

Sustainable intensification of the SE Australia beef and lamb industries - post-farm gate



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The Primary Industries Climate Challenge Centre is a joint venture between the University of Melbourne and the Victorian Department of Environment and Primary Industries



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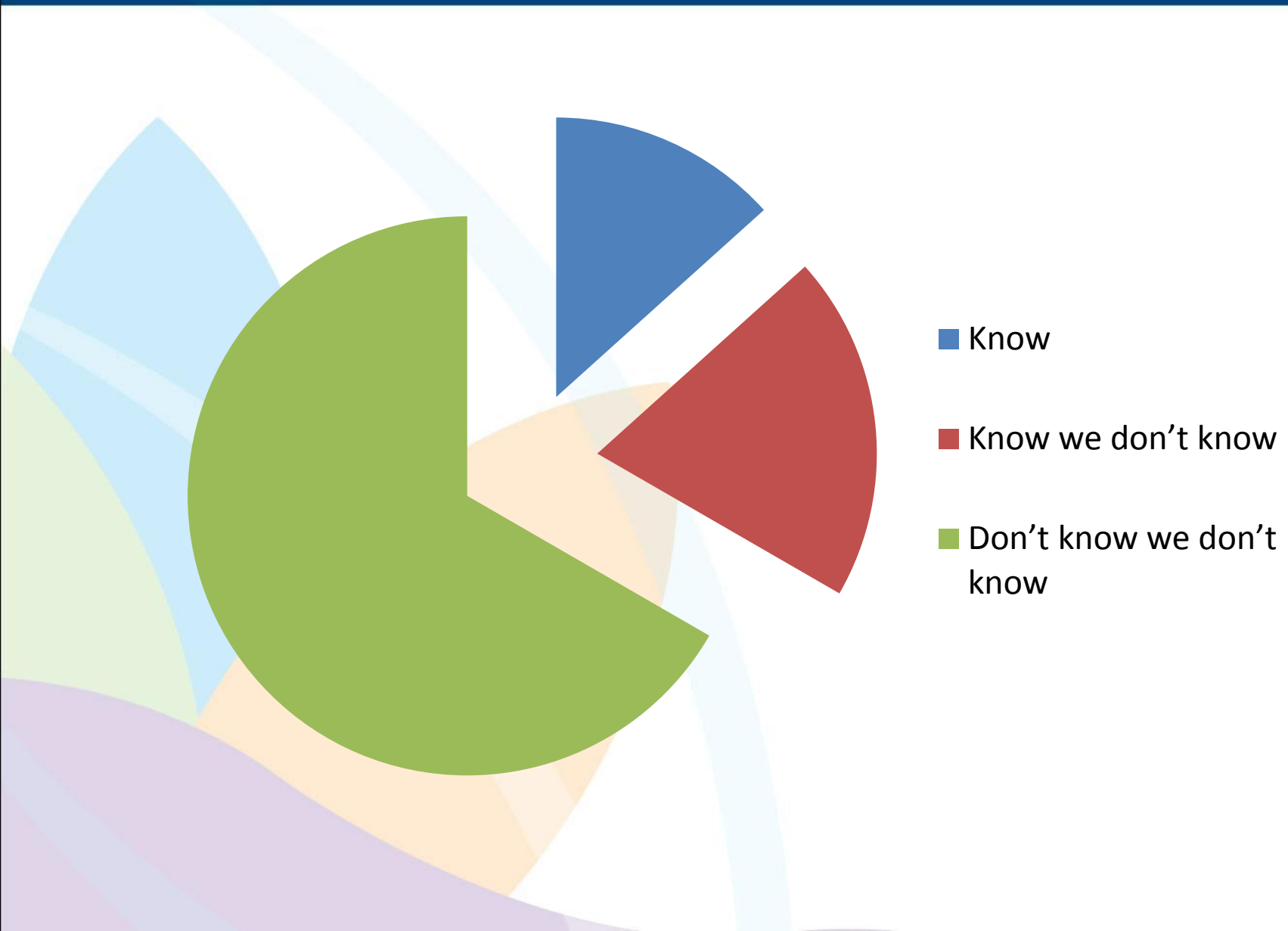


Introduction

It is now 2050 and we have achieved sustainable intensification under a changing climate – how?



What do we know about 2050?





For Sustainable meat industry in 2050;

- People still eating meat.....
- Markets and can get product to markets
- Food Safety, Quality, Welfare and sustainable processing
- Meat plants - minimal use of water and energy, capture and return of nutrients
- Inefficiencies and loss in present supply chain no longer occurring
- To achieve this.....





Step change required

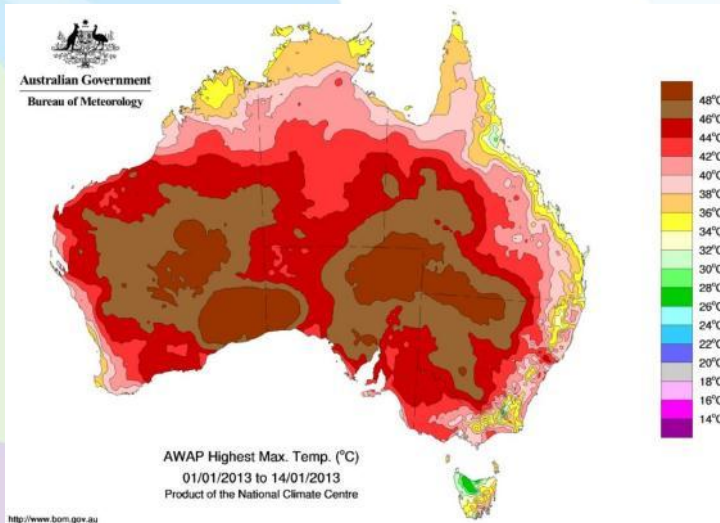
- Some knowledge of yield, quality, bacterial load of total animal products prior to slaughter
 - Sensing, monitoring, adjusting (diversion) in;
 - animal up to slaughter
 - all parts of carcass, co-products, including storage
 - Closed loop large food (meat) factories
- ↑ scale ↓
- Localised sustainable processing
 - Just in time processing





Climate Change and Intensification (CC and I)

Intensification of animal production



Higher temperatures

Less water





Effect of CC and I on animal to carcass

- Likely to influence carriage and transmission of foodborne pathogens
- Increased mortality during transport and lairage
- Reduction in carcass yield
- **Amelioration A**



Effect of CC and I on quality

- Increase in 'Heat-shortening' and pale, weepy meat



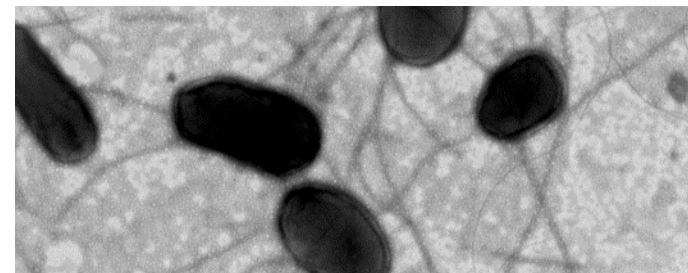
- Increase in browning of meat during storage and display



- These will also influence microbial spoilage and shelf-life

Amelioration A

- Increased toughness of meat
- Increased risk of dark-cutting and more variation in meat pH
- Unknown effects of genetic selection on carriage of foodborne pathogens
- **Amelioration A**

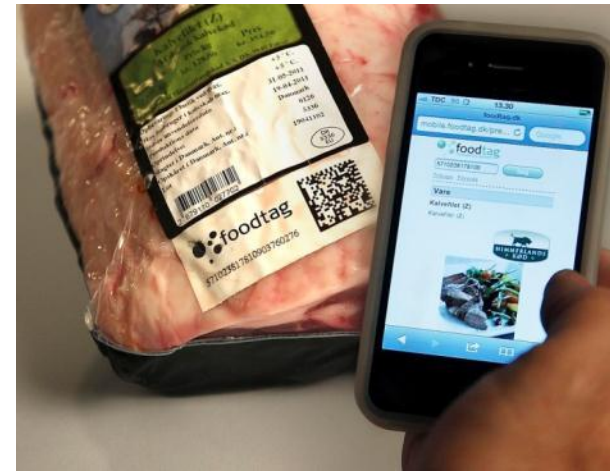
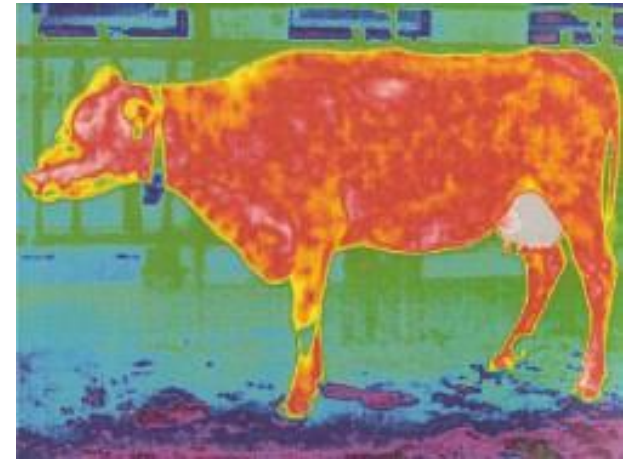




Welfare - 2014

- Drivers of change in both public and private domains.
- Welfare standards and auditing required by industry and processors, as well as retailers and restaurant chains.
- Recognition that animal welfare is an important product quality attribute.

- Continuous fully automatic monitoring of animal welfare and health
 - A few validated key integrated indices of welfare.
- Consumer can access the 'quality of life' history
 - humane AND the animals have lived a 'good life'.

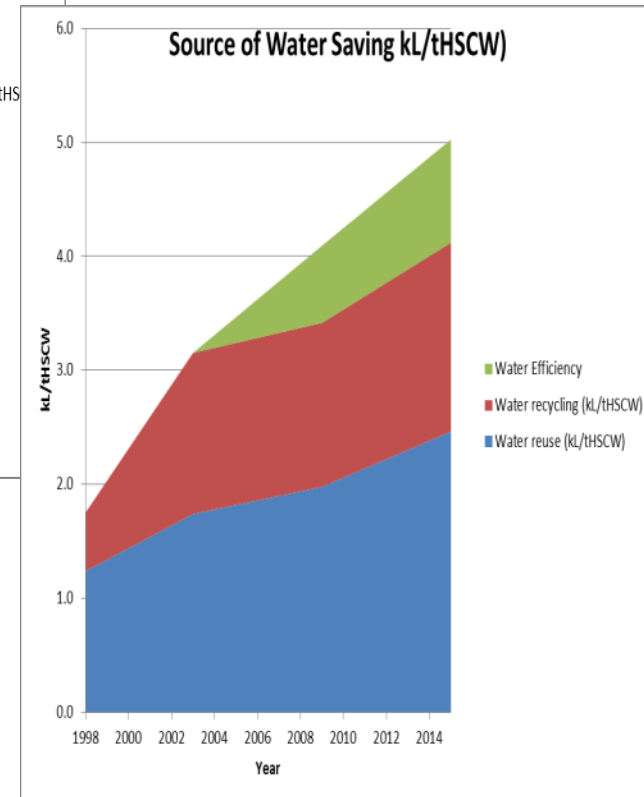
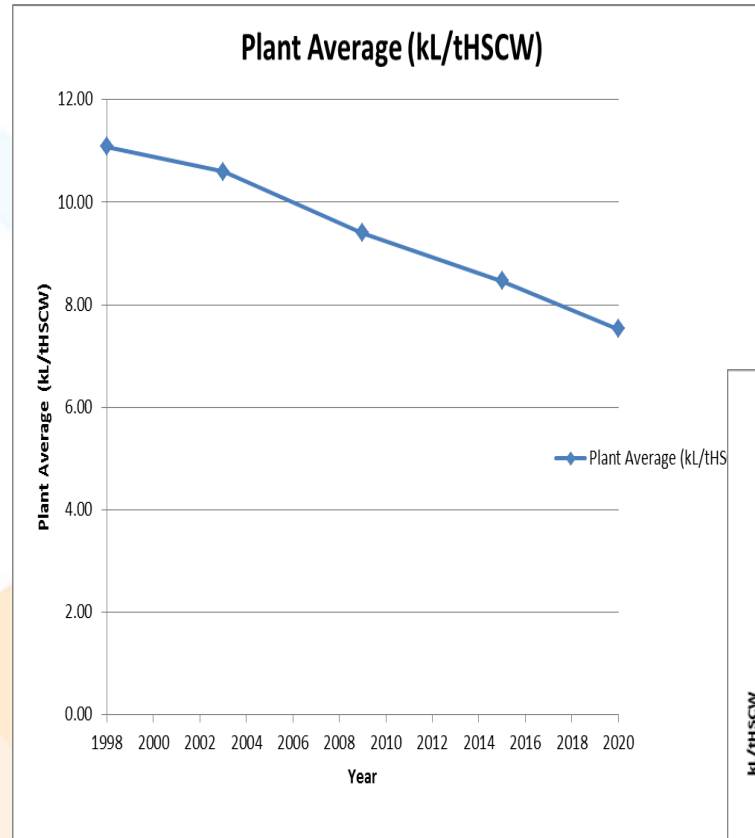




Meat plant environmental - 2014

Focus areas

- Water
- Energy
- Waste
- Emissions

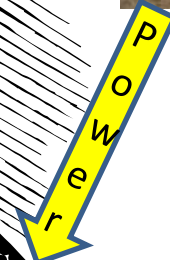
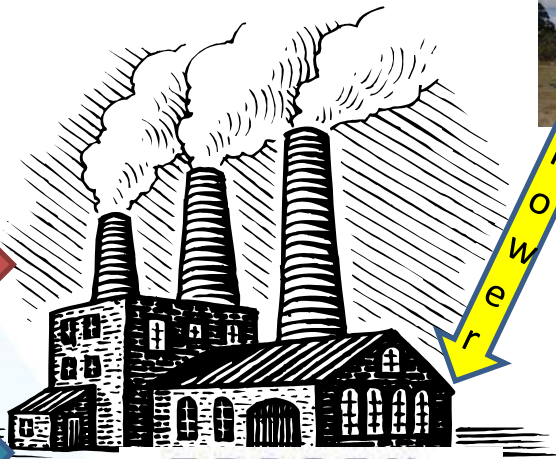


Source: MLA projection

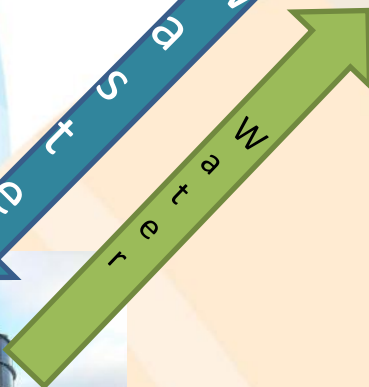


Meat plant environmental - 2050

CLOSED LOOP ABATTOIR



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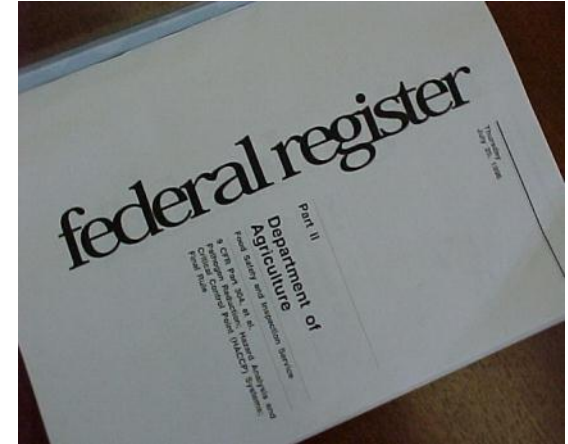


Co-products

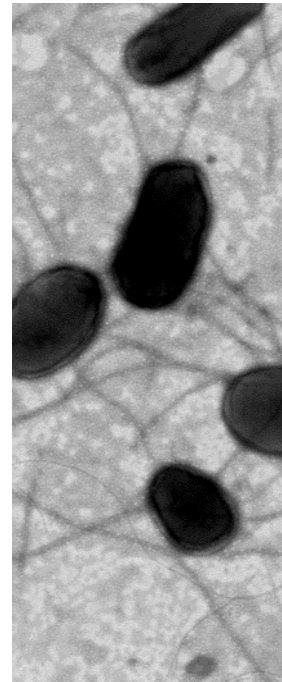
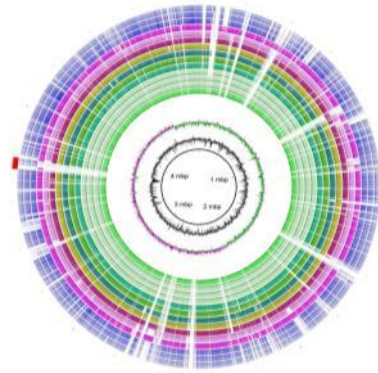
Biogas



- Driven by:
 - Market access and trade
 - Customer requirements
 - Consumer pressures
- Current controls:
 - Limited on farm controls
 - Control during processing
- Detection of food borne pathogens in meat
 - Current methods and technologies
 - Looking for the needle in a haystack
 - Laborious
 - Limited sensitivity and specificity



- Application of computer modelling
 - Predicting contamination (on farm, during processing)
- New food borne pathogens rapidly identified
 - Easily identify emerging pathogens
- Detection systems
 - Quantitative, on farm and during processing
 - Real time on-line detection
- Control
 - On farm and during processing





Quality measurement and carcass specs

2014

- Manual MSA grading of carcasses, 'consignments', vendor declarations, for predicting quality
- Ageing of meat for MSA quality assurance

2050

- Feed specifications for target markets
- Stress measured for diversion – welfare, quality **A**
- Robotic automated sampling and assessment;
 - meat and fat % , tenderness, chemistry and bacteria for quality, food safety, shelf-life **A**
- Processes for tender meat at 24 hrs and despatch to consumer **A**





Muscle to food conversion - 2050

- Large meat factories require;
 - 70 % less labour hours, due to technology and automation
 - Self-sustainable for water due to closed loop processing and changes in internal cleaning rooms and external yards
 - Self-sustainable for energy
- Localised processing using renewable energy
 - Shelf-stable products
 - Enable long distance transport to markets



Large meat factories process and products - 2050

- Shelf-stable products
- Hot-boning **A**
- No large scale chilling **A**
- Meat which is tender at 24 hrs **A**
- Wireless sensor networks connected to animals/carcass/product and remedial actions **A**
- Ancillary processing on-site



Acknowledgements

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www.piccc.org.au

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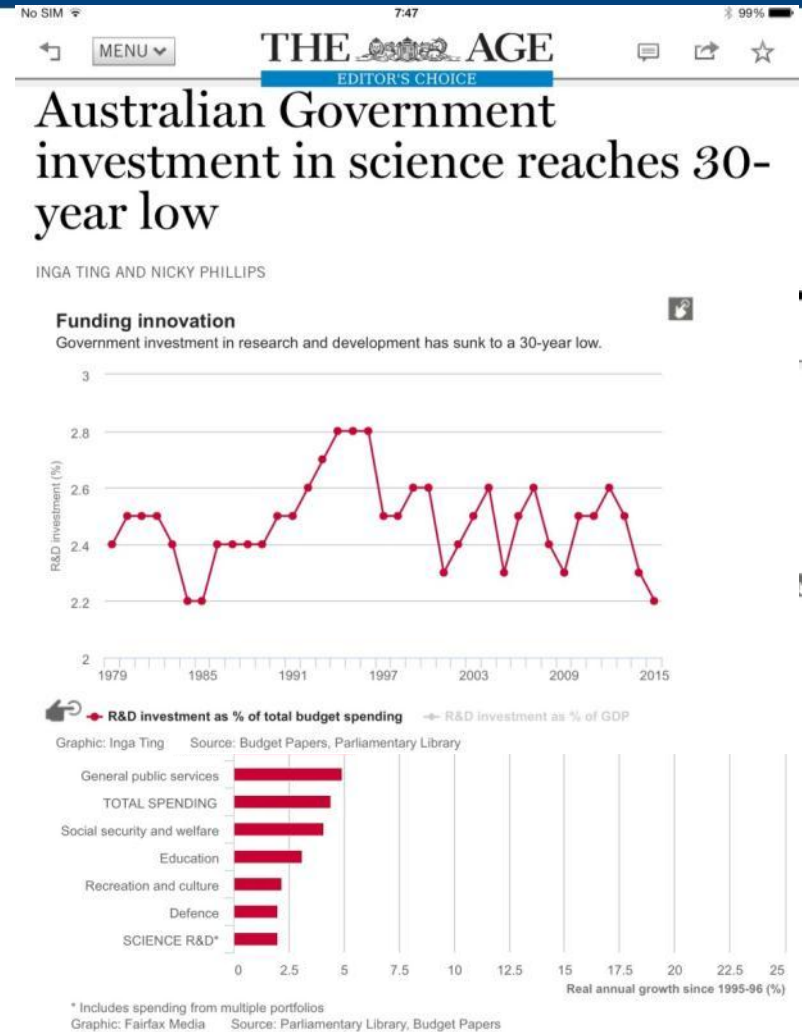


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To achieve this vision for 2050

- Increased \$ on R&D
- Accelerated focus on;
 - Partnerships
 - International collaborations
 - Cross-discipline projects





Introduction

It is now 2050 and we are looking back at the past 35 years and identifying the key innovations, research, policies and practices, adopted by industry, that allowed us to increase productivity in the red meat industry, while not increasing our impact on the environment or degrading the natural resource base

In other words, we have achieved
Sustainable Intensification

