Engagement and Impact 2018

Murdoch University

MUR07 (HLS) - Impact

Overview

Title

(Title of the impact study)

Eating Quality in Cattle and Sheep

Unit of Assessment

07 - Agricultural and Veterinary Sciences

Additional FoR codes

(Identify up to two additional two-digit FoRs that relate to the overall content of the impact study.)

06 - Biological Sciences

15 - Commerce, Management, Tourism and Services

Socio-Economic Objective (SEO) Codes

(Choose from the list of two-digit SEO codes that are relevant to the impact study.)

83 - Animal Production and Animal Primary Products

97 - Expanding Knowledge

Australian and New Zealand Standard Industrial Classification (ANZSIC) Codes

(Choose from the list of two-digit ANZSIC codes that are relevant to the impact study.)

01 - Agriculture

11 - Food Product Manufacturing

33 - Basic Material Wholesaling

36 - Grocery, Liquor and Tobacco Product Wholesaling

41 - Food Retailing

Keywords

(List up to 10 keywords related to the impact described in Part A.)

beef quality

lamb quality

sensory

carcase

grading

consumer

meat science

value-based trading

Sensitivities

Commercially sensitive

No

Culturally sensitive

No

Sensitivities description

(Please describe any sensitivities in relation to the impact study that need to be considered, including any particular instructions for ARC staff or assessors, or for the impact study to be made publicly available after EI 2018.)

Aboriginal and Torres Strait Islander research flag

(Is this impact study associated with Aboriginal and Torres Strait Islander content?
NOTE - institutions may identify impact studies where the impact, associated research and/or approach to impact relates to Aboriginal and Torres Strait Islander peoples, nations, communities, language, place, culture and knowledges and/or is undertaken with Aboriginal and Torres Strait Islander peoples, nations, and/or communities.)

No

Science and Research Priorities

(Does this impact study fall within one or more of the Science and Research Priorities?)

Yes

Science and Research Priority	Practical Research Challenge
Food	Knowledge of global and domestic demand, supply chains and the identification of country specific preferences for food Australia can produce.

Impact

Summary of the impact

(Briefly describe the specific impact in simple, clear English. This will enable the general community to understand the impact of the research.)

Meat Standards Australia (MSA) registration is now the gold standard endorsement of meat eating quality for the cattle and sheep industries. Underpinning meat brands and products with recognised registration defining a level of quality provides transparency and standardises product quality data across the value chain, driving retail pricing and generating consumer confidence in those brands.

In 2016–2017 over 2.7 million cattle were graded through the MSA program (over 40% of the national slaughter), and more than 5.7 million sheep (over 25%). 48,000 producers, 54 processors and more than 3,600 end user outlets supply 156 MSA-licensed beef and lamb brands to the market, with the MSA pathway delivering an estimated $130 million in additional farm gate returns to beef producers in 2016–17.

Beneficiaries

(List up to 10 beneficiaries related to the impact study)

Cattle and sheep producers

Cattle and sheep abattoirs and processors

Beef and lamb retailers

Beef and lamb consumers

Countries in which the impact occurred

(Search the list of countries and add as many as relate to the location of the impact)

Australia
United States of America
France
Poland
Ireland
England
Japan
Korea, Republic of (South)
China (excludes SARs and Taiwan)

Details of the impact

(Provide a narrative that clearly outlines the research impact. The narrative should explain the relationship between the associated research and the impact. It should also identify the contribution the research has made beyond academia, including:

MSA grading is a system providing a standard of quality assurance through a product labelling system designed to underpin brands. It assures consumers that a cut of beef or lamb will eat to the quality shown on an MSA label when cooked by the method shown. Underpinning brands with an appropriate level of quality can drive retail pricing and generates consumer confidence in those brands. For MSA to be effective, consumers have to agree on the definitions of quality. To generate confidence in the data one of the largest multinational consumer sensory testing regimes was conducted which involved 94,000 participants scoring more than 660,000 beef samples in eight different countries.

Expanding the sensory testing to lamb raised the participant numbers to 140,000 consumers. In the survey, every consumer was served seven samples, including a high and low quality product. The first sample is common to provide a standardised benchmark, with the following six presented in a randomised order. The consumer was asked to score tenderness, juiciness, liking of flavour and overall liking and then to select an overall quality rating. The consumer data was then analysed against detailed production factors across the value chain (on farm, abattoirs and onto retail) including carcase grading data at the point of slaughter. This data was then combined to predict the final consumer rating of a particular cut (muscle) x cook combination.

The international reach of the testing ensured quality predictions were applicable to external markets, since more than 50 per cent of Australian beef and lamb/sheepmeat is exported. The countries involved recognise the MSA sensory testing regime as the 'gold standard' and have expressed interest in developing similar systems tailored to their individual domestic markets.

Application for MSA registration in Australia is voluntary for producers, processors and retailers. From its introduction in 1998, more than 2.7 million cattle were graded through the MSA program in the 2016–2017 financial year, representing over 40% of the national adult cattle slaughter (up from around 1.5 million cattle, under 20%, in 2011) through 54 licensed beef processors. In 2016–17 more than 5.7 million sheep were MSA processed through 19 abattoirs. This represented 25% of the national lamb slaughter following MSA pathways (up from 1 million sheep, or 5%, in 2011). The proportion of trademarked lambs continues to increase. 71% of all lambs processed through MSA pathways were subsequently trademarked to support MSA lamb brands.

The MSA program now extends to 48,000 producers, 54 MSA processors and more than 3,600 end user outlets (including wholesalers, retailers, supermarkets and foodservice businesses) across Australia. There are 156 MSA-licensed beef and lamb brands underpinning their products with the independent eating quality endorsement of MSA. Eleven brands are now promoting MSA in export markets.

A key aspect of the MSA registration program was the development of data collection and feedback systems from processor to producer and retailer so all components of the value chain have access to transparent data on the quality of their product.

Of particular value was the development of the MSA carcase quality index, where the potential quality of a beef carcase can be expressed as one simple number. The beef index is used by beef processors and producers to measure and benchmark the eating quality potential of their cattle allowing continuous improvement across the value chain. In the lamb industry the index has been initiated in genetic improvement programs with the development of two new eating quality traits (intramuscular fat; shear force) both characterised by the Murdoch team.

The underpinning meat quality research from Murdoch, in combination with MSA registration, has driven an overall increase in beef and lamb eating quality, providing direct benefits to both producers and consumers. The MSA Beef Index continues to increase, up 0.84 points from 2011.

The work has also led to better utilisation of each carcase, allowing the grading of cuts and even individual muscles into the appropriate quality grade, so more meat can be sold at a recognised price point price rather than minced.

The MSA program delivers commercial benefits to all sectors of the supply chain. Based on the average carcase weight of MSA cattle in 2016–17, MSA beef producers potentially received an additional $65 per head for young, non-feedlot cattle. The average price differential for MSA beef compared to non-MSA cuts at independent butchers stores across all major primal cuts was $1.50/kg over the same period. In 2016–17 alone the MSA pathway delivered an estimated $130 million in additional farm gate returns to beef producers. The Centre for International Economics independent report (listed in Part C) estimated the benefits to the Australian industry across the value chain at $679 million between 2010/11 and 2014/15.

The impact of this work is measurable (see Part C) and attributable to Prof. David Pethick and his team at Murdoch University's Animal Production Group. The MSA pathways team was awarded the ARC Eureka prize for

Excellence in Research by a multi-disciplinary team in 2010. Prior recognition of the impact of Pethick's research came in 2005 with a Merial Howard Yelland Beef Industry Award in recognition of his outstanding contribution to the beef industry and internationally through the award of the French meat academy in 2013 (Medaille de L'Academie de la viande) for his contribution to the MSA grading system as an international standard of excellence.

One French brand is already using MSA principles, and Pethick has been awarded an up-coming study tour to help further commercialisation in France. Pethick's European partners have also created the '3G' initiative, where partners using MSA sensory evaluation can share data to help construct MSA grading protocols within their domestic markets.

Associated research

(Briefly describe the research that led to the impact presented for the UoA. The research must meet the definition of research in Section 1.9 of the EI 2018 Submission Guidelines. The description should include details of:
- what was researched
- when the research occurred
- who conducted the research and what is the association with the institution)

The Animal Production team in the School of Veterinary and Life Sciences at Murdoch University has a long history of research into improving meat productivity, lean meat yield and improved eating quality, with its outputs being taken up commercially across Australia.

Deep understanding of meat science in lamb and beef started with pioneering metabolic work focused on glucose, glycogen and fatty acid metabolism in sheep under different physiological scenarios. The work moved on to investigating the importance of pre-slaughter nutrition and genetic influences affecting the "dark cutting syndrome" of beef and lamb. In understanding what genetic, environmental and physiological factors affect meat quality, the team also undertook seminal work on investigating what influences consumer acceptance of lamb and beef meat: a mix of tenderness, juiciness, flavour and overall liking in both Australian and international consumers. A key contribution to consumer acceptance was an understanding of the negative consequences of single trait selection for growth, muscling and leanness.

More recently the team have applied these principals to the understanding of the genetic and nutritional regulation of intramuscular fat development (marbling), a key consumer acceptance trait.

The unique character of this work is the connection between basic science and the prediction of eating quality, consumer satisfaction and willingness to pay for a defined level of quality.

FoR of associated research

(Up to three two-digit FoRs that best describe the associated research)

07 - Agricultural and Veterinary Sciences

References (up to 10 references, 350 characters per reference)

(This section should include a list of up to 10 of the most relevant research outputs associated with the impact)

Pethick DW, Harper GS and Oddy VH (2004) Growth, development and nutritional manipulation of marbling in cattle: a review. Australian Journal Experimental Agriculture 44, 705-715.

Pethick DW, Harper G and Dunshea FD (2005) Fat metabolism and turnover. In Quantitative aspects of ruminant digestion and metabolism. Pp345-372. Eds. J Dijkstra, JM Forbes and J France. CABI Publishing, Wallingford, UK

Pethick DW, Fergusson DM, Gardner GE, Hocquette JF, Thompson JM and Warner R (2005) Muscle metabolism in relation to genotypic and environmental influences on consumer defined quality of red meat. In Indicators of milk and beef quality. Eds JF Hocquette and S Gigli. EAAP publication No.112 pp 95-110. Wageningen Academic Publishers

Pethick DW, Banks RG, Hales J and Ross IR (2006) Australian prime lamb- a vision for 2020. International Journal of Sheep and Wool Science 54(1): 66-73

Polkinghorne R, Watson R, Thompson JM and Pethick DW (2008) Current usage and future development of the Meat Standards Australia (MSA) grading system. Australian Journal of Experimental Agriculture 48, 1459–1464

Hocquette JF, Gondret F, Baeza E, Medale F, Jurie C, Pethick DW (2010) Intramuscular fat content in meat producing animals: development, genetic and nutritional control, and identification of putative markers. Animal 4, 303-319

Legrand I, Hocquette J-F, Polkinghorne RJ, Pethick DW (2013). Prediction of beef eating quality in France using the Meat Standards Australia system. Animal 7, 524-529

Pannier L, Gardner GE, Pearce KL, McDonagh M, Ball AJ, Jacob RH and Pethick DW (2014). Associations of sire estimated breeding values and objective meat quality measurements with sensory scores in Australian lamb. Meat Science 96, 1076-1087

Hocquette J-F, Van Wezemael L, Chriki S, Legrand I, Verbeke W, Farmer L, Scollan ND, Polkinghorne R, Rødbotten R, Allen P and Pethick DW (2014) Modelling of beef sensory quality for a better prediction of palatability. Meat Science 97, 316-322

Bonny SPF, Pethick DW, Legrande I, Wierzbicki J, Allen P, Farmer LJ, Polkinghorne RJ, Hocquette JF and Gardner GE (2016) European conformation and fat scores have no relationship with eating quality. Animal 10(6), 996-1006

Additional impact indicator information

Additional impact indicator information

(Provide information about any indicators not captured above that are relevant to the impact study, for example return on investment, jobs created, improvements in quality of life years (QALYs). Additional indicators should be quantitative in nature and include:
- name of indicator (100 characters)
- data for indicator (200 characters)
- brief description of indicator and how it is calculated (300 characters).)

Name

Impact Assessment of MLA Expenditure

Indicator Data

The Final Report for Impact Assessment of MLA Expenditure 2010-11 to 2014-15 was prepared by The Centre for International Economics and ISJ Investments, and is available on the MLA website.

Indicator Description

Meat & Livestock Australia (MLA) expenditure from 2010-11 to 2014-15 on research & development (R&D) and marketing programs provide industry returns of $6,170 million from expenditure of $997 million with a benefit cost ratio (BCR) of 6.2:1.

Name

MEAT STANDARDS AUSTRALIA ANNUAL OUTCOMES REPORT 2016–17

Indicator Data

The Meat Standards Australia Annual Outcomes Report 2016-17 was published by Meat & Livestock Australia Limited and is available on the MLA website.

Indicator Description

More than 2.7 million cattle and 5.7 million sheep were graded through the Meat Standards Australia (MSA) program in the 2016–17 financial year. In that same 12 month period it is estimated the program delivered an additional $130 million in farm gate returns for beef producers.