



AMPC



AUSTRALIAN MEAT PROCESSOR CORPORATION LTD

PROGRAM **OVERVIEW**

2015 | 2016

THE ROLE OF THE AUSTRALIAN MEAT PROCESSOR CORPORATION

AMPC has 105 members operating in 135 meat processing establishments, representing more than 97 per cent of Australia's red meat processing capacity.

AMPC's primary objective is to maximise the long-term viability and sustainability of the red meat processing industry by providing outcomes that:

- improve efficiency and competitiveness
- enhance the sustainability of the sector
- assist in protecting and securing market access
- enhance capability and innovative capacity, and
- increase overall productivity and performance.

AMPC invests in three key programs – the Core Program, the Joint Program and the Plant Initiated Projects (PIP) Program.

The **Core Program** is the main industry research, development and extension (RD&E) program in the red meat processing sector. It is administered and delivered by AMPC and is supported by an industry-wide consultation process. This program addresses key issues facing the red meat processing chain in terms of productivity, profitability, sustainability and capability. Levies for eligible RD&E activities are matched by government funding.

The **Joint Program** is a collaboratively funded RD&E, marketing and market access program between AMPC and Meat & Livestock Australia (MLA) that uses both processor and producer levies and matching Australian Government funds for eligible activities.

The Joint Program generates supply and value chain results that support food safety and eating quality and increased demand for meat and meat products. In collaboration with the peak industry councils and MLA, AMPC fosters development across the red meat industry supply chain and establishes targets for joint activities.

The **Plant Initiated Projects (PIP) Program** is a mechanism for leveraging additional private investment in industry RD&E programs. It enables processors to identify and undertake RD&E projects that can benefit the whole red meat processing sector. It facilitates the transition to and adaptation of new technologies at operating plants under real world conditions.

Indications from FY 2014–15 show that processing companies continue to support the PIP Program in terms of both size and species, and across a broad range of RD&E activities. This applies in particular to priority investment areas such as capability development and the adoption of emerging processing technologies.



The Australian Meat Processor Corporation (AMPC) is the Rural Research and Development Corporation for the red meat processing industry in Australia. AMPC's mandate is to provide research, development, extension and marketing services that improve the productivity, profitability and sustainability of the sector. Red meat processor levies are strategically invested in programs that deliver a range of benefits for industry and the broader Australian community.

PROCESSING TECHNOLOGIES

PROGRAM 1 OUTPUTS

Technologies that improve process efficiency, reduce the cost of production and facilitate improved value capture.

PROGRAM STREAMS	DESCRIPTION OF THE PROGRAM STREAMS
1.1 Productivity and Quality	Increasing processing efficiency and productivity is essential to ensure Australian red meat processors are competitive in domestic and international markets. It is crucial to the sustainability, viability and growth of a sector that has been characterised as high-volume and low-margin. This program will focus on developing and implementing technologies and solutions that automate manual tasks, increase the use of manual assist technologies, and improve resource efficiency to enhance process value and recovery.
1.2 Sensing and Analysis	The Australian red meat processing industry works with raw material that is highly variable both in shape and composition. Each carcass is different and the ability to automatically measure characteristics 'online' offers an opportunity to increase processing efficiency and productivity. This program will focus on developing and implementing systems that can manage these variations to capture the data and images necessary to adjust cutting lines for automation and inform processing decisions according to carcass type, product specification, and customer and market requirements.
1.3 Materials Handling	Meat processing facilities incur significant labour and other business costs associated with managing increasingly complex materials handling challenges. This stream focuses on developing and implementing cost-effective technologies and solutions to materials handling tasks, including the load out of carcasses, picking and packing boned and sliced product (e.g. primals, subprimals and shelf-ready portions) and cartoned meat.
1.4 Value Added	This stream explores the potential for innovative concepts, products and technologies to add value within the supply chain. It will focus on transforming existing products (e.g. improving the eating characteristics of secondary cuts) and creating new ones (e.g. transforming inedible co-products into raw ingredients for other industries). Projects will deliver cost-effective methods of increasing value in alignment with customer needs.
1.5 Plant Initiated Projects (PIPs)	AMPC supports members to identify and undertake RD&E projects that benefit the whole sector. AMPC facilitates these projects through the PIP Program. Members can identify site or business-level RD&E activities that will improve processing efficiency and technology. Areas of RD&E activity might include the automation of manual tasks; value adding of existing and new products; improvements to materials handling; improvements to processes, practices and systems to increase productivity; and improvements in the global competitiveness of the Australian red meat processing industry.

PROGRAM 1 STREAM PROJECT PORTFOLIO (PROJECT CODE IN BRACKETS)	BUDGET
Program Stream 1.1: Productivity and Quality	\$2,048,766
<p>Intelligent Y-Cutter Optimisation (2013.5038 and 2013.5039) The objectives of these two projects are to improve the reliability and uptake of the Intelligent Y-Cutter technology in Australia. This will be achieved by improving parameter tuning and system performance during normal operation through modification of code parameters, development of better sensors and implementation of a new monitoring and fault diagnostics system.</p> <p>Lamb Aitchboning Manual Assist (2014.1055) This project will develop a manual assist device for lamb hindquarter boning. The device will give the boner freedom to concentrate on the boning technique in the most ergonomic manner reducing the physical effort required and increasing consistency and yield.</p> <p>X-Ray Lamb Frenching (2014.1056) This project will investigate the use of X-ray sensing to develop an automated solution for producing French lamb racks. Previous R&D has investigated options to semi-automate or automate this process without using water as the primary process. The lack of an accurate sensing system to guide an automated solution has held back development of a non-water-based system.</p> <p>Caprine and Ovine ‘Cubing’ Characterisation and Automation Feasibility (2016.1001) This project will investigate technical requirements and specifications for developing a cost-effective technology to cut caprine and ovine carcasses into cubes.</p> <p>Automated Beef Rib Set Deboning (2016.1011) This project will produce a design for a commercial machine to debone chilled beef rib sets. It will be a compact, relatively inexpensive device that will need an operator to load the product, but will remove the bone automatically.</p> <p>Technology Evaluation for Fat Removal from Beef Striploins Leaving a Uniform Thickness (2016.1032) This project will assess requirements for fat trimming and quantifying the variability in beef striploin with respect to fat trimming requirements. It will review the general literature on uniform fat trimming and automation patents. It will evaluate methods for handling, fixing, sensing and trimming fat from beef striploins.</p> <p>Cellular Production (2016.1033) Research will examine the potential benefits and possible disadvantages of automated cellular-based processing systems versus continuous production systems. It will consider the suitability of both traditional industrial robots and newer collaborative robots for automating meat processing tasks.</p> <p>New Concepts For Cattle Slaughtering and Break-Up Into Primal Meat Cuts. Stage 1: Concepts Creation (2016.1034) This project will examine new technologies and approaches to creating new potentially advantageous automated concepts for cattle slaughtering and break-up into primal meat cuts. It will look at technologies being developed and used in other manufacturing and processing sectors to evaluate novel methods for tackling slaughter, dressing and break-up tasks.</p> <p>French Dressed Lamb Rack Preparation Robot Cell. First Stage to Research and Develop a User Requirement Specification and Present a Prototype Build Cost and Timeline (2016.1035) This project will develop user requirement specifications following a successful stage 1 R&D project to create a concept for the automated french dressing of lamb racks. It will create a prototype build cost and timeline for the next developmental stage.</p> <p>Technology and Processing Automation Using the Internet of Things (2016.1036) The objective of this project is to set a foundation for introducing industrial internet solutions to the Australian red meat processing industry by demonstrating how to integrate and monitor existing production steps in the industrial internet.</p>	

<p>Investigation Into the Financial and Technical Feasibility of Using a Low-Temperature, Cascading NH₃-CO₂ Refrigeration System to Reduce the Cost of Production of Liquefied CO₂ for Snow Applications in the Red Meat Industry (2016.1038) This project will investigate the feasibility of using common equipment for both a low-temperature refrigeration plant and off-peak production facility for liquefied CO₂ in a co-located environment.</p> <p>Ultrasonic Knife for Bovine Slaughter-Board Activities (2016.1039) This project will further develop and adapt ultrasonic knives and convert them from ovine processing to bovine applications.</p> <p>Improvements to Robotic Bandsaw Operations (2016.1043) This project will analyse and develop key components in automated cutting by targeting robotic band sawing in the red meat industry. Recognising that full automation in beef processing can be challenging and prohibitively expensive, it will focus on isolating components that can improve intermediate stages of partial automation, while working towards a holistic system that incorporates 3D computer vision, algorithmic cut path generation, online monitoring of tool health and computer visualisations.</p> <p>Bandsaw Risk Mitigation and Bandsaw Replacement (2016.1045) This project is designed to develop a 'suite' of solutions which mitigate the risks caused by band saws, focusing on measuring operator fatigue and alertness and new technologies that may replace traditional bandsaw blades.</p> <p>Innovative Race and Knocking Box Design Concepts to Optimise Animal Welfare and Carcase Quality (2016.1046) This project will focus on combining new technologies with best practice engineering design to develop and evaluate new approaches to moving bovine animals through the race and up to the point of stunning.</p> <p>Wearable Technology for the Meat Processing Industry (2016.1048) This project will investigate the applicability of wearable technology, in conjunction with machine learning, as potentially transformative technologies for the Australian red meat processing industry.</p>	
<p>Program Stream 1.2: Sensing and Analysis</p>	<p>\$674,123</p>
<p>Beef and Lamb OCM with CT In Situ Further Development (2014.1057/ A.TEC.0123) This project will continue to apply learnings from previous laboratory based industry R&D projects into computed tomography (CT) technology to demonstrate how advanced CT images captured in situ and in real time on a meat processing line can enable the next quantum leap in sheep and beef objective carcase measurement (OCM) and automation.</p> <p>X-Ray OCM Bone, Fat and Muscle Trials (2014.1065/ A.TEC.0124) This project will continue to investigate the potential for dual X-ray systems enabling automation through sub surface sensing to become a cost-effective system for providing eating quality, food safety inspection and supply chain information for the Australian red meat sector.</p>	
<p>Program Stream 1.3: Materials Handling</p>	<p>\$694,242</p>
<p>Meat Lumping – Beef Quarters (Phase 1) (2013.5022) This project will develop a motorised transport device to replace manual handling of carcasses.</p> <p>Container Loading Pilot Installation (2014.1011) This project will continue to develop an automated container loading system as a production pilot to be installed in a red meat processing facility.</p>	
<p>Program Stream 1.4: Value Added</p>	<p>\$72,951</p>
<p>Value Adding (2016.1037) This project will focus on improving the profitability of meat processing operations by defining specific business cases and supply chain partnership models for higher value co-products that can be generated from non-red meat parts of the animal.</p>	

<p>Program Stream 1.5: Plant Initiated Projects (PIPs)</p>	<p>\$1,130,288</p>
<p>AMPC supports members to identify and undertake RD&E projects that benefit the whole sector. AMPC facilitates these projects through the PIP program. Members can identify site or business-level RD&E activities that will improve processing efficiency and technology.</p> <p>Areas of RD&E activity might include development of manual assist technologies and automation of manual tasks; value adding of existing and new products; improved materials handling; improving process, practices and systems to increase productivity; and improving global competitiveness of the red meat processing industry.</p>	
<p>TOTAL AMPC CONTRIBUTION</p>	<p>\$4,620,370</p>







ENVIRONMENT AND SUSTAINABILITY

PROGRAM 2 OUTPUTS

Products and services that improve industry sustainability with regards to environmental, economic and social outcomes.

PROGRAM STREAMS	DESCRIPTION OF THE PROGRAM STREAMS
2.1 Energy Efficiency	Red meat processing facilities consume a lot of energy – especially for refrigeration, steam and hot water production. This is expensive, as well as being a source of greenhouse gas emissions. This stream focuses on generating innovative concepts, methodologies and products for reducing the overall energy consumption of red meat processing operations and the intensity of energy consumption (i.e. energy consumed per unit of output). It will look at using available on-site renewable energy sources instead of relying on external energy derived from fossil fuels such as coal, gas, liquefied petroleum gas, oil or diesel.
2.2 Waste Management	Red meat processing can produce liquid and solid wastes that are costly to treat and remove. However, waste treatment technologies are available that can reduce costs and even generate income by converting waste into solid and liquid biofuels, nutrients such as nitrogen, phosphorus and potassium, compost, bioactives for manufacturing pharmaceuticals and nutraceuticals, biodegradable plastics, and edible and non-edible products. This stream will focus on developing innovative products and processes to reduce, reuse, recycle and dispose of waste in ways that limit the impact on the environment, cut waste management costs and generate extra revenue streams through product recovery.
2.3 Water Conservation	Red meat processing requires water to ensure high levels of food safety and hygiene are maintained. The primary sources of water are town supplies and bores, as well as rivers and dams. Decreasing availability and the increasing cost of water are forcing plants to reduce consumption, recycle where it is safe to do so, and consider new sources where available. This stream will focus on developing new products and processes around water harvesting, reuse and recycling systems that can deliver a reliable, safe and affordable supply whilst maintaining food safety standards.
2.4 Sustainability	This stream will research new concepts, methodologies and processes directed to projects that can contribute to the further validation of the sustainable supply chains that already exist in Australia. This includes, but is not limited to food safety, integrity systems, animal health & welfare systems and biosecurity.
2.5 Plant Initiated Projects (PIPs)	AMPC supports members to identify and undertake RD&E projects that benefit the whole sector. AMPC facilitates these projects through the PIP Program. Members can identify site or business-level RD&E activities that will enable the sustainable development of the business. Areas of RD&E activity might include the management of energy, water or waste; planning for extreme climate events; biosecurity; and animal welfare issues.

PROGRAM 2 STREAM PROJECT PORTFOLIO (PROJECT CODE IN BRACKETS)	BUDGET
Program Stream 2.1: Energy Efficiency	\$197,735
<p>Investigation into Modular Micro-turbine Cogenerators and Organic Rankine Cycle Co-generation Systems for Abattoirs (2016.1002) This project will investigate how to use micro-turbines and Organic Rankine Cycle units to cut energy costs and greenhouse gas emissions from abattoirs. It will produce practical information red meat processors can use when considering such equipment, helping them to undertake detailed appraisals and make decisions.</p> <p>Investigation into Voltage Optimisation Technology for Australian Red Meat Processing Facilities (2016.1005) This project will investigate the benefits or otherwise of voltage optimisation equipment as an energy efficient technology for abattoirs.</p> <p>Investigation into the Potential Applications for Medium-to High-Temperature Solar Thermal Technologies at Australian Abattoirs (2016.1006) This project will investigate replacing a fossil-fuelled boiler with a solar thermal boiler. It will also explore the possibility of supplementing, complementing or replacing existing boiler systems. A thorough techno-economic analysis of the most suitable technology will be recommended as a case study which will also indicate a number of other potential applications.</p> <p>Integrating Solar Photovoltaic (PV) Technology with Battery Storage at Australian Abattoirs (2016.1007) This project will involve a detailed techno-economic analysis of the most up-to-date solar photovoltaic technology with battery storage.</p> <p>Quantifying Energy Savings from In-Line Temperature Boosting of Steriliser Water Ring Mains at Abattoirs (2016.1008) This project will investigate the energy savings that might be achieved by integrating point-of-use heating systems into existing hot water ring mains in abattoirs, especially for sterilisation units. It will consider any additional indirect benefits.</p>	
Program Stream 2.2: Waste Management	\$686,297
<p>Robust Membrane Systems for Enhanced Primary Treatment and Energy Recovery of Abattoir Wastewater (2013.5024) This project will investigate whether membrane technology is a viable alternative to dissolved air flotation (DAF) for treating abattoir wastewater, and the technical and economic viability of using it for heat recovery.</p> <p>Optimising Energy and Nutrient Resources in Food Production, Meat Processing and Essential Services (2014.1073) This project will investigate the risks of and drivers for anaerobic digestion of waste streams from agri-industry and municipal wastewater treatment (referred to as co-digestion). It will include a review of literature and a full-scale demonstration of co-digestion.</p> <p>Rapid Digestion Composting Technology Evaluation Project (2016.1009) This project will review alternative rapid digestion technologies to try to identify their advantages over traditional waste management solutions such as conventional composting. It will find ways of reducing costs for the industry and generating new revenue opportunities through abatement projects and beneficial use of by-products.</p> <p>Solid Waste Management of Paunch and Inorganic Waste (2016.1010) This project will examine solid waste management activities for paunch handling; the characterisation of paunch waste to inform design criteria for dewatering technologies; and inorganic waste reduction, reuse and recycling.</p> <p>Biochar and Hydrochar as Solid Waste Management Systems in the Australian Meat Processing Industry (2016.1012) This project will investigate the potential of the hydrochar process for converting abattoir solid waste into a renewable energy source and fertiliser. It will examine the calorific value of hydrochar, its potential to increase crop yield, and the economic value of the process.</p>	

<p>Self-Cleaning Membranes for Cost-Efficient Tallow Recovery (2016.1022) This project will involve a proof-of-concept bench-scale pilot trial to investigate the benefits of an actively cleaned (self-cleaning) membranes for the red meat processing industry as an alternative to dissolved air floatation (DAF) technology.</p> <p>Purple Phototrophic Bacteria for Resource Recovery from Red Meat Wastewater (2016.1023) This project will develop purple phototrophic bacteria (PPB) that allow near-complete carbon, nitrogen and phosphorus removal in a one-step process. PPB could be used to recover energy; nutrients (e.g. by stripping or crystallisation); high-protein high-nitrogen products for fertiliser; industrial commodity proteins; commodity chemicals; and even potentially animal feed (particularly for chicken or fish).</p> <p>Anaerobic Membrane Bioreactors: In-vessel Technology for High-Rate Recovery of Energy and Nutrient Resources (2016.1024) This project will complete the research program into anaerobic membrane bioreactors (AnMBRs) as a high-rate in-vessel anaerobic technology for treating processing plant wastes, particularly combined wastewater. The final stage of research will focus on strategies to increase the organic loading capacity of the AnMBR and increase the release of nutrients (particularly phosphorus) with subsequent capture and reuse.</p>	
<p>Program Stream 2.3: Water Conservation</p>	<p>\$247,105</p>
<p>Strategic Evaluation of Opportunities and R&D Needs for Water Reuse and Recycling in Red Meat Processing Operations (2016.1021) This project will take a broad, strategic look at the opportunities and constraints for improving water efficiency at abattoirs using diverse water recovery options. It will define an R&D framework to help the industry identify and implement such solutions while effectively managing potential risks.</p>	
<p>Program Stream 2.4: Sustainability</p>	<p>\$260,547</p>
<p>Animal Welfare – Percussive Stunning Review (2016.1040) This project will involve analysing and publishing data to support the use of percussive stunning as an acceptable method under Australian conditions. It will review published scientific data and industry findings to establish what issues have been encountered overseas and assess optimum stunning conditions.</p> <p>Animal Welfare – Development of Key Performance Indicators and Reporting Tools to Facilitate Government Recognition of the Australian Livestock Processing Industry Animal Welfare Certification System (2016.1041) This project aims to establish a single standard, and a verification and reporting process to address regulatory and quasi-regulatory requirements and avoid audit duplication for compliance in the area of animal welfare. It will deliver reporting tools at a plant and industry level to facilitate government recognition of the Australian Livestock Processing Industry Animal Welfare Certification System.</p>	
<p>Program Stream 2.5: Plant Initiated Projects (PIPs)</p>	<p>\$565,144</p>
<p>AMPC supports members to identify and undertake RD&E projects that benefit the whole sector. AMPC facilitates these projects through the PIP Program. Members can identify site or business-level RD&E activities that will enable the sustainable development of the business. Areas of RD&E activity might include the management of energy, water or waste; planning for extreme climate events; biosecurity; and animal welfare issues.</p>	
<p>TOTAL AMPC CONTRIBUTION</p>	<p>\$1,956,828</p>





FOOD SAFETY, INTEGRITY SYSTEMS AND MEAT SCIENCE

PROGRAM 3 OUTPUTS

The delivery of high standards of food safety, product integrity and eating quality. Meat science that enables new insights into effective process interventions.

PROGRAM STREAMS	DESCRIPTION OF THE PROGRAM STREAMS
3.1 Food Safety	Food safety is a critical component of the red meat supply chain and a key driver of Australian exports. This stream focuses on technologies and tools that ensure industry understands, validates and demonstrates food safety in processing, and responds to and manages safety risks and concerns. Projects in this stream will demonstrate technologies for rapid detection of pathogens in red meat and risk-based interventions that ensure food safety.
3.2 Integrity Systems	Australia enjoys an enviable reputation in the international market for producing clean and safe premium quality meat. The integrity of the underlying systems ensures products are safe and wholesome. This stream focuses on systems and technologies that ensure traceability, biosecurity, disease risk mitigation, strong animal health and hygiene, and overall meat quality standards.
3.3 Meat Science	Production of high-quality meat is underpinned by a robust understanding of meat properties and qualities, such as meat tenderness, colour, pH, intramuscular fat, etc. This stream focuses on technologies that help measure, monitor and improve meat qualities. It will also look at technologies and practices that can alter these properties.
3.4 Transformational Meat Science (TMS)	Unanticipated scientific findings often push the boundaries of knowledge further than planned research. This stream includes projects that focus on basic meat properties such as structure and colour at a molecular level, and how advanced technologies can be used to alter these properties. The stream is dedicated to disruptive meat science.
3.5 Plant Initiated Projects (PIP)	AMPC supports members to identify and undertake RD&E projects that benefit the whole sector. AMPC facilitates these projects through the PIP Program. Members can identify site or business-level RD&E activities that are linked to food safety, quality and integrity.

PROGRAM 3 STREAM PROJECT PORTFOLIO (PROJECT CODE IN BRACKETS)	BUDGET
<p>Program Stream 3.1: Food Safety</p> <p>Rapid Detection of Meat Pathogens using MALDI-TOF Mass Spectrometry and Metabolomics (2014.1049) This project will continue to investigate the use of proteomics-based matrix-assisted laser desorption ionisation-time of flight (MALDI TOF) mass spectrometry and metabolomics approaches for rapid, sensitive, reliable and cost-effective detection of listeria, salmonella and <i>E. coli</i> in red meat.</p> <p>Metagenomic Analysis to Explore the Mechanisms of Carcass (2014.1066) This project will continue to investigate the mechanisms responsible for carcass contamination in processing plants, focusing on microbial transmission from hide to carcass, and looking at bioaerosols as carriers of pathogens.</p>	\$235,946
<p>Program Stream 3.2: Integrity Systems</p> <p>Sheep CRC Extension FY15–19 (1000.0006) Projects within this CRC program aim to develop new information and technologies that simultaneously increase the lean meat yield, eating quality and nutritional value of lamb meat, delivering benefits across the supply chain.</p> <p>Electronic System for Alternate Protocol for Managing Illegible or Missing Shipping Marks for the USA (Precursor Project to the Use of Barcodes as the Shipping Mark) (2016.1047) This project will implement a system to aid the collection, processing and reporting of the carton GS1 barcode and related data as an alternative to managing illegible or missing shipping marks for export to the United States.</p>	\$1,759,275
<p>Program Stream 3.3: Meat Science</p> <p>Value of Online Measures – A Processor Perspective (2013.2007) This project will understand beef and sheep processors’ perspectives on the value of various online carcass measures. It will review literature on the success or failure of on line measures and survey processors.</p> <p>Enhancing Retail Colour Stability and Shelf Life of Lamb Meat for Key Markets (2013.3003) This project will continue to compare the retail colour stability and shelf life achieved through different levels of dietary antioxidants in lamb diets under grain-fed and pasture-based systems. It will also examine heat stress and thermoneutral conditions during finishing, transportation and lairage.</p> <p>Development and Validation of a Probe to Measure Meat Quality (PhD) (2013.9501) This project will continue to build on earlier work to evaluate a handheld probe with the potential to measure tenderness and other traits in lamb meat. Undertaken as a PhD project, it will establish the ability of the probe to predict tenderness and other traits, as well as aiding a commercial application.</p> <p>The Influence of Pre-Slaughter Stress on Meat Quality and Carcass Yield of Prime Lambs (2013.9504) This project will continue to investigate the role of stress on meat quality and meat yield in prime lambs. It will develop industry practices to manage the stresses caused by such factors as dehydration, extended curfews and pre-slaughter handling in order to optimise carcass yield, animal welfare and meat quality.</p> <p>Manipulating Processing Conditions to Enhance Lamb Meat Colour Stability (2013.9508) This project will continue to improve colour stability in lamb meat using a supply chain approach. It will focus on the relationship between oxygen consumption, bloom depth and retail colour and identify related processing technologies.</p> <p>Automated Visual Inspection and Preparation of Live Animals for Meat Processing (2014.1041) This project will continue to develop technologies for the automated detection of animal contamination in lairage with the evaluation of a high throughput cleaning station that prepares animals for slaughter. It will review existing technologies and evaluate the possibility of building such a station.</p> <p>Ultrasonic Measurement of Tenderness of Vacuum-Packaged Beef (2014.1045) This project will extend ultrasound technology in measuring the tenderness of vacuum-packed beef and in developing a proof-of-concept online non-invasive measuring tool for processing plants. The prototype will have an electronic assembly for ultrasound acquisition and signature production. It will incorporate a tenderness prediction model closely correlated with standard shear force measurements.</p>	\$1,670,924

<p>Identifying Storage Thresholds in Frozen and Chilled Red Meat (2014.1048) This project will continue to investigate the effects on meat quality of freezing following an extensive chill period. It will examine the use of oxidation to indicate freeze duration and the effects of long-term freezing on lamb and beef quality and safety.</p> <p>Causes and Contributing Factors to Dark Cutting – Current Trends and Future Directions (2014.1060) This project will continue to review the literature in order to identify the factors influencing dark cutting and provide recommendations and directions for specific future research.</p> <p>Infrared Thermography and Radio Frequency Identification for Detection of Stress in Lairage (2014.1063) This project will develop automated systems for detecting stressed animals during lairage, focusing on beef cattle with secondary trials in sheep and goats. The project will produce a proof-of-concept infrared thermography (IRT) that can detect ‘at risk’ animals using the surface temperature of the body and eyes. It will combine IRT with radio frequency identification (RFID) reader panels placed in strategic locations at abattoirs to identify individual animals and groups.</p> <p>Sensing for Offal Grading and Enablement of Automation (2016.1003) This project will develop an automated sensing system for offal grading. It will be based on a grading tunnel using X-ray, a hyperspectral camera and a UV sensor to inspect for cysts, lesions, pus, faecal and urine contamination, and the presence of foreign material. Sensors produce images that may be saved for auditing and claims management.</p> <p>Optimising Eating Quality of Beef Steak By Using Tri-Gas MAP (2016.1042) This project will evaluate how the tri-gas solution (oxygen 30%, carbon dioxide 30% and nitrogen 40%) affects shelf-life and organoleptic qualities of Australian beef exported to Europe.</p> <p>Relationship between Fear of Humans, Temperament and Handling Pre-Slaughter on Lamb Welfare and Meat Quality (3000.5091) This project will investigate the relationship between stress and the meat quality of lambs. It will focus on key animal characteristics such as genetics, temperament, fear of humans and pre-slaughter handling.</p>	
<p>Program 3.4: Transformational Meat Science (TMS)</p>	<p>\$927,976</p>
<p>Improving Beef Colour at Grading (2013.3005) This project will continue to investigate the role of muscle structure in determining beef meat colour, which at grading is a key attribute to influencing carcass value. It will develop strategies to manipulate muscle structure in order to improve colour.</p> <p>Muscle Structure and Water Retention in Fresh and Cooked Meat Products (2013.5009) This project will continue to focus on the basic mechanisms responsible for fluid loss in meat during pre-rigour processing and storage and cooking. It will look at the structural changes that occur and conduct experiments to determine the structural basis of water loss during cooking.</p> <p>Optimising Meat Quality and Functionality through Novel Processing Interventions (2013.5040) This project will continue to investigate processing technologies to develop new value-added red meat products. It will focus on rapid tenderisation of non-primal cuts, including tough muscles, increasing the overall value of carcasses. It will explore new technologies to ‘tenderise’ low-value meat and accelerate tenderisation in high-value cuts from ‘tough’ animals.</p> <p>The Effect of Processing Technologies on Microbial Populations Impacting the Shelf Life of Meat (2013.5041) This project will continue to use a molecular approach to investigate the impact of processing technologies, such as ultrasound and pulsed electric field, on microbial inactivation and survival, and the effect on shelf life of meat. It is essential to understand the impact of processing technologies on bacteria to improve the effectiveness of these techniques in reducing spoilage and the incidence of pathogenic bacteria.</p>	
<p>Program 3.5: Plant Initiated Projects (PIPs)</p>	<p>\$282,572</p>
<p>AMPC supports members to identify and undertake RD&E projects that benefit the whole sector. AMPC facilitates these projects through the PIP Program. Members can identify site or business-level RD&E activities that are linked to food safety, quality and integrity.</p>	
<p>AMPC CONTRIBUTION</p>	<p>\$4,876,693</p>





CAPABILITY, EXTENSION AND EDUCATION

PROGRAM 4 OUTPUTS

The establishment of the core capabilities required by the sector and the translation and communication of R&D outputs to stakeholders. Includes key training initiatives at both the research and vocational level.

PROGRAM STREAMS	DESCRIPTION OF THE PROGRAM STREAMS
4.1 Industry Capability	This stream focuses on developing innovation capabilities within the red meat processing sector and among its personnel. Key to this is identifying the training, education and capability gaps that exist. AMPC continues to support the Meat Processing Professional Development Program, which provides accredited courses and general-purpose workshops to extend R&D to industry personnel. AMPC has identified the importance of tailoring training resources to meet the needs of small to medium enterprises (SMEs), and will invest in this area to aid capability building. The company will invest in new on line extension programs that complement face to face engagement.
4.2 Extension Services	AMPC continues to support extension and adoption strategies to ensure R&D outputs deliver value to industry. This includes industry networks that are critical for disseminating results. In 2015–16, AMPC will manage the following engagement networks: <ul style="list-style-type: none"> ■ Meat Inspection and Quality Assurance Network ■ Meat Industry Training Network ■ Meat Industry Environment Network ■ Meat Industry Engineering Network.
4.3 Scientific Education	AMPC continues to recognise the need to foster professionals who will contribute to industry innovation. This stream invests in scholarships and programs that develop and build the skills of undergraduate, post-graduate and post-doctoral students and professionals intent on undertaking research careers in the red meat processing sector. AMPC also recognises the significant results that can be gained from improving coordination and collaboration across government, RDCs, industry and educators. Strengthening these partnerships will help cut duplication and improve efficiencies.
4.4 Vocational Training	The red meat processing industry faces continual changes to operating market access and regulatory requirements, which result in the need for ongoing professional development and training for employees. In addition, it is difficult to attract and retain highly skilled personnel. This stream focuses on providing vocational training and upskilling opportunities for plant staff, and is based on priority pathways to build and retain capability within the sector.
4.5 Plant Initiated Projects (PIPs)	AMPC supports members to identify and undertake RD&E projects that benefit the whole sector. AMPC facilitates these projects through the PIP Program. Members often identify business-specific capability building, training and educational initiatives that they intend to implement on site. This stream helps processors implement those initiatives.

PROGRAM 4 STREAM PROJECT PORTFOLIO (PROJECT CODE IN BRACKETS)	BUDGET
Program Stream 4.1: Industry Capability	\$842,708
<p>Meat Processing Professional Development Program (2016.1016) This project will provide accredited courses and general-purpose workshops to extend the latest R&D to meat industry personnel and industry trainers and give them the skills and knowledge needed to implement changes in practice.</p> <p>Developing Resources for Compliance with Recently Harmonised Work Health and Safety (WHS) Legislation for High Priority Areas in the Red Meat Processing Industry (2016.1025) This project will focus on revising and updating support materials for WHS Certificate II for meat processing personnel. It will develop a WHS guide for maintenance engineers, which will cover the responsibilities of senior managers, supervisors and personnel who need to comply with new WHS legislation as it applies to the industry.</p> <p>Disease and Contamination Image Library (2016.1028) This project seeks to create a world-class digital resource to support the training and assessment of red meat industry personnel. The library will be aimed at meat inspectors and quality assurance staff, but will also be valuable for training trimmers, stock handlers, livestock managers, livestock transporters and regulatory officers.</p> <p>Customisation of Training Materials for SMEs (2016.1029) This project will review previously developed industry resources to determine their applicability to small and medium sized enterprises, which have identified a number of issues with current RD&E outcomes. Often smaller businesses do not operate standard processing chains and their isolation can mean it is difficult to make use of standard RD&E outputs.</p> <p>Development of an Interactive Training Platform (2016.1030) This project will develop AMPC's online and interactive training platform in 2015–16. It will bring together individual and group learning tools, which give members access to self-paced learning across a range of topics within AMPC's remit. The optimal platform will blend traditional face-to-face seminars and webinars with interactive online functionality, including member forums and coursework.</p>	
Program Stream 4.2: Extension Services	\$865,410
<p>Meat Industry Training Network (2016.1013) This project will support a forum which ensures that R&D outcomes and new regulatory and industry requirements are embedded in the meat industry training system and are communicated and assessed consistently. The network also communicates meat industry training requirements and priorities to state and federal training authorities.</p> <p>Meat Processing Engineering Network (2016.1014) This project will support a forum which consists of industry personnel, researchers, regulators and trainers. The network distributes new information for processing plant engineers and provides extension services for AMPC R&D activities. It also gives plant-based engineering personnel, researchers and regulators a forum to explain, explore and discuss issues and innovations.</p> <p>Meat Inspection and Quality Assurance Network (2016.1015) This project will support a forum for practitioners to discuss with peers, researchers and regulatory representatives the practical implications of changing quality assurance requirements and ways to meet these effectively. The network also communicates industry training needs and priorities – generated by changing regulatory, customer and importing country requirements – to industry bodies and state and federal training authorities.</p> <p>Meat Industry Environment Network (2016.1017) This project will support a forum which helps disseminate information on the RD&E activities of AMPC's Environment and Sustainability Program. It promotes engagement among plant environment managers, researchers, regulators and industry consultants to ensure new regulatory requirements are circulated and all parties are meeting their obligations.</p> <p>Management of the Australian Q Fever Register for 2015-16 (2016.1044) This project will continue delivering the register's services and research activities to the red meat processing industry. The register is an important contributor to Q fever risk management in the workplace. A Technical Management Committee will review activities and help design an industry survey to better understand factors that may inhibit some organisations from using the register.</p>	

<p>Service Agreement for the Provision of Professional Extension Services and Consultancy. (2016.1062) This extension project will examine training advice given to meat processing companies or their registered training organisations (RTOs) on the uptake of training and government funding available to aid its use. It will provide career services advice to the red meat processing industry, as well as industry education and training advice to state and Commonwealth government agencies. Priorities and changes to market and customer requirements will be identified.</p>	
<p>Program Stream 4.3: Scientific Education</p>	<p>\$1,056,673</p>
<p>Collaborative Primary Industries Health and Safety Partnership (PIHSP) Program (2013.5045) This project will continue the work of PIHSP, which is committed to developing industry-wide research projects that achieve significant WHS benefits. AMPC and its members recently participated in brainstorming to explore barriers to resolving WHS issues in the industry. This project has identified key initiatives in other primary industries, which can be of benefit in red meat processing.</p> <p>An Integrated Scholarship Program in Process Engineering (2016.1026) This project is part of AMPC’s goal of establishing a prestigious Integrated University based Scholarship Program to educate and train the next generation of industry leaders and technical professionals. The scheme will engage with industry and integrate students and researchers, ranging from undergraduates to masters-level and PhD students with academic staff supervisors. This component of the program will focus on providing scholarship support in process engineering, automation and robotics.</p> <p>Educational Pathways: Creating a Highly Skilled Meat Industry (2016.1027) This project is part of AMPC’s goal of establishing a prestigious Integrated University based Scholarship Program to educate and train the next generation of industry leaders and technical professionals. The scheme will engage with industry and integrate students and researchers, ranging from undergraduates to masters-level and PhD students with academic staff supervisors. This component of the program will focus on providing scholarship support in food technology and nutrition.</p>	
<p>Program Stream 4.4: Vocational Training</p>	<p>\$504,955</p>
<p>Development of Training and Assessment Support Materials for the Revised Meat Safety Qualifications (2016.1018) This project will enable the development of written training and assessment support materials for sixteen new Units of Competency in Certificate III and Certificate IV in Meat Processing (Meat Safety). RTOs will be the most frequent users of these training materials, which are vital for ensuring standardised training and assessment across Australia.</p> <p>Red Meat Processing Upskilling Scholarship Program (2016.1019) This project will form the vocational component of AMPC’s Integrated Scholarship Program. It will allow existing personnel to upgrade their skills to Certificate IV level or higher. This will ensure red meat processing companies and the broader industry address identified skill shortages, build capability in a dynamic and changing environment, and put in place succession planning.</p> <p>Meat Industry Leadership Development Program (2014.1029) This project will continue to implement strategies that aid formal and informal leadership development for senior meat processing personnel. It will focus on senior and developing leaders to help the industry address new challenges. The project will provide a forum for identifying future leadership requirements that support innovation in the industry.</p>	
<p>Program Stream 4.5: Plant Initiated Projects (PIP)</p>	<p>\$847,716</p>
<p>AMPC supports processors to identify and undertake RD&E projects that can benefit the whole sector. It facilitates these projects through the PIP Program. This stream relates to PIP’s focus on building capability and delivering innovative training opportunities for industry.</p>	
<p>AMPC CONTRIBUTION</p>	<p>\$4,117,462</p>





INDUSTRY IMPROVEMENT AND ECONOMIC ANALYSIS

PROGRAM 5 OUTPUTS

High level evaluations of the economic impact of AMPC investments and mechanisms to improve overall industry performance.

PROGRAM STREAMS	DESCRIPTION OF THE PROGRAM STREAMS
5.1 Industry Improvement	This stream provides research and analysis to help improve the overall performance of the Australian meat processing industry against its global competitors. It includes competitiveness analysis and benchmarking studies that identify and quantify economic factors. Studies will include mechanisms to increase productivity and profitability and improve sustainability. At a more granular level, analyses may consider the economic factors associated with regulatory compliance, industry marketing, energy policy and carbon emissions, infrastructure investment, workforce management and innovation policy.
5.2 Economic Analysis, Data and Statistics	This stream generates and improves economic models for the red meat supply chain in order to assess supply and demand constraints and opportunities. A portal will be developed on the new AMPC website that provides timely and accurate processing-related information, data and statistical analysis from Australia and around the world.
5.3 Industry-Wide System Improvements	This stream identifies mechanisms by which the Australian red meat processing sector can become more competitive through industry-wide system improvements, such as common IT platforms or portals to reduce compliance costs. It will focus on areas where industry-wide reputation is critical to export success, such as supply chain issues associated with shipping information, food safety etc.
5.4 Strategic Communications	This stream improves AMPC visibility and develops strategic communications with key stakeholder groups. It covers strategic marketing communications based on a three-year plan to substantially lift AMPC’s profile and recognition levels, and to differentiate it from other meat industry organisations with key influencers. It does not include day-to-day project marketing communications.

PROGRAM 5 STREAM PROJECT PORTFOLIO (PROJECT CODE IN BRACKETS)	BUDGET
Program Stream 5.4: Strategic Communications	\$68,575
Evaluating the socio-economic benefits of the red meat processing industry in regional Australia (2016.1031) This project will provide an estimate of the economic contribution of the red meat processing sector across regional Australia at the national, state and individual region levels. It will also quantify the social impacts of the sector at the macro and micro levels.	
AMPC CONTRIBUTION	\$68,575



JOINT PROGRAM: FOOD SAFETY, INTEGRITY SYSTEMS, MARKET ACCESS AND MARKETING

PROGRAM 6 OUTPUTS

In association with MLA, AMPC invests in through supply chain activities to enhance market access, to improve marketing communications and to further develop food safety and integrity systems.

Note: MLA manages market access and marketing activities in the Joint Program. However, AMPC invests separately in and manages the Technical Market Access Program, which deals with specific non-tariff barrier issues of greatest concern to industry.

PROGRAM STREAMS	DESCRIPTION OF THE PROGRAM STREAMS
6.1 Market Access	Australia's red meat exports face access restrictions in many overseas markets. Global trade liberalisation and improvements in technical market-access conditions are key focus areas in industry efforts to create opportunities for growth, development and diversification. The industry invests in research and consultation, and assists diplomatic activities and advocacy in pursuit of commercial and economic gains from removing or reducing impediments to trade. This stream builds on industry positions and advocacy to tackle trade barriers.
6.2 Marketing	Through this stream, AMPC invests in the development and delivery of market insights, and promotes beef and lamb domestically and internationally. This includes domestic advertising campaigns and the highlighting of Australia's integrity systems in international markets.
6.3 Food Safety	Food safety systems and quality assurance are vital for all sectors of the red meat industry. This stream conducts scientific research to ensure food safety systems are at the leading edge of knowledge and practice. It supports the development of food safety and quality assurance systems.
6.4 Integrity Systems	This stream invests in through supply chain meat and livestock integrity systems such as the National Livestock Identification System (NLIS) and its associated capability development.
6.5 Other	This stream develops information technologies that drive productivity and innovation through the supply chain, such as objective carcase measurement (OCM). It also examines ways to build engagement with the community on integrity practices and value chain capabilities.

PROGRAM 6 STREAM PORTFOLIO	BUDGET
Program Stream 6.1: Market Access	\$3,408,158
<ul style="list-style-type: none"> ■ Progressing industry positions under the India-Australia, Indonesia-Australia, Australia-GCC, Trans Pacific Partnership and Regional Comprehensive Economic Partnership trade negotiations ■ Strategic advocacy in support of timely implementation of the China-Australia free trade agreement (FTA) ■ Advocacy in support of initiating FTA negotiations with the European Union ■ Implementing measures to assist in alleviating access impediments in Indonesia, the Middle East and China ■ The ongoing effort in conjunction with industry and government to tackle prioritised technical trade barriers imposed by a number of Australia’s trading partners. Priorities are determined by IMAAC. 	
Program Stream 6.2: Marketing	\$4,785,000
<ul style="list-style-type: none"> ■ Developing and delivering market and consumer insights that help red meat producers and other stakeholders in the value chain to make informed business management decisions ■ Aggressive promotion of lamb and beef in global markets through domestic advertising campaigns and international investment in the integrity of Australia’s red meat products. 	
Program Stream 6.3: Food Safety	\$778,000
<ul style="list-style-type: none"> ■ Scientific research to ensure food safety systems are at the leading edge of knowledge and practice ■ Support of the development of food safety and quality assurance systems for all sectors of the red meat supply chain. 	
Program Stream 6.4: Integrity Systems	\$1,157,000
<ul style="list-style-type: none"> ■ Developing and implementing appropriate meat and livestock traceability systems including NLIS and promotion of industry capability. 	
Program Stream 6.5: Other	\$169,500
<ul style="list-style-type: none"> ■ Identifying information platforms and technologies that drive productivity and innovation through supply chains. It will focus on developing and proving objective carcass measurement technologies that predict a range of carcass attributes including eating quality and lean meat yield ■ Supporting effective engagement with the community to reinforce that the industry is an ethical and responsible custodian of livestock, land and resources. The community engagement program will support industry to communicate the integrity of practices through the supply chain and the commitment of the industry to improvements based on scientific underpinning ■ Building innovation value chain capability through programs such as the Australian Intercollegiate Meat Judging Association (ICMJ) competition. 	
AMPC CONTRIBUTION	\$10,297,658



SUITE 1, LEVEL 5, 110 WALKER STREET, NORTH SYDNEY NSW 2060
PO BOX 6418, NORTH SYDNEY NSW 2059
T (02) 8908 5500 F (02) 9436 0343 AMPC.COM.AU