.12).

In line with this sentiment, Teys Australia recently unveiled plans to build a dedicated DEXA room at their beef processing plant at Rockhampton in Queensland; which is set to be launched for use in standard commercial production, in August 2017. Teys emphasised that the critical part of DEXA's application was providing objective feedback between producers and processors and information that accurately described meat quality and what consumers were willing to pay for. The Review understands that the move is Teys's attempt at building more trust and confidence between producers and processors. However, Teys are quoted in a media article that they caution that there will be a long consultation as they have no intention of 'paying people' until all are comfortable with the integrity of the new process (The Land - Teys Australia producer workshop a 'must do', 2 May 2017).

Furthermore, the Review understands that MLA believe that standardised of LMY across the industry is the best way to provide producer confidence in the grading system. This standardisation concept was further described in a media release by the MLA on 2 May 2017. MLA have also indicated that standardisation is also required to enable proper auditing and assurance of the grading system.

4.2.3. Enabling processing automation

MLA anticipates the installation of DEXA to reduce the barriers to adoption for OCM and other automation technology solutions in the future. The use of OCM and other automation technology will attribute to better processing plant management of boning-room labour, improved prediction of future product volume for different markets and the ability to market products with greater accuracy of specifications (MLA Funding Proposal, accessed April 2017, pg.8).

The objective measure of LMY without automation is specifically able to benefit improved carcase sortation[8] to customer specifications using objective carcase measures. When combined with automation, this information can also be used to direct advanced robotics for automated boning (Development of supply chain OM strategy & value proposition to stakeholders, MLA, 2016, pg.5).

Currently, X-ray technology such as SEXA technology and DEXA are being deployed by major Australian red meat processors as part of their automated cutting and boning procedures. Figure 8 below highlights an example of how DEXA can be applied to enable full beef automation in cutting and boning. An example of this can be seen in Figure 7 below.

Figure 7: Use of DEXA in beef boning automation
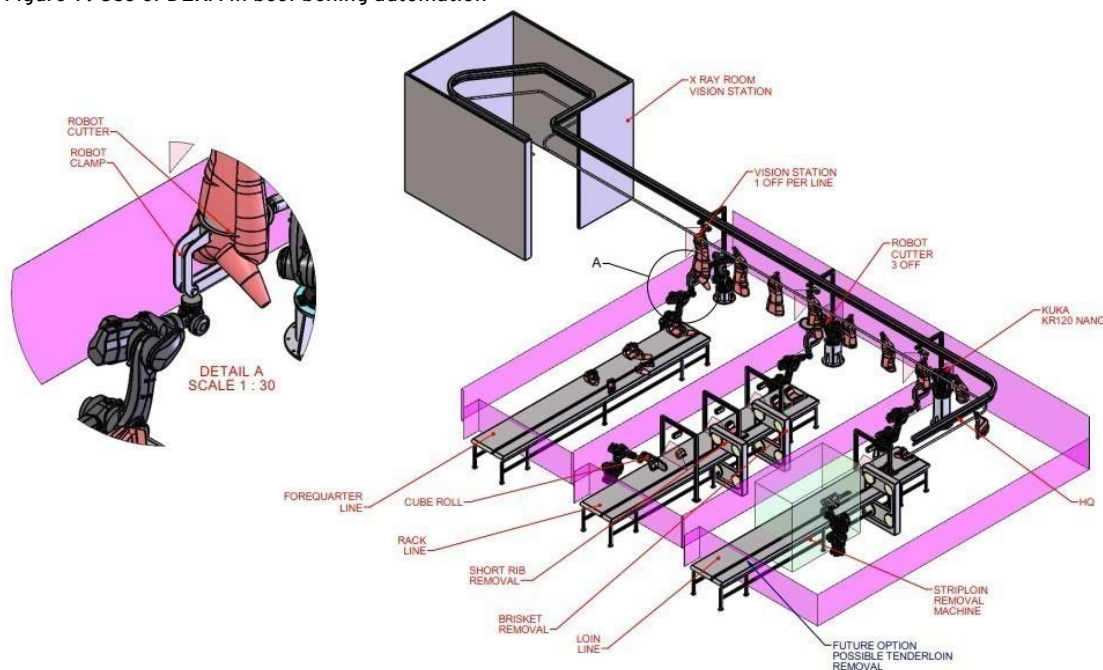
Source: Scott Technology Ltd

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[8] *Sortation is to the process of sorting items into categories or into a set order, especially when done by machine or computer*

Matters being examined

As part of The Review, EY will be investigating the application of DEXA and how it can be applied with or without automation and the associated benefits to processors. Additionally, EY will seek to understand the requirements for additional technology to support DEXA's application for automation purposes, including robotics and animal tracking technologies. These findings will be articulated in more detail in the final report.

## 4.3. Proposed use of Dual Energy X-ray Absorptiometry (DEXA)

The specific technology MLA is proposing be purchased and installed is DEXA, a bone density measurement technology, which can also measure fat and muscle definition. MLA have proposed the DEXA units be installed in a purpose-built lead-walled section within each processing facility, post slaughter either prior to, or after, chilling of the animal in the production line. The choice of the installation location has been left to processors to determine.

Matters being examined

As part of The Review, EY will be investigating the installation of DEXA, how it can be applied, location and implication of location, in a processing plant for the stated applications. These findings will be articulated in more detail in the final report.

The DEXA technology utilises two X-ray beams with different energy levels that are projected onto the carcase to provide an accurate indication of LMY (MLA Funding Proposal, accessed April 2017, pg.9). The data captured include x-ray images (illustrated in Figure 8 below), carcase weight and carcase ID which are then subsequently fed into the software algorithm for the calculation of LMY in the animal carcase (Scott Technology Ltd meeting, 2017). This algorithm is proposed to be programed into software as part of MLA's proposed installation and used to analyse DEXA scan data, carcase weight and carcase ID to arrive at a prediction of percentage of lean meat, fat and bone for individual carcases.

Figure 8 Example of a DEXA beef carcase x-ray scan
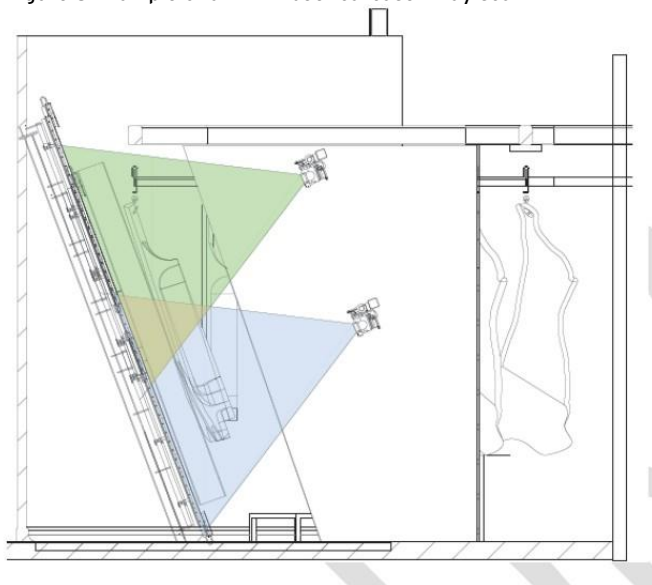
Source: MLA Funding Proposal, accessed April 2017, pg.18)

The information characterising LMY will be linked to an in-plant Radio Frequency Identification (RFID) systems, where available, and live animal tracking systems, using NLIS[9] numbers specific to each animal and shared back to producers. The LMY data is proposed to be collectively stored by MLA (or a suitable independent body) in a suitable and secure location, and used for collective R&D and marketing, or to create solutions for providers more generally.

The Proposal has recognised that calibration of each DEXA unit is required at installation and periodically, to maintain accuracy and consistency across the industry; vital to underpinning objective lean meat yield data and carcase pricing. As a consequence of funding the technology purchase and installation, The Proposal also suggests that this auditing function be carried out by AUS-MEAT, similar to current randomised auditing of manual grading. Funding of AUS-MEAT DEXA audits is expected to be redirected from current funding of the manual grading audit function. AUS-MEAT, being jointly owned by processors and producers, is deemed to be best placed to carry out the audit function.

Matters being examined

As part of The Review, EY will be investigating matters relating to intellectual property, data ownership, and the governance required as part of maintaining an industry standard for use of DEXA output and facilitating data access to the industry. These findings will be articulated in more detail in the final report.

4.4. The Proposal's rationale for an expedited rollout of DEXA

The following section articulates the expected benefits that MLA believe would accrue if there were to be the proposed accelerated industry-driven DEXA installation, and the resulting issues that would impede producers if it was market-led by the processing sector (MLA Project 150 Funding Proposal, accessed April 2017, pg.8). The specific issues MLA anticipates from a market-led installation include further industry consolidation in the processing sector; challenges in defining audit processes and standardisation of DEXA installations; and an overall delay in shifting the industry to value-based operations that would improve productivity and better meet consumer needs.

Matters being examined

As part of The Review, EY will assess the minimum threshold of processor adoption of DEXA (measured by processor numbers or carcases processed) to realise the suggested industry-wide benefits, and assess consequences of under adoption. These findings will be articulated in more detail in the final report.

4.4.1. Expected benefits of an expedited DEXA roll-out

The proposed installation of DEXA is stated by MLA to address the continued concerns by red meat producers and feed-lotters, towards the validity of carcase measurements and thus payments for livestock. MLA states that the accelerated, centrally driven installation, is required to achieve wide adoption and standardisation of OM (MLA Project 150 Funding Proposal, accessed April 2017, pg.7).

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[9] *The National Livestock Identification System (NLIS) is Australia's system for the identification and traceability of cattle, sheep and goats.*

In addition, MLA's proposal states that an accelerated industry-wide application of the technology will deliver other key benefits to red meat producers and the wider industry value chain (MLA Project 150 Funding Proposal, accessed April 2017, pg.8), including:

▶ Transforming the industry towards livestock production and marketing through objective data and value measurements which is an anticipated to return $220m to the value chain per annum by 2020

▶ Providing the industry with a valuable database of objective measures, critical to supporting individual farm and whole-of-industry scale productivity improvements

▶ The installation of DEXA will reduce the barriers to adoption for OCM and other automation technology solutions in the future

Matters being examined

As part of The Review, EY will investigate the suitability of an expedited roll-out, and if so whether it would be optimal to invest $150m, after considering the various options, the potential benefits including who they will flow to, and the associated risks. These findings will be articulated in more detail in the final report.

4.4.2. Implications of a market-led outcome

MLA indicates in The Proposal that market-led adoption of OCM technology is likely to be, at best, ineffectual and is likely to have an adverse impact on producers (MLA Project 150 Funding Proposal, accessed April 2017, pg.2).

The Review understands that MLA believes:

▶ That smaller processors may find it more difficult to fund capital investments and that as a result industry-wide adoption is anticipated to take longer under a market-led approach

▶ This inability to invest may put pressure on smaller processors to the extent that further industry consolidation may take place, and that this may in turn may result in negative impacts to producers

▶ Market-led adoption is likely to mean that processors have less incentive to broadly share their operational data.

Matters being examined

As part of The Review, EY will further investigate the above rationale and assess the interest from processors to install DEXA under a market-led scenario. In addition, we will also explore the benefits and issues of both market-led installation and industry-driven installation. These findings will be articulated in more detail in the final report.

4.5. Proposed costs and financing overview

This section outlines the cost inclusions and exclusions and proposed funding structure specified in The Proposal, and lists key inputs and assumptions within the proposed funding model.

Further to the information provided in this document, MLA has recently advised the Review that they are now exploring alternative funding models to that originally proposed.

AMPC have advised the Review that they are supportive of the development and advancement of OCM technology and specifically whether DEXA represents the appropriate technology platform to support this. They note that early signs are encouraging, and have advised that they stand ready to support their members and the wider industry into providing research on that technology. They have advised that they are awaiting the outcomes of this Review to assist them in considering these matters.

4.5.1. Proposed cost

Based upon the documentation received by The Review from MLA, The Proposal includes the purchase and installation of DEXA units in up to 90 AUS-MEAT accredited meat processing facilities in which the total cost is estimated to be $150m. (MLA announcement, 10 November 2016). The proposed average cost per unit for purchase and installation is $1.45m per unit (MLA Funding Proposal, accessed April 2017, pg.9). The Review acknowledges that this is a voluntary opportunity and the proposed cost is for up to 90 AUS-MEAT processing facilities.

These individual unit costs include the cost of purchasing the DEXA unit, its installation at a processing plant and additional program administration costs. The individual unit cost however, does not include plant modification costs which may be required to accommodate the DEXA unit. Nor does it appear to include the on-going operating and maintenance costs (MLA Funding Proposal, accessed April 2017, pg.13). Further details of The Proposal cost inclusions and exclusions are outlined in Table 2 below (Cost inclusions and exclusions sourced from the MLA Funding Proposal, accessed April 2017, pg. 13).

Table 2: The Proposal cost inclusions and exclusions			
#	Cost Areas	Included/Excluded	Cost borne by
1	Initial purchase of DEXA unit	Included	The Funding Proposal
2	Installation of DEXA unit	Included	The Funding Proposal
3	Program governance costs	Included	Not specified
4	Plant modification costs	Excluded	Processor
5	Operating costs (hardware and software)	Excluded	Processor
6	Maintenance costs (hardware and software)	Excluded	Processor
7	Audit of DEXA unit accuracy and calibration consistency	Excluded	AUS-MEAT[10]
8	Training and knowledge management	Excluded	Not specified
9	Integration costs with internal systems (e.g. ERP, other tools)	Excluded	Not specified
10	Decommissioning costs	Excluded	Not specified

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[10] MLA announcement, 10 November 2016

Matters being examined

As part of The Review, EY will seek to investigate the implications of MLA's proposed ownership of the DEXA unit and clarify the potential impact of the intended terms and conditions of use. We will assess additional costs that may be associated with these factors. These findings will be articulated in more detail in the final report.

Based on information outlined in The Proposal (MLA Funding Proposal, accessed April 2017, pg.13) and subsequent discussions with MLA (interview conducted on 31 March 2017), The Review understands that, while processors will operate and maintain the DEXA unit, the ownership is to be retained by MLA. The Review understands that if the proposed roll out occurs, MLA and processors will periodically assess whether the unit is being used in accordance with the intended purpose. The details of this arrangement will need to be agreed upon between MLA and processors.

Matters being examined

As part of The Review, EY will seek to investigate the implications of MLA's proposed ownership of the DEXA unit and clarify the potential impact on processors of the terms and conditions of use that are yet to be negotiated. We will assess any additional costs that may be associated with these factors. These findings will be articulated in more detail in the final report.

4.5.2. Proposed financing structure

The Proposal notes that the originally proposed funding structure comprises of a government concessional loan through the Commonwealth Regional Investment Corporation. The proposed loan would have been structured over a negotiated period of 10 years against a reduced borrowing rate. It was proposed that the loan would have been underwritten by MLA and serviced through the apportionment of producer levies over the loan repayment period (MLA Funding Proposal, accessed April 2017, pg.11).

The Review notes that the financing structure outlined above was proposed in documentation dated in 2016 and we understand, through discussion with MLA, that this has evolved. For the purposes of this Issues Paper, The Review has relied upon documentation made available to The Review team and look to provide further clarity in regards to this in the final report as more information is made available.

Based upon the government concessional loan outlined above, The Proposal outlines plans to drawdown on this loan during the rollout period between FY17 to FY20, with gradual increases in the repayment of capital and interest over the life of the loan. The total cost of funding is $183.4m which includes cumulative interest of $32.1m (MLA Funding Proposal, accessed April 2017, pg.11). The interest rate proposed in the funding model is based on 10 year Government bond rates as at 28 November 2016 of 4.75% (MLA Funding Proposal, accessed April 2017, pg.13).

The proposed funding model was prepared based upon a 'worst case' view should the initiative not be eligible for the Government 'Matching dollar' contribution (MLA Funding Proposal, accessed April 2017, pg.13).

The producer levies in FY17 to FY20 are modelled on current market trends, while years FY21 to FY26 are based on long term historical averages. The use of new levies or levy price increases have not been factored into this model to fund the new asset (MLA Funding Proposal, accessed April 2017, pg. 13). Levy expenditure is predicted to exceed levy income as built up reserves are utilised between FY17 to FY20. Thereafter, levy expenditure is anticipated to normalise at $91.5m per annum (MLA Funding Proposal, accessed April 2017, pg.12). This is illustrated in Figure 9 below.

Figure 9: Projected levy income vs planned expenditure
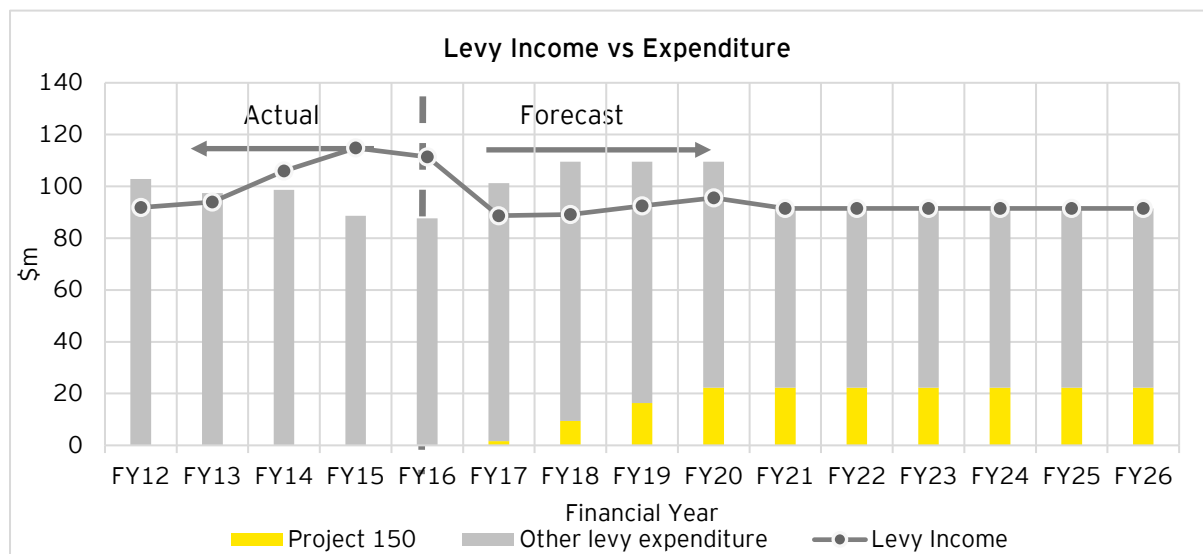
Source: MLA Funding Proposal, accessed April 2017, pg. 12

4.6.   Proposed expected benefits

This section outlines the proposed benefits of the DEXA implementation to producers, the Government, the taxpayer and the broader industry as per MLA's Funding Proposal.

4.6.1.   Proposed industry wide benefits

The Proposal estimates a cumulative industry wide benefit of $1,540m by 2026 based on the expedited adoption of DEXA. This benefit is the aggregate of the total estimated gross annual benefits of $220m between 2020 and 2026 (MLA Funding Proposal, accessed April 2017, pg.8).

The incremental benefit of expedited adoption and the market based adoption rate is $910m by 2026. This is based on incremental annual, gross benefits of $130m between 2020 and 2026 (MLA Funding Proposal, accessed April 2017, pg.8). The difference between a market based approach and expedited adoption of DEXA is outlined in Figure 10.

Figure 10: Estimated cumulative benefits of market based approach and expedited adoption

Estimated cumulative benefits of market based approach and expedited adoption
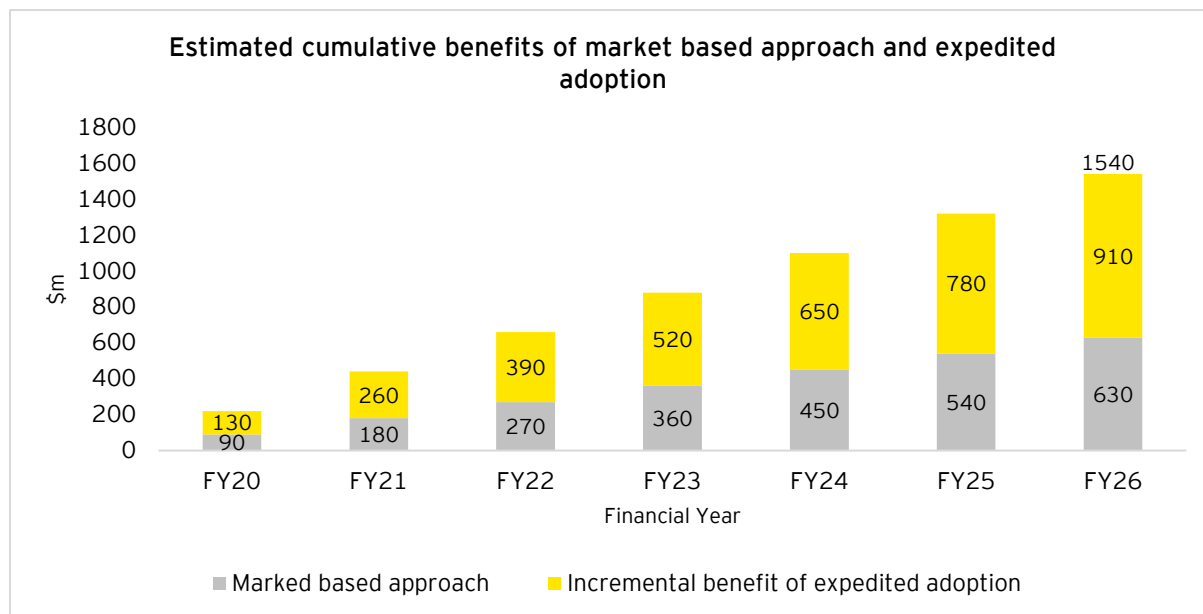
Source: MLA Funding Proposal, accessed April 2017, pg. 8

These benefits are categorised into four groups (MLA Funding Proposal, accessed April 2017, pg.9):

1. Increasing lean meat yield of the Australian flock and herd

2. Optimising purchasing of livestock to better suit end markets

3. Optimising boning room fabrication to best enable available livestock purchased to meet end customer needs; and

4. Increasing boning room cutting accuracies.

It is important to note that the Funding Proposal estimated benefits at an industry wide level, while the proposed costs only address the installation of DEXA units (as illustrated in Table 3 above) and do not include the other areas which would facilitate the realisation of the broader benefits e.g. processing automation.

Matters being examined

As part of The Review, EY will seek to investigate the:

1. Key assumptions underpinning the proposed benefit values,

2. Attribution of the proposed benefit value to:

   a. industry stakeholders, and;

   b. the components of the industry value chain

These findings will be articulated in more detail in the final report.

The 'Development of supply chain OM strategy and value proposition to stakeholders' report (Executive Summary, 2017) prepared by Greenleaf, Miracle Dog Consulting and S. Williams Consulting, estimates benefits separately to The Proposal.

The value proposition benefits are based on six scenarios where benefits may be generated. These scenarios are broadly consistent with the four benefit groups identified in The Proposal:

1. Increasing lean meat yield but maintaining eating quality

2. Increasing lean meat yield but maintaining pH

3. Increasing feedlot quality but maintaining turn off times

4. Improving animal health

5. Optimise livestock purchased to market specifications

6. Fabrication of purchased livestock to optimise value

The potential upside benefit based on 100% adoption is estimated $417m annually by 2030, of which $334m is attributable to the beef industry. The likely estimated benefit based on expected adoption rates is $247m annually by 2030, of which $196m is attributable to the beef industry (Development of supply chain objective measurement OM strategy and value proposition to stakeholders', 2017, pg.3).

The Executive Summary documentation available to The Review at the time of writing does not specify the expected rate of adoption. It does however state that the 'likely' benefit estimates do exclude expediting DEXA and therefore assumes a lower rate of adoption than that specified in The Proposal. The value proposition report specifies these benefits were estimated to be split equally between producer and off-farm sectors of the supply chain over time in most of the scenarios modelled (Greenleaf, Miracle Dog Consulting and S. Williams Consulting, 2017 as cited in 'Development of supply chain OM strategy and value proposition to stakeholders', 2017, pg.2).

Matters being examined

As part of The Review, EY will investigate the findings from the Development of supply chain OM strategy and value proposition to stakeholders' report (Executive Summary) and assess their impact on the likely benefits and outcomes. These findings will be articulated in more detail in the final report.

4.7.   Proposed DEXA roll-out

The documentation provided to The Review included a proposed installation program for the installation of DEXA in processing plants. This included the appointment of a Program Manager to work with third parties to commence procurement and installation of DEXA technology (MLA Funding Proposal, accessed April 2017, pg.9). The proposed installation program consists of four steps:

Step 1	Step 2	Step 3	Step 4
After successfully receiving the required loan from the Commonwealth*, a tender process would be undertaken to determine OCM technology suppliers and installation partners. (*The Review notes recent advise that the funding proposal is evolving)	In 2017, MLA would commence the program with the appointment of a project manager to administer the project, work with processors and partners to purchase and install OCM technology at AUS-MEAT accredited processing facilities.	Set up supporting systems and processes, including technology auditing and data storage.	MLA will service the debt obligation through apportioning producer levies, developing an exit strategy – where appropriate – from day to day administration of OCM technology in processing facilities.

4.7.1. Proposed technology installation schedule

Based upon the documentation received by The Review from MLA, it is understood that the installation of small DEXA units would commence across a number of plants in FY17, and the roll-out continuing to FY20 (MLA Funding Proposal, accessed April 2017, pg.9). This is subject to the initiative receiving formal approval from the necessary stakeholders and confirmation of acceptable installation timeframes with the individual processors.

Large DEXA units are in final stages of development and testing and it is proposed that the installation of these units may commence during the first half of FY18, with roll-out continuing through to FY20 (MLA Funding Proposal, accessed April 2017, pg.10). A summary of an indicative installation schedule proposed by MLA is set out in Table 4 below:

Table 4: Indicative technology installation schedule and cost						
Year ended	Large Facilities		Small Facilities		Total	
	Number	Cost ($m)	Number	Cost ($m)	Facilities	Cost ($m)
2017	0	0.0	9	12.5	9	12.5
2018	23	35.6	16	18.7	39	54.3
2019	17	26.7	14	9.4	31	36.0
2020	17	26.7	7	21.8	24	48.5
Total	57	88.9	46	62.4	103	151.3

5.   Voice of the industry – what we've heard so far

5.1.   Overview

This 'voice of the industry' research (the study) is being designed to directly bring the vital perspectives of producers and processors to The Review. It recognises that these informed industry operators provide a range of practical insights, perceptions and expectations which represent critical considerations for the industry.

5.2.   Methodology

This study makes use of qualitative research in the form of in-depth interviews with producers and processors. By design, qualitative research is intended to gather rich insights and perspectives of respondents, the purpose being to speak with a cross section of industry participants to gather diverse points of view and to then summarise emerging themes. As part of The Review, the interviews were conducted by telephone between March 8th and April 20th, 2017, each lasted between 30 and 60 minutes.

Interview respondent profile	Interviews
Processors Top 4	2
Processors 5 to 15	5
Processors 16 to 30	3
Processors 31 to 45	7
Processors 46 and smaller	3
Total Processors	20
Producers Large (sell 50k+) p.a.	7
Producers Medium and small	4
Seedstock producers	6
Total Producers	17

In total 17 producers and 20 processors have been interviewed to date. Of these, 5 producers and 5 processors had a focus on sheep meat, the remainder were focused on beef. Industry bodies were invited to provide a list of members as candidates to be recruited for interview, however only AMPC provided a member list. The rest were sourced by The Review team. The interviews with processors (20, representing over 80% of processor capacity) and producers (17, including several of the very largest) both reached a point at which no new perspectives were being introduced in additional conversations. Additional interviews will be pursued with producers in the lead-up to the final report.

The study is exploring producer and processor perspectives on: OCM, the DEXA technology proposal, confidence in DEXA to meet suggested benefits, proposed project funding and capital expenditure.

The initial findings presented in this section are substantiated by a range of direct quotes gathered during the extensive interview process.

5.3.   Introduction to initial findings

The following six initial findings emerged from this qualitative research among producers and processors:

1. Almost all producers and processors are calling for pilot programs, generating reliable data, to take place before significant industry expenditure is undertaken. These pilot programs will demonstrate the technical and commercial impacts of DEXA and inform individual operator capital decisions

2. Confidence in DEXA to deliver suggested industry developments is only moderate among both producers and processors. The absence of a reliable knowledge base of trials, studies or data from the use of DEXA on cattle, has left confidence at moderate levels among both groups

3. Producers and processors view capital investment as a means to deliver their own business strategy and to activate their business model. Processors consider that Industry investment programs of this type assume all operators need the same capital equipment, and share similar views about industry priorities, when in reality each processor is pursuing their own business model

4. Carcase grading and pricing has been an ongoing source of frustration to producers. This history has undermined their level of trust in processors and OCM technologies are often viewed as the solution to this frustration. This mistrust in manual grading is too widespread to be ignored, the industry cannot dismiss the problem, and it needs to address the problem

5. OCM technologies generally, are seen by producers as much-needed tools to increase the objectivity and transparency of carcase measurement. The benefits include accurate grading and valuation, enabling processors to optimise boning, helping producers to identify inefficient stock, informing breeding strategies and supporting the producers' pursuit of a value based marketing approach

6. While processors are concerned that DEXA technology will lead to producers pursuing yield over quality, producers are well trained in the importance of meat quality factors. They intend to use the accurate yield measurement from DEXA to complement their decision-making, not to redirect it.

In summary, the initial findings of our engagement with the industry suggests there is a desire from producers and processors to see further evidence of DEXA technology being proven for beef in commercial operations. In addition to this, there is a call for greater visibility as to the proposed investment and associated benefits.

5.3.1.   Finding #1: Calls for a DEXA pilot program – technical and commercial impact

Based on our consultations with both producers and processors there was a clear desire to see pilot programs using DEXA conducted before any significant capital is invested. They expect any business case to be well supported by pilots, trials and data.

Pilots will enable producers and processors to consider a DEXA investment based on reliable data, and to assess the extent to which DEXA technology will support their own business model.

"I think it could be a good program and I sort of like the idea, but not sure it is worth that sort of investment. Might be good to see it trialled small scale to see how it goes." – **Top 50 processor**

"We need trials, to run over 2 years, installed in larger plants and doing high volume numbers." – **Top 4 processor**

"Once we know what DEXA can do, a business can determine if DEXA supports their business model, and they may have a reason to invest." – **Top 35 processor**

"Perhaps four pilots as a priority: a pilot in each of the northern and southern regions focused on domestic markets and eating quality. Then two more focused on export markets and yield in each of the north and the south regions." – **Large producer and processor**

"We certainly need to see some evidence presented far more clearly, we need to see some results that show it will perform as indicated." – **Sheep producer**

"This is all new to me, we were supposed to see a presentation about this at recent MINTRAC conference for QA managers but it didn't happen for some reason." – **Top 30 processor**

These pilot trials would not only demonstrate the technical merits of DEXA to the industry, they would also address commercial concerns that the technology may not result in prices paid by processors to producers accurately reflecting the 'value' of the meat and the carcase.

"If the processors do the right thing, premiums will be paid for higher yielding carcases. What will more likely happen is they will use it to benchmark prices for the best and discount underperforming carcases. The processors now pay the base rate for the best cattle and less for everything else." – *Seedstock producer*

"I have been to all our processors' plants but there are too many factors in the grids, between 10 and 20 measures. DEXA based 'saleable red meat yields' could become yet another tool or criteria for processors to discount the value of a carcase." – **Small producer**

"If OCM just measures yield characteristics and replaces graders we will not get a better outcome, it won't identify top quality carcases by itself – it needs to be used in conjunction with current carcase measurements including quality measurements e.g. marbling, colour, fat depth etc....." – **Seedstock producer**

In Summary

Both producers and processors want to see pilot programs using DEXA conducted before any significant capital is invested. They want to see if the technology actually works for the industry, on many fronts. They expect any business case to be well supported by pilots, trials and data. Two processors interviewed indicated a willingness to conduct pilot programs at their facilities.

5.3.2. Finding #2: Moderate confidence in DEXA delivering industry developments

Based on documentation provided to The Review and subsequent interviews, we understand that during the announcement of The Proposal five 'industry developments' were foreshadowed to flow from the introduction of DEXA. The Review sought to understand producer and processor views on the importance of each of these industry developments, and to gauge their confidence that DEXA would actually deliver these industry developments.

The responses from producers and processors were somewhat consistent, they scored the importance of the suggested 'Industry developments' highly, but scored their own confidence that DEXA would deliver these, significantly lower. Figure 13 identifies the industry developments with respective the level of importance and confidence demonstrated below.

Figure 13: DEXA related industry developments are important, but confidence significantly lower
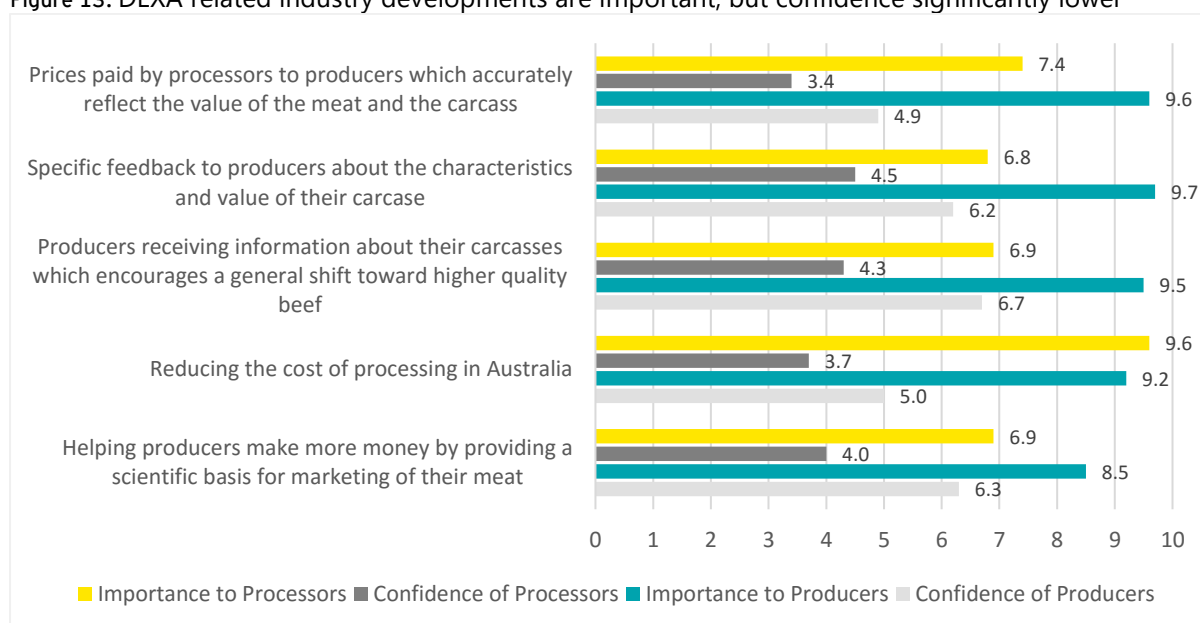
Source: EY voice of the Industry

Both producers and processors indicated their knowledge of the performance of DEXA was low because they had no basis at this stage to be sufficiently confident of the technology.

"I haven't seen any studies, the industry is littered with failures, the cost of a mistake is great but I haven't seen any workings." – **Large producer**

"I have no confidence at all in DEXA until it is trialled in at least 2 abattoirs, it's got a long way to go." – **Top 4 processor**

In Summary

Producers and processors currently seem to lack clarity in understanding how DEXA may meet industry needs.

5.3.3. Finding #3: Capital investment seen as a means to deliver own business strategy

Producers and processors view capital investment as a very selective means to deliver their own business strategy and to activate their business model. Both producers and processors are actively scanning the industry for relevant technology solutions which work for their business. Ultimately their capital decisions are made based on robust business cases, consisting of reliable data about a project's value to their company and its customers.

"We compete in our business for capital based on payback and ROI." – **Top 4 processor**

"I have to put proposals to management, it's not likely to proceed unless it was a request from our customers." – **Top 30 processor**

"We are monitoring different systems around the world, we look at plants and visit trade shows, but at this point in time none of them meet the criteria for us." – **Top 5 processor**

DEXA was a capital priority at this point in time, for just two of the 20 processors interviewed:

"Only those that really want DEXA should do it. For us it will be for lambs." – **Top 35 processor**

"I am going to do it anyway, we are intending to invest at one site, we are happy to be a trial site." – **Large producer and processor**

The remainder expressed three common reasons they were not focused on spending capital on DEXA technology: suitability to their business model and customers, Industry priorities and a lack of research explaining DEXA capability and performance.

Business model and customers

"Each business is pursuing a particular business model, the idea that DEXA meets everyone's business model doesn't stack-up." – **Top 4 processor**

"I am not knocking the technology, I just think it needs more thought, grading things is one thing but you've got to have other facilities in place to fully utilise the technology." – **Top 25 processor**

"We have a grading system and MLA LDL data bases provide this insight for cents, not $150m. Getting cost out is the priority." – **Top 4 processor**

"I don't really know exactly what it does but I don't think I've got customers at the moment that really want this. We already provide feedback and not many of them even look at the data we give them." – **Top 40 processor**

Industry priorities

"I think we can invest $150m in many better things to improve returns for farmers and consumer end products e.g. working out better feeding regimes, finding better farm management techniques, manufacturing to provide greater range of products to consumers and enhance returns for both producers and processors." **– Top 15 producer and processor**

"Industry in general needs to find improvements, but I don't know if this is the right one." **– Top 30 processor**

"From an investment point of view what concerns me is that this could be a waste of money if we are not growing flock numbers. How can we encourage farmers to produce more stock (which declines every year) rather than this large investment in grading technology?" **– Top 45 processor**

"MLA is telling people that producers are demanding DEXA, but the MLA should take the same caution with capital that individual producers do. The beef industry backs some losers, if something is imposed it's doomed to failure." **– Large producer**

Lack of research

"I am not against the idea of using technology, just against the fact that there has not been enough thought put into this." **– Top 5 processor**

"I would like them to show us some research that shows why the DEXA system was chosen." **– Top 30 processor**

"No, we need hard data otherwise we will repeat the Future tech model." **– Top 4 processor**

"The industry is littered with investment failures, the cost of mistakes is very great. I haven't seen any workings on the returns so I have my reservations." **– Large producer**

In Summary

Based on The Proposal inclusions both producers and processors are seeking clarity on; how this investment may impact (and be implemented) based upon business model, how it aligns with industry priorities and what evidence based research is available for consideration

5.3.4. Finding #4: Carcase grading and pricing an ongoing source of producer frustration

Producers expressed a low level of confidence and trust in the manual grading of carcases by processors. Many producers interviewed shared stories of how manual grading was leading to variable carcase valuations; how 'split mobs' of cattle were graded differently by different processors; and how processor grids were applied inconsistently depending on cattle supply.

> "We have split 'mobs' and got vastly different results at different processors. At times there has been $100 per head difference between processors." - **Large producer**

> "Grids are the greatest rort of all time, when they are short of cattle they don't even use the grids, but when there is plenty around they will use the grids to knock down prices." - **Small to medium producer**

> "Yes, it's a major concern that every processor has a different grading system - it's ridiculous because there is no uniform standard, they can grade however they want and the producer just has to cop that, we need industry wide conformity. Everything needs to be graded under the same system, quality is the most important consideration." - **Seedstock producer**

> "We've had situations in the past when we had to challenge the grading and they were found to have been incorrectly graded and underpaid. I'm bloody sure that these mistakes are sometimes made deliberately, the processors underpaying producers to take more profit for themselves - a lot of that going on, we should have more independent graders in the processors." - **Seedstock producer**

This history has undermined the level of trust between many producers and processors with producers feeling financially exposed, particularly in drought conditions.

> "Northern producers developed a hatred for processors during the drought, they believed that processors took advantage of the producer being forced to sell." - **Top 10 processor**

While a complete suite of OCM technologies to measure all attributes is considered ideal, some producers and processors do share relationships based on trust. They have established a basis for trading with greater confidence in carcase valuation.

> "We don't deal with the Processors we don't trust, over time we now trust the abattoir we deal with, so we trust the system. " - **Large Producer**

> "We already operate another grading system to value a carcase, we operate an open door with producers, and they can come in a see how we grade their carcase. We conduct open days when producers come in and see how the system operates." - **Top 5 processor**

In Summary

The historical mistrust of manual grading appears to remain widespread and a continued source of deep frustration for producers.

5.3.5. Finding #5: OCM technologies seen as much needed tools to increase the objectivity and transparency of carcase measurement

Producers seek OCM technologies which remove subjective human factors from carcase grading, valuation and feedback. Producer interviews identified five main benefits of OCM technologies:

Benefit #1

In the short-term, OCM tools potentially enable processors to accurately value both the quality and quantity of saleable red meat in a carcase.

"OCM will take out subjective analysis of carcase." **‒ Seedstock producer**

Benefit # 2

OCM tools should also ensure that the processor is sufficiently informed by images to optimise either automated or manual boning, for the greatest yield or value from the carcase.

Benefit # 3

In the medium term, some advanced OCM technologies may inform a producer about which of their herd is likely to be 'inefficient' and not worthy of an investment in continued feeding.

"I need to identify the inferior animals because the cost of feeding them when they have a poor conversion of energy to meat, is not worthwhile." **‒ Large producer**

Benefit #4

In the longer term, the factual insights emerging from the broad range of OCM tools will inform producers how to fine-tune their breeding strategies to increasingly improve the overall quality of their herd, based on what truly makes a carcase valuable.

"OCM will enable us to more accurately monitor and track back to parents, aiding genetic evaluations." **‒ Seedstock franchise**

"It will help our breeding program to ensure we are producing the right product. We would be able to trace back to sires to ensure we are breeding for the market demands." **‒ Large seedstock producer**

Benefit #5

The progressive accumulation of sufficient insight to support the industry progressively transforming to a value based marketing approach.

"At the moment there is no value based marketing system in place, I am all for that happening and we have to get to a value based marketing approach in order to change the emphasis from commodity based, to reward for effort." **‒ Seedstock franchise**

In Summary

OCM technologies represent a range of benefits which are expected to increase the objectivity and transparency of carcase measurement and support producers' evolution to a value based marketing approach.

5.3.6. Finding #6: Concern that DEXA will lead to producers pursuing yield over quality

Processors anticipate that the DEXA project will provide them with as accurate measure of meat yields and fat content, a smaller number would expect to use the DEXA imagery of the carcase for cutting and boning optimisation. However, processors expressed great concern that DEXA will lead to paying for yield over quality, and this is not a better outcome for consumers.

"Encouraging yield over quality does not necessarily mean better outcomes for producers or consumers." **– Large sheep producer and processor**

"My concern is that using DEXA for robotic technology might be OK but using it as a measurement for payment has the potential to commoditise beef and lower the overall value of beef over time. It has the potential to move producers in the wrong direction e.g. towards yield and away from quality." **– Top 5 processor**

"This may be a good approach for producers in northern areas where the focus is already on yield but is not the right approach for the southern industry as we are going for quality. It's very dangerous to spend so much money on one trait across the whole country." **– Top 5 processor**

The Review's consultation with processors explored concerns that DEXA will result in a race to 'yield' by producers. This was not confirmed during interviews with producers themselves. While producers expect DEXA will provide much more accurate estimates of saleable red meat yield, they also recognise that the value of their carcase is determined by the 'grids' provided by processors. MSA attributes such as colour, marbling, ph., and bruising are all of great importance to the price they ultimately receive from the processor today. Producers considered this would not change.

Producers therefore consider that, in the medium to long-term, using this additional information wisely should lead to them conducting a more profitable producer business.

"Hopefully we might get paid a little more if we produce the right article" **– Large producer**

"The data would support making better on-farm decisions, it should mean we'd be able to make more money." **– Large producer**

In Summary

Processors themselves will play an important role in maintaining the correct balance between meat quality and yield factors in the value grid for a carcase, in the event that DEXA technology plays a future role in OCM.

5.4.   Working together, moving forward

Producers and processors have the potential to either work together or unilaterally. They share many common interests but also have the potential to disrupt one another. Industry members are calling for greater collaboration and consultation, to build the cohesiveness of the 'industry'.

"It's about time that processors and producers start working together. I pay a lot of levies and there seems to be a lot of money just wallowing around rather than being applied to industry improvements." – **Top 15 processor and producer**

"I don't understand it at all, I imagine there's a reasonable amount of resistance from processors. I only know it is an industry directive from industry body MLA." – **Seedstock Franchise**

"The announcement was made without consultation with industry and sounded like a mandate. I really don't know how it is supposed to be rolled out, it has not been properly researched or explained." – **Top 5 processor**

"I would suggest some sort of seminar to provide better understanding of this. I would also suggest a small scale trial before going ahead." –**Top 30 Processor**

Producers and processors consider pilots or trials are a more constructive approach to progress, and both are eager to collaborate to implement pilot programs

"We need to conduct the trials using an educational approach, which explains to all producers and processors how the technology is performing. It will get everyone on board sooner." – **Large Producer**

"We all need to be very open minded about this, there is generally not enough cooperation through our industry. Information needs to be more readily sharable and transferable." – **Seedstock Franchise**

"I'd like to be much better informed about this proposal & technology. Very surprised I have not heard about it before now. It's nice to be contacted and to be part of something like this for a change." – **Seedstock Producer**

"It's a disjointed industry reluctant to share, the parties need to discuss the potential benefits, then to volunteer collaboration. Then spending a small percentage of $150m to prove the investment would be far better." – **Large producer**

Initial Conclusion

Producers and processors participating in The Review recognise the need for the industry to pursue a progressive approach. Many also consider cooperation a critical component of growth and success for the broader industry.

The participants in this study have reinforced that a thorough assessment of DEXA technology, including DEXA pilot installations, would represent a constructive step forward for all involved.

Producers and processors consider that trials would provide both parties with informed and credible insights into the merits of DEXA technology. They considered proposing significant investments without this information was premature.

6. Next steps for The Review

The Review welcomes feedback on the issues raised in this paper and any other issues that the industry and interested parties believe The Review should consider as part of its work.

Hence, please forward your response to this Issues Paper via dexa.independent.review@au.ey.com by 12 May 2017.

We would like to thank you, the industry for your on-going support.

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