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Report for Processing Sector Capability Assessment

Providers Survey Analysis

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1. Introduction

Meat & Livestock Australia (MLA) and Australian Meat Processing Corporation (AMPC) have recognised a clear need to identify the capability needs for the red meat processing industry currently and into the future. This report aims to identify the capability needs, mapped against the industry challenges, drivers and gaps in research, development and extension (RD&E) that require investment into the future.

MLA and AMPC engaged GHD to conduct an online survey of providers to help gain a greater understanding of the current R&D capacity and capability that exists within the red meat processing industry as a whole.

The survey was undertaken in February 2012. This report is the analysis of the results from the provider survey.

2. Current priorities

Respondents were asked to rank a series of RD&E priorities based on their level of importance to their organisation and nominate whether current activities were being undertaken in each priority area. Current priorities were ranked by the percentage of respondents who nominated the level of importance as 'high'.

The top 5 priority areas were:

- Quality assurance
- Value adding
- Process optimisation
- Resource use – water and energy
- Livestock management

Of the top 5 'high' priority areas, two (resource use and livestock management) activities were currently being undertaken by less than half of the providers surveyed. Livestock management is recognised as a long standing priority area and as such processing enterprises have a high degree of existing internal expertise. In contrast, resource use was nominated as a 'high' or 'medium' priority by 79% of providers, however only 45% are currently undertaking activities in this area. No respondents regarded resource use as 'low' priority highlighting the current importance of resource use in the red meat processing sector.

Table 2 below outlines the relationship between the top 5 priority areas and the percentage of providers currently undertaking activities in each area.

Table 1 Most import RD&E activities nominated by providers

Priority area	Importance			Activity already undertaken	
	High	Medium	Low	Yes	No
Quality assurance	79%	26%	5%	63%	37%
Value adding	74%	32%	11%	76%	24%
Process optimisation	74%	32%	5%	55%	45%
Resource use – water and energy	74%	32%	0%	45%	55%
Livestock management	68%	16%	21%	40%	60%

The 5 areas nominated as least important to providers were:

- Product and brand development
- Marketing and sales
- Packing – systems, process, technology

- Packaging – packaging materials, cartons, MAP forming
- Human Resources management

The 'low' priority areas have low associated activity levels. Product and brand development, marketing and human resource management are three areas providers nominated as least likely to dedicate resources towards. Additionally, the results highlight packing (systems, processes and technology) and packaging (materials) are also both low priority areas and the least frequently undertaken RD&E activities by service providers.

The following two charts highlight the current priority areas based on importance levels (high, medium and low) and whether activities are currently being undertaken.

Figure 1 Importance levels of RD&E priority areas

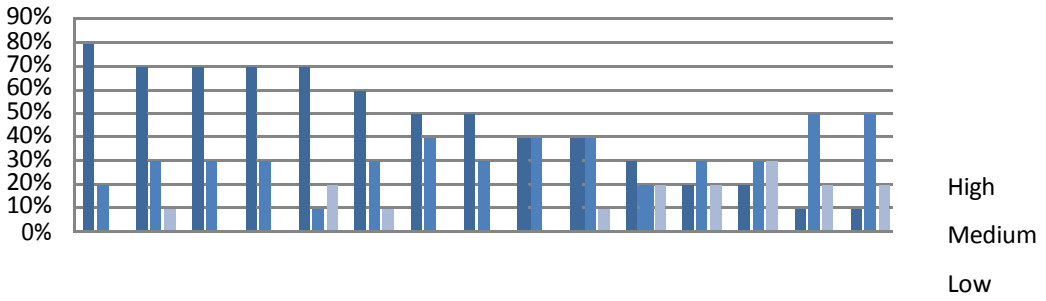
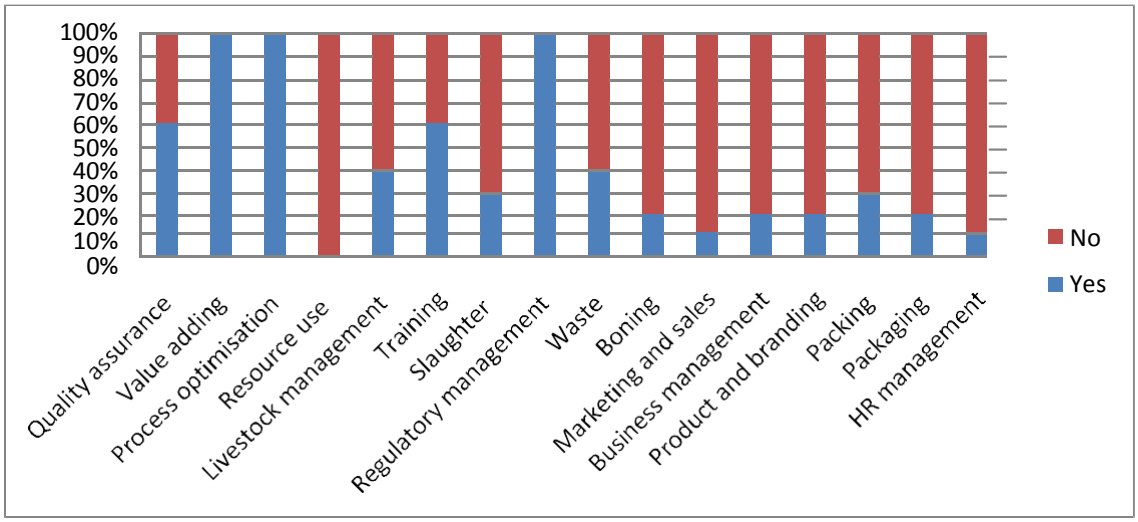


Figure 2 RD&E activities currently being undertaken



3. Current research

The following tables represent staff numbers and total staff time being committed to research over the past two years in terms of full time equivalents (FTEs). Of the 431 FTEs, 37% of provider staff time is dedicated to research across the red meat supply chain.

Table 2 Staff numbers and FTEs dedicated to research across supply chain segments

Supply Chain Segment	Number of Staff	FTEs	% of Staff time
Feedlots	105	42	40%
Processing plant	623	260	42%
Value adding	430	129	30%
Total	**1158**	**431**	**37%**

Table 3 Staff numbers and FTEs dedicated to research across red meat species

Species	Number of Staff	FTEs	% FTEs per species
Cattle and Sheepmeat	198	71	36%
Cattle	648	270	42%
Sheepmeat	254	75	29%
Goats	47	13	28%
Other (e.g. Deer)	11	2	18%
Total	**1158**	**431**	**37%**

4. Current capability

Capability is considered against FTEs by discipline across age structure, location, salary range, focus and supply chain segment.

Survey respondents had premises, plants, research facilities or offices located in the following locations:

- Adelaide
- Armidale
- Bairnsdale
- Brisbane
- Canberra
- Cowra
- Dunedin
- Launceston
- Melbourne
- Orange
- Sydney
- Toowoomba

The following tables outline FTEs as a percentage across the supply chain and each species to give an indication of the labour allocated to each segment from the sample of providers.

Table 4 Provider capability across the supply chain

Supply chain segment	Percentage of FTEs
Feedlots	13%
Processing plant	57%
Value adding	30%

Table 5 Provider capability across species

Species	Percentage of FTEs
Cattle	65%
Sheepmeat	33%
Goats	2%

Respondents were asked to nominate FTEs employed in technical employment classifications against disciplines within the red meat processing sector. The following table outlines the results, which indicates the majority of respondents had capacity within animal science, meat science and industrial engineering.

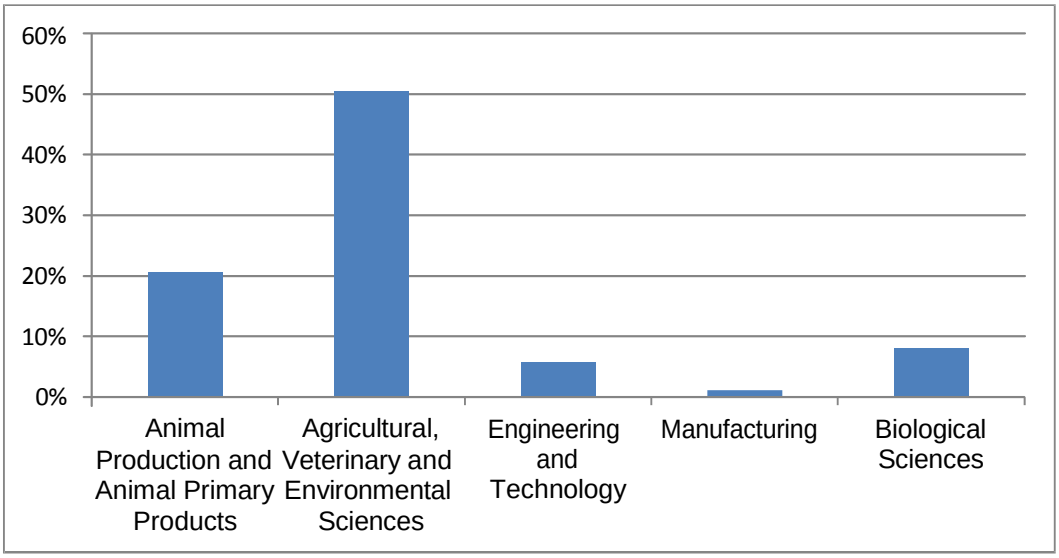
Table 6 FTEs by discipline

Discipline	FTE	S	T	LS	O	A	C	En	E	EX
Animal science	**34%**	62%	44%	0%	11%	59%	31%	0%	69%	0%
Biochemistry	**3%**	11%	7%	0%	0%	0%	0%	0%	6%	0%
Chemical engineering	**3%**	0%	0%	0%	0%	0%	0%	12%	0%	0%
Environmental science	**4%**	1%	0%	0%	0%	0%	0%	19%	0%	0%
Food technology	**5%**	3%	0%	0%	0%	17%	0%	6%	6%	75%
Industrial engineering	**20%**	4%	19%	0%	79%	7%	57%	62%	14%	13%
Meat science	**27%**	15%	21%	0%	5%	5%	9%	0%	5%	13%
Product Development	**1%**	0%	3%	0%	0%	0%	0%	0%	0%	0%
Other	**3%**	4%	6%	0%	5%	12%	3%	1%	0%	0%

FTE Split - Scientist (S), Technician (T), Lab Support (LS), Engineer (En), Education (E), Extension (Ex), Communications (C), Administration (A), Other (O).

Current employment capability of providers in the red meat processing industry was categorised using the Australian Standard Research Classification (ASRC). This will allow for comparisons with processors, broader red meat industry data and labour force information as well as consistency with the National R&D strategy terminology. The results are shown in Figure 3.

Figure 3 Employment by ASRC categories



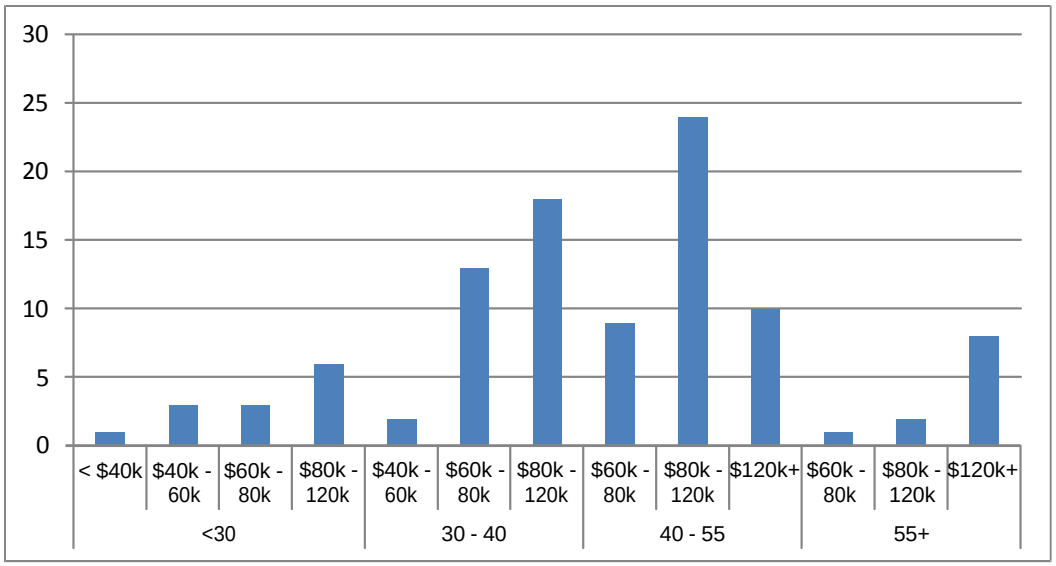
The age structure of providers within each discipline highlights a high proportion of young meat scientists and a relatively high representation of experienced labour in the food technology field.

Table 7 Age structure of employment within each discipline

Percentage by age	<30	30 - 40	40 - 55	55+	Total
Animal Science	0%	7%	6%	1%	14%
Biochemistry	1%	0%	2%	0%	3%
Chemical engineering	0%	1%	3%	1%	5%
Environmental science	2%	2%	0%	0%	4%
Food technology	2%	4%	6%	5%	17%
Industrial engineering	8%	5%	8%	0%	21%
Meat science	17%	7%	7%	0%	31%
Product Development	0%	4%	1%	0%	5%
Total	**30%**	**30%**	**33%**	**7%**	**100%**

The salary range and distribution in the red meat industry is typical of the wider red meat industry and comparable to competing industries.

Figure 4 Staff numbers by age group and salary range



The following table outlines open ended responses given by providers regarding their focus area for each nominated staff member. Providers showed a high degree of experience in livestock management, food safety and automation.

Table 8 Number of employees with current capability in each nominated RD&E focus area

Focus area	Employees
Automation	15
Beef production	3
Beef/sheep slaughter/boning engineering	1
Biochemistry	1
Bioenergy	1
Environment sustainability	1
Environmental sustainability	1
Food safety	12
Food safety - slaughter, boning and smallgoods	1
Hygienic animal processing	1
Livestock handling	1
Livestock management	23

Livestock management - animal health	6
Meat quality	1
Meat quality, Biochemistry, Product development, Sensory, Teaching	1
Microbiology	2
Objective technologies to support meat quality grading	1
Processing efficiency	2
Processing efficiency, marketing, quality assurance	1
Production of new bio actives	4
Risk assessment and modelling	1
Risk communication	1
Shelf-life assessment	1
Technical	1
Veterinary	1
Veterinary & risk assessment	1
Waste	6
Waste water treatment	3
Wet meat packing	3
Not specified	12

5. Students

This section aimed to gain an understanding of the focus, discipline, funding source and project description ofphD students in the red meat processing sector.

Over half of the students currently employed by providers in the red meat industry (see Table 9) have qualifications in the animal science discipline. This relates directly to the focus area of students outlined in Table 10, where just over half nominated livestock management (traceability, animal health, animal nutrition, biosecurity and procurement). This indicates that animal science may be a preamble to other disciplines, whereby students often aim to complete this element as a core component of their studies before concentrating on a more technical focus area of red meat processing. Additionally, a large proportion of students in the animal science discipline may enter the job market at the feedlot or value adding level of the supply chain as indicated in Table 11.

Table 9 Students by discipline

Main Discipline	%
Animal science	51%
Biochemistry	20%
Environmental science	9%
Food technology	8%
Meat science	12%

Table 10 Students by focus area

Main focus	Students (%)
Livestock management – traceability, animal health, animal nutrition, biosecurity, procurement	52%
Packaging - packaging materials - cartons, MAP forming	3%
Process optimisation – using research to reduce waste and increase yield & value	12%
Product and brand development	6%
Quality Assurance – product specifications, microbiology, meat eating quality	15%
Regulatory management – food safety, OHS, environmental	2%
Resource use – water and energy	3%
Value Adding – systems, technology, processes	7%

Table 11 Students by species and supply chain segment

Species	Supply chain segment	Students (%)
Beef	Feedlots	39%
	Processing plant	9%
	Product development	7%
	Value adding	24%
Beef total		**79%**
Sheepmeat	Processing plant	12%
	Value adding	9%
Sheepmeat total		**21%**

6. Infrastructure

This section focuses on the availability of infrastructure to undertake red meat processing RD&E projects. The types of facilities used for RD&E activities are identified, along with the location and ownership of facilities, which are summarised in Table 12. A more detailed description of the facilities nominated by providers including the location and ownership status, along with the detailed facility nominated are outlined in Table 13.

Table 12 Summary of facilities used by providers

Facilities used by providers	Total
Advanced automated technologies	8
Intensive - feedlots	2
Laboratory	34
Large animal or meat processing facilities	6
Monitoring devices	6
Office facilities	10
Packaging and value adding facilities	4
Product development kitchen	2
Sensory facilities	2
Surgery	2
Workshop	6
Total facilities	**82**

Table 13 Location and ownership of facilities used by providers

Facilities used by providers	Location	Owned by the organisation?		
		No	Yes	Total
Advanced automated technologies	Brisbane		2	2
	Dunedin		2	2
	Stapylton, QLD	2		2
	Sydney		2	2
Intensive - feedlots	Gatton		2	2
Laboratory	Adelaide		5	5
	Armidale		3	3
	Brisbane	1	2	3
	Cowra		1	1

	Dunedin		2	2
	Gatton		2	2
	Herston, QLD	2		2
	Macquarie university	2		2
	Murdoch University	2		2
	Sydney	1		1
	Tennyson, QLD		2	2
	Toowoomba		2	2
	University of NSW	2		2
	University of Queensland	2		2
	Werribee	1	1	2
Large animal Plant Contaminant (PC)1 & PC2 facilities	Gatton		2	2
Large animal PC3 facilities	Gatton		2	2
Meat processing facilities	Dunedin		2	2
Monitoring devices	Adelaide		2	2
	Brisbane		2	2
	Toowoomba		2	2
Office	Sydney	1		1
Office facilities	Adelaide		4	4
	Brisbane		2	2
	Launceston		1	1
	Regional NSW		2	2
Packaging	Adelaide		2	2
Product development kitchen	Melbourne		2	2
Sensory facilities	Adelaide		2	2
Surgery	Toowoomba		2	2
The Flinders proteomics facility	Adelaide		1	1
Value adding facilities	Adelaide		2	2
Workshop	Brisbane		2	2
	Melbourne		2	2
	Sydney		2	2
Total		**16**	**66**	**82**

7. Collaboration

Table 14 summaries the main business area, supply chain segment and species for which RD&E collaboration has occurred over the past five years, along with identifying the collaborating organisation.

Table 14 Provider collaboration in the red meat processing industry

Species	Main business area	Supply chain segment	Collaborator
Beef	Business improvement	Value adding	Lycopodium
			Food Safety Services SA Pty Ltd
			The University of Adelaide
	Environmental sustainability	Processing plant	Kilcoy Pastoral
			MLA
			Nolan's Meats
			Primo
			Teys Bros
	Laboratory Services	Value adding	SYMBIO
	Livestock management	Feedlots	Agriscience Qld (DEEDI)
			CSIRO
			CSIRO, NSW & Qld
			The University of New England
	Marketing	Value adding	MLA
	Packaging	Value adding	MLA Sydney (research packaging needs in abattoirs)
	Process Control	Value adding	Primo Smallgoods
	Processing efficiency	Feedlots	MLA
		Processing plant	Churchill Abattoir
			CSIRO
			CSIRO Food and Nutritional Sciences
			Machinery Automation & Robotics
		Value adding	MLA
	Quality Assurance	Feedlots	Murdoch University, WA: Vic DPI; SARDI
		Processing plant	CSIRO
			John Dee, Qld; Northern Cooperative Meat Co., NSW
			Ag Research, New Zealand

			University of New England, NSW
			University of Tasmania
			Victorian Bioinformatics Alliance
		Value adding	Otago University, New Zealand
			SARDI
			University of Tasmania
	Regulatory management	Processing plant	AMPC
			DAFF Biosecurity Food (AQIS)
			National Institute of Health, Argentina
			University of Queensland
			Washington State University, USA
Sheepmeat	Business improvement	Value adding	Tatiara
	Environmental sustainability	Processing plant	Alindare
			AMPC
			CSIRO
			Fletchers
		Value adding	NZ MAF
	Livestock management	Feedlots	Livestock producers
	Process Control	Value adding	Primo Smallgoods
	Processing efficiency	Processing plant	Alliance group
			AMPC
			CRF
			SARDI
	Quality Assurance	Processing plant	DAFWA
			Murdoch University, WA
			TAFE SA
			University of Catania, Italy; University of Bayreuth, Germany
			University of Tasmania
			VicDPI
		Value adding	Ag Research, New Zealand
			CSIRO
			SYMBIO
	Regulatory management	Processing plant	Tasman
Goat	Processing efficiency	Processing plant	Norvic

8. Key themes of qualitative findings

8.1 Future priorities

Future priorities which emerged from the qualitative open ended questions are summarised into the following key themes:

- **Meat / food safety**
  - Increasing the safety of co-products as animal feed and human food
  - Improving the safety of meat through evaluation of hygiene and intervention strategies as well as providing a National Association of Testing Authorities (NATA) accredited meat testing service focusing on high end market access confirmation testing (pSTEC)
  - Generation of data to substantiate food safety
  - Improving product safety
  - Improving food safety issues associated with meat (food borne pathogens and market access; evolution and emergence of pathogens; through chain risk management; shelf-life management)
- **Automation**
  - More focus on beef, sheep, goat processing automation, slaughter, boning, chilling, packaging and load-out, new technologies
  - Sensing of the product features for automation in the unstructured environment will still be a challenge in the next 5 to 10 years. As the sensing technologies and robotics become more accessible and cost effective to use, then automation will become more widely implemented and accepted. The main areas for focus would around the processing automation with an aim for adoption of current equipment
  - Improving automation of sensors to provide automatic recording of the output and reduction of greenhouse emissions from plant sites
- **Reduce carbon footprint (greenhouse gas emissions) of abattoirs**
  - Improving efficiency and reduced energy consumption (including bioenergy)
- **Wastewater treatment**
  - Research and development of wet meat handling and packaging technologies
  - Product safety and use of emerging technologies to improve meat quality
  - Waste utilisation/conversion
  - Adding value through product development and branding
  - Efficient water use, innovative waste minimisation and animal welfare

8.2 Limiting factors

Limiting factors which emerged from the qualitative open ended questions are summarised into the following key themes. The responses included on this page are taken from participants responses:

Individual business level

- Labour constraints
  - Lack of staff is the main limiting factor hindering RD&E at the Meat Science department of a regional NSW university, limiting the potential to take on more challenging projects
  - Lack of support to foster growth in smaller organisations affects overall labour expertise
  - Need further opportunity/funding to align post graduate research with the red meat processing industry
  -
- Funding
  - A major limiting factor, along with the use of 'preferred scientific providers', which limit the use of wider scientific expertise
  - The 'availability' of funding
  - Lack of industry support (from funding organisations) to foster the development of smaller companies

Industry level

- Funding
  - Reluctance to invest in short term projects which have beneficial economic rewards
- Disconnect between RD&E providers and commercial processors
  - Lack of alignment of priorities between the two segments
  - Industry bodies need to broker a stronger linkage between the two segments
- Limited commercial operating environment
  - Low number of large plants, volatile operating environment and limited resources in processing plants
- Limited technical expertise at plant level
  - A variety of expertise exists at each plant, largely dependent on the size of the enterprise

8.3 Strategies to alleviate limiting factors

Strategies which emerged from the qualitative open ended questions include the following recommendations:

- Vigorous evaluation of commercial benefit and scientific output before project commencement
- RD&E to be conducted in partnership with processing enterprises
- More active engagement required between technology suppliers and researchers
- Workshops, forums and idea generations
- Focus on up-skilling QA managers at the plant level
- Improve linkages between industry bodies and researchers
- Provide a strategic focus for research
- Risk management of future red meat RD&E projects
- Heavier focus on adoption of research
- Strategic consolidation of capability and resources

Appendix A

Detailed responses

Detailed responses from sections 6, 7 and 9 of the provider survey

Qualitative responses

Section 6

Future priorities

t	The research and development of wet meat handling and packaging technologies.
t	(Respondent) foresees a short term future only. As this business is built around one 1 scientist/consultant who retires in approx. 2 years so no future is planned beyond 2014.
t	Product safety and use of emerging technologies to improve meat quality. Waste utilisation/conversion. Adding value through product development and branding.
t	Efficient water use, innovative waste minimisation and animal welfare.
t	Beef, sheep, goat processing automation, slaughter, boning, chilling, packaging and load-out, new technologies.
t	Reduce carbon footprint of abattoirs.
t	Improving the safety of meat through evaluation of hygiene and intervention strategies as well as providing a NATA accredited meat testing service focusing on high end market access confirmation testing (pSTEC). Application of cold ozone pasteurisation for ground beef chilled shelf life extension. Application of ozone gas for microbial control in processing areas.
t	R&D priority will be safety of co-products as animal feed and human food.
t	Continue to support the MLA in providing sensory and market research capabilities and expertise.
t	Sensing of the product features for automation in the unstructured environment will still be a challenge in the next 5 to 10 years. As the sensing technologies and robotics become more accessible and cost effective to use, then automation will become more widely implemented and accepted. The main areas for focus would around the processing automation with a aim for adoption of current equipment.
t	The main priority areas of research that our business will focus on is waste water treatment, energy (including bioenergy) and greenhouse gas emissions within the context of sustainable business principles.
t	On line technologies to improve meat processing cost efficiencies and meat quality grading.

t	Biofilms: Improved dispersal and disinfection of bacteria. Improved coatings for pipes and surfaces to discourage the formation of biofilms. Improved removal of the products of biofilms where these are problem e.g., clogging filtration membranes. Odour Control: Improved automation of sensors to provide automatic recording of the output and reduction of greenhouse emissions from plant sites to fulfil Carbon Tax obligations. Anaerobic Digestion: Improved composting (DiCom) or methane production (TPAD) depending on local site requirements. Aerobic Digestion: Improved treatment of high strength waters. Enzymatic break-down of Fats, Oils and Greases.
t	Novel wastewater treatment technologies remain our prime focus. However our focus is also to expand to industries beyond red meat processing.
t	Increasing technical market access barriers to trade/generate data to substantiate food safety.
t	Need to validate processing interventions to minimize hazard levels.
t	Extension of shelf-life to underpin efficient export market access.
t	Identification of emerging hazards/diagnostic capability and benchmarking and attribution.
t	As identified in our business strategic summary in section 1. We intend focusing on: - analysis to identify resource constraints (be it as a result of market, - product/process development for added value to improve utilisation and political or economic forces): - reduce waste through improving both raw material and finished product stability.
t	Risk assessment of meat and meat products.
t	livestock handling; meat safety; electronic information systems ; education and training.
t	Developing technologies to add value to waste streams., efficient and sustainable dewatering technologies .
t	Food safety issues associated with meat (Food borne pathogens and market access; Evolution and emergence of pathogens; Through chain risk management; Shelf-life management; Epidemiology and ecology of microbial hazards; Transmission of hazards through meat production; Quantitative data for risk assessments; Hazard characterisation and identification).
t	Developing novel processes of producing bioactives to vaule add to the meat industry.
t	Cowra: As described previously to undertake R&D that leads to improvements in the quality of red meat (all species). Armidale: Production efficiency at pasture (joint program with CSIRO Livestock Industries & UNE).

Section 7

Limiting factors – organisational level

t The main limiting factor that hinders our organisation is lack of staff. The Meat Science department at UNE is currently composed of one scientist and one technical officer. For routine analyses this lack of staff can be covered by training and employing students. However, it severely limits the potential to engage in more challenging research projects, or take on more research projects.
t Funding is a major limiting factor. The use of "preferred science provider" which limit the use of wider expertise of scientists.
t Project opportunities.
t Funding Availability, ROI of Automation, Industry Knowledge, Industry Comfort With Automation, Skill Level.
t Resources both in terms of funding and staffing.
t Lack of focus by the meat industry on co-products. Co-products are seen primarily as a revenue source to provide cash flow and efficiency of production of co-products and expanding the opportunities does not receive long-term commitment. And why should it? The meat industry is in the business of producing and selling meat and co-products are a secondary issue.
t Lack of support from funding organisations and industry to foster the development of small companies to provide R&D knowledge, technology, concepts and development.
t Research interests are largely limited by funding opportunities. There is an opportunity to align (funded) post graduate research with the red meat processing industry (ie students have been funded by APA and USQ scholarships or fully funded overseas post graduate students). Some further engagement with MLA / AMPC is required to better lever these opportunities for both parties.
t Decline in the level of meat industry investment in RD&E. / Lack of attractiveness of the meat industry as a rewarding career path for new graduates / Sporadic RD&E funding opportunities which encourages potential RD&E providers to focus their efforts elsewhere.
t Lack of funding and engagement of demonstration sites to develop, test and prove the technology.
t 1) We are a private company and RD&E can play only a small part of our portfolio of work t 2) Meat industry has poor culture in terms of IP protection which makes profitable investment in environmental IP challenging. t 3) There are far superior business yields to be found in newer industry sectors - CSG, etc.

t SARDI is an applied R&D provider that delivers research outputs contracted to address key industry needs. As such our priorities are set by our close working relationships with industry. By working closely with MLA we don't see any limitations for us.
t Slowness of contracting processes.
t Available industry funds.
t We need another dedicated meat scientist and continued funding. Maintaining staff capabilities in the face of an ageing workforce and financial pressures that results in limited replacements. Maintaining Research Stations to allow conduct of grazing ruminant livestock research.

Limiting factors – industry level

t Focus on commodity and low interest in new bio-technological opportunities/products.
t Funding Availability, ROI of Automation, Industry Knowledge, Industry Comfort with Automation, Skill Level.
t Cost, lack of trained people.
t Inadequate resources to run extension trials that demonstrate applicability to stakeholders.
t The meat industry is very successful in adopting R&D that is beneficial. However, there is reluctance to invest in R&D that does not deliver a short -term payback. The industry is more likely to adopt R&D that it has a direct involvement in creating and which is tailored to suit specific meat companies.
t Lack of Funds - R&D vision represents too big a picture for many to grasp - paybacks are too long to realise - processors will not support long term initiatives- their capital expenditure budgets don't allow them the invest in R&D - lack of trust - not enough technology providers with the knowledge or experience in meat processing
t Large disconnect between RD&E providers and commercial processors resulting in lack of alignment of priorities and expertise between the 2 groups
t Lack of funding and engagement of demonstration sites to develop, test and prove new technologies.
t 1) Low margin sector with extreme volatility in their business environment - tends to select for nimble tacticians rather than long term strategists. t 2) Limited number of large companies with good resources (funds, technical personnel, in-house research equipment). t 3) Most production facilities located in regional areas - travelling to/from site for our personnel, environmental samples is expensive and difficult compared to industries located in capital centres.

t	Technical capability at the QA Manager level, supported by senior processor management to adopt best practice, i.e. Outputs from research undertaken.
t	Strategic focus of research work, risk management, recognition it is part of the food industry.
t	Commitment to training and access to funded training options.
t	The industry is reasonably successful in adopting RD&E relevant to food safety and market access issues.
t	There is a lack of meat science trained people who have the necessary communication skills and experience to aid adoption. Willingness to adopt, and more traditional industry structures and mindset.

Strategies to alleviate limiting factors

t	Nil
t	Attract funding for additional staff
t	Projects outcomes need to be vigorously evaluated for commercial benefits and value to the industry.
t	Projects need to be evaluated for the science level and scientific output.
t	Feedback on progress reports and projects outcomes need to be communicated with science providers.
t	Support projects that can lead to commercial biological products. This can be through facilitating access to international markets and communicate the benefits to stakeholders.
t	Workshops, Open Days, Support Early Stage Developments, CBA to cover bigger picture of automation. Focus on short term goals and long term plans especially where ROI is considered.
t	Persuade more graduates to join the industry and persuade industry that graduate engineers and scientists are useful to the industry.
t	Increasing funding and stakeholder communication opportunities.
t	R&D should be conducted in partnership with meat companies or by meat companies
t	MLA needs to broker stronger alignment between the meat processing industry and RD&E providers so that there is stronger alignment in RD&E priorities and utilisation of expertise between the 2 groups.
t	Actively engage technology suppliers and researchers in presenting their ideas and technology to R&D selection panels and then more actively engage in the follow up process of organising and funding demonstrations at suitable sites.

t * Focus on up-skilling QA Managers in plants - they require the necessary technical knowledge and specialist support to address non-conformances i.e. The detections of pathogenic E.coli that threaten Australian trade access and business risk management.
t Strategic focus of research work: - Reviewing the significant body of work that MLA has achieved over the last 10 years, indicates a very broad range of activities which losely fit in supply chain Themes of 'On farm' 'Processing' and 'Marketing'. Within these areas it is difficult to discern the strategic elements based on the activity. Hence a key limitation would appear to be industry conversion (adoption of findings) when it may more likely be the diluted delivery of those findings. The Strategic focus may better be industry driven (ownership has a way of concentrating focus) - not sure how this could be done. Risk management: The Red Meat Industry may be considered a mature industry; market research organisations frequently identify it as in decline. It is labour intensive and its products are generally low added value but still expensive, as such any change carries considerable risk. The future will depend on RD&E adoption; this may be assisted through the use of expert risk managers being tasked with implementation of key 'Strategic focus' elements. (Note: these risk managers would not be 'innovation managers' - they would be senior 'program managers', experienced and proven). Recognition it is part of the Food Industry: This is a market aspect, adding value to meat is done by many small food companies, which do so profitably. Products like trim or hides which are considered almost as by-products may be better viewed as a starting valuable protein product, and skills from food scientists/product developers/technologists applied either through the food industry or developed in-house to reap the value they have.
t Improved linkages between key organisations and committees
t Industry appears willing to accept outcomes of research but may require more proactive support of ongoing research programs. Given the critical nature of food safety for market access and industry success the percentage investment in proactive food safety research initiatives is surprisingly small.
t Key support for groups that have an international track record for conducting R&D that is scientifically sound, but is also backed with a track record of industry application - this support should co-sponsor positions for new meat scientists with such groups. Strategic consolidation of capability & resources. Whole of supply chain demonstrations of improved profitability resulting from R&D.

Appendix B
Current priorities

Priority area	Importance			Activity being undertaken	
	High	Medium	Low	Yes	No
Quality Assurance	79%	26%	5%	63%	37%
Value Adding	74%	32%	11%	76%	24%
Process optimisation	74%	32%	5%	55%	45%
Resource use – water and energy	74%	32%	0%	45%	55%
Training	68%	16%	21%	40%	60%
Livestock management	63%	32%	11%	63%	37%
Slaughter – systems, technology, processes	53%	47%	5%	30%	70%
Regulatory management – food safety, OHS, environmental	53%	37%	5%	55%	45%
Waste – solid and waste water	47%	47%	5%	39%	61%
Boning – systems, technology, processes	42%	42%	16%	22%	78%
Marketing and sales	32%	26%	26%	13%	88%
Business management	26%	37%	21%	22%	78%
Product and brand development	21%	32%	37%	24%	76%
Packing – systems, process, technology	16%	53%	26%	29%	71%
Packaging - packaging materials - cartons, MAP forming	16%	53%	21%	18%	82%
Human Resources Management	5%	58%	26%	11%	89%

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