



Value Adding in the Meat Industry

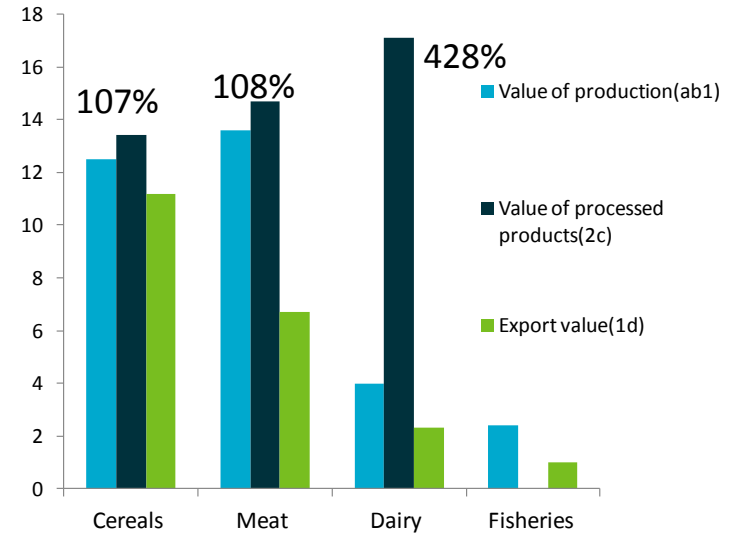
MINTRAC Conference 19-20th October 2016

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Australia's innovation performance



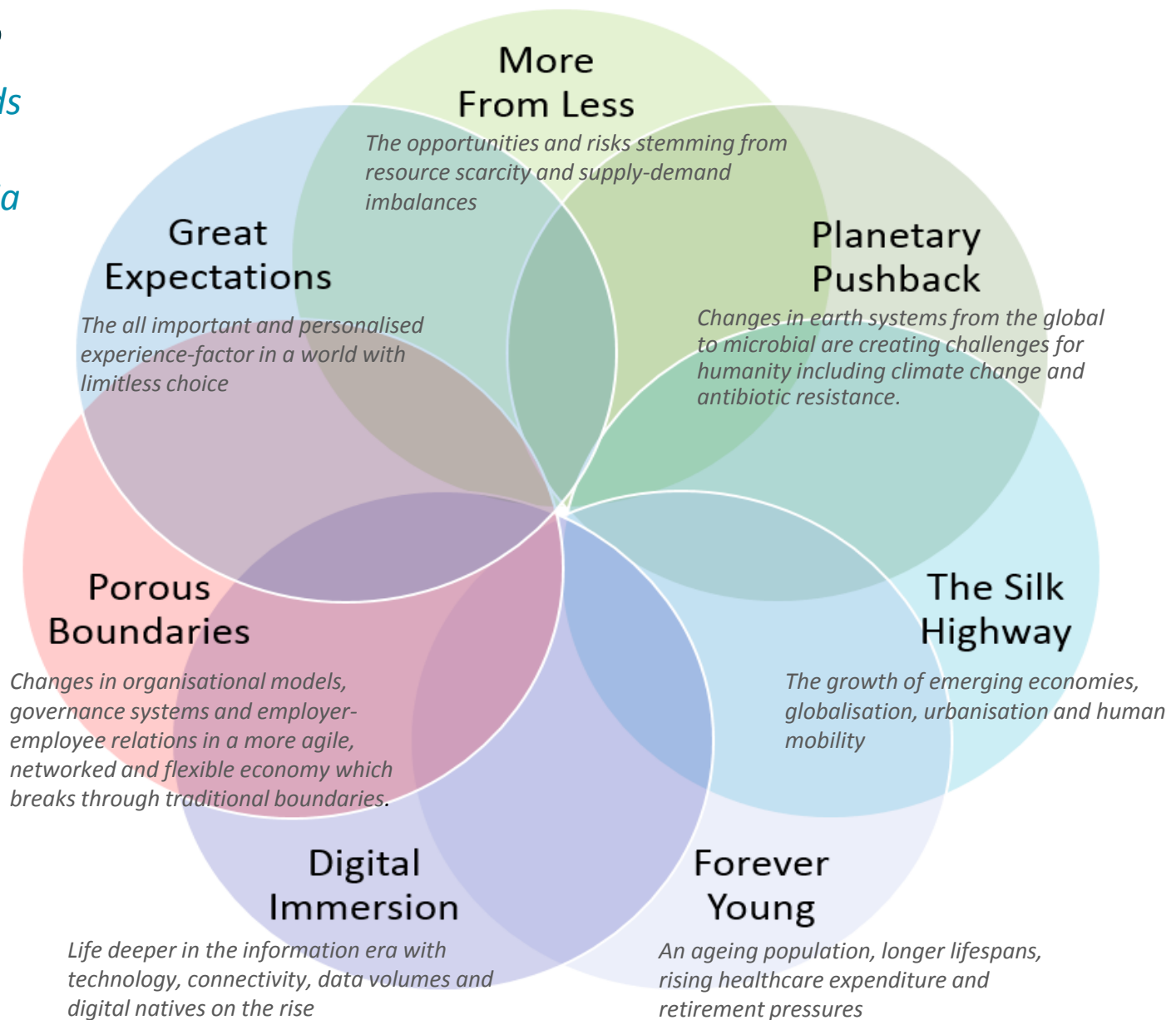
- 10th** Strong in terms of R&D inputs
- 22nd** Middling in terms of outputs
- 81st** Weak global rank for innovation efficiency (ratio of R&D inputs to outputs)



Although meat is the largest agricultural commodity in Australia, there is less value adding compared to other industries (Cereals, Dairy, seafood)

Megatrends

the 7 Global megatrends driving challenge and opportunity for Australia



Source: Australia 2030 – Navigating our uncertain future (2016) CSIRO Futures

What will Australia look like in 2030? Possible scenarios



1. Volatile Asia Pacific

Australia faces volatile markets, natural hazards, disease outbreaks and geopolitical destabilisation associated with food and water insecurity in the Asia Pacific region, and the world beyond.

Megatrends: More from less, The silk highway, Porous boundaries



2. Complacent Australia

Australia is complacent and fails to build upon existing industries and diversify into new ones. We are outperformed, particularly by developing nations, and compromise our wealth and prosperity.

Megatrends: More from less; Planetary pushback



3. Smaller, Faster Digital World

Australia's economy shifts towards a knowledge and services economy driven by technology adoption and connectedness. While stable and wealthy, Australia is heavily dependent on global trade.

Megatrends: Digital immersion; Great expectations, Forever young, porous boundaries



4. Mining & Dining

Australia's mining and agricultural industries represent the lion's share of exports and are the underpinning wealth generators for the economy. Both sectors also have engineering and technology growth.

Megatrends: The silk highway; More from less

Analysis of red meat industry against each scenario

Scenario	Supply	Processing	Markets
Volatile Asia Pacific	<ul style="list-style-type: none"> Red meat supply in short supply due to drought and climate change Rapid decline in beef & sheep production 	<ul style="list-style-type: none"> Value of beef reduced due to low quality of carcass and no assured supply Profit margins very low Cannot operate everyday 	<ul style="list-style-type: none"> Domestic market in sharp decline Exports difficult with more regulatory barriers Consumers turning away from meat
Complacent Australia	<ul style="list-style-type: none"> Supply of red meat slowly declining Very little innovation in breed genetics 	<ul style="list-style-type: none"> Processing still mostly minimal for commodity export More vulnerable to changes in animal stocks 	<ul style="list-style-type: none"> Domestic market slowly declining due to changing eating habits Export still strong but more competition from other countries e.g. Brazil
Smaller, faster, digital world	<ul style="list-style-type: none"> Farmers, incorporate digital solutions into their existing practices Automated farm hands – Robots 	<ul style="list-style-type: none"> More automated and digitised processes in meat industry Highly skilled workforce in computing and high technologies but minimal numbers 	<ul style="list-style-type: none"> Focus on segmentation of consumers based on preference, liking and experience they are after Customise premium value added products
Mining and Dining <div> <p>This table identifies potential risks and opportunities for the red meat industry through testing the industry response within each scenario.</p> </div>	<ul style="list-style-type: none"> Producers are investing as demand increases Producers form strategic alliances with processor National on-farm protocols for animal welfare and husbandry 	<ul style="list-style-type: none"> Strong profitability from high demand and price All components of carcass is sold due to diversity of markets Processor brands developed with clear value propositions New technologies and state of art infrastructure adopted 	<ul style="list-style-type: none"> Australia holds dominant position in global red market Highly transformed red meat products exported to Asian affluent consumers Non-tariff trade barriers abandoned Provenance brands commanding great premiums

Source: Australia 2030 – Navigating our uncertain future (2016) CSIRO Futures

Strategic and Applied research for potential challenges facing the meat industry

Value addition to red meat for premium products

Megatrends – More from less, Great expectations

Importance of beef meat colour

- Consumer acceptability
- Quality of product
- Dark meat- cost to industry:
 - Reduced value: up to \$1000 per carcass
 - 6-7% Meat Standards Australia non-compliance figure (2014-15)
 - National cost is estimated to be up to \$500 million/annum



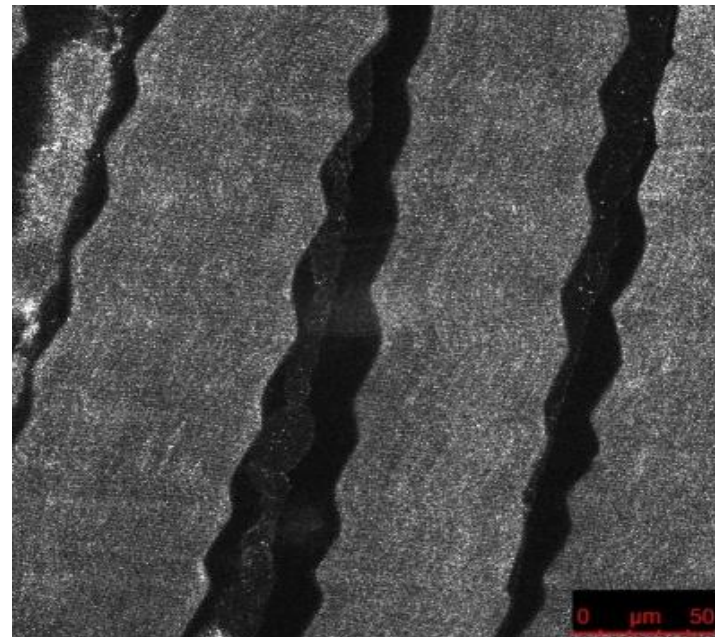
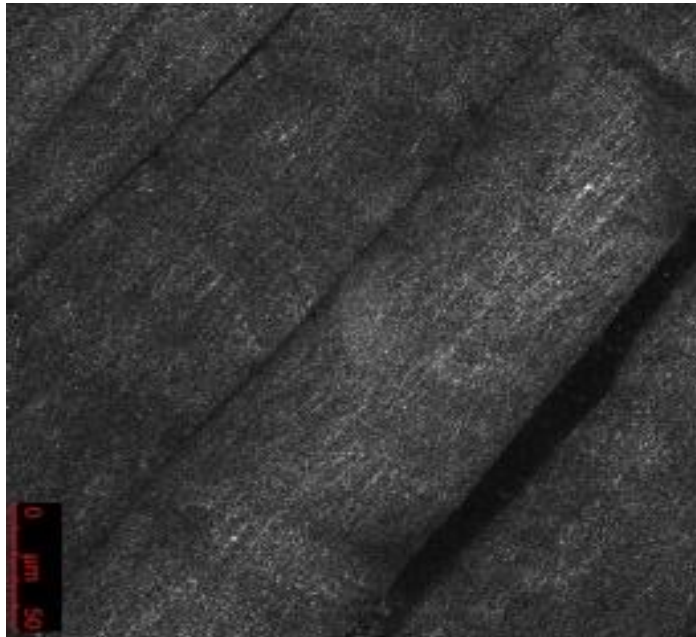
Research – how does meat structure impact on meat colour?

Improving colour with temperature – early post mortem

Before



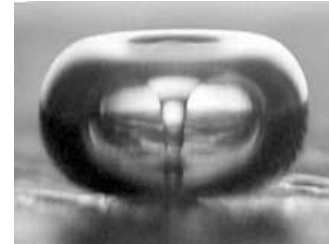
After



“Novel” processing interventions for meat tenderisation

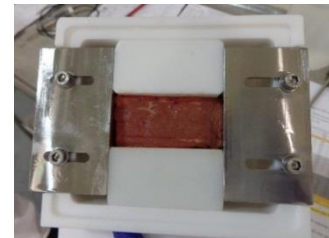
Ultrasound

- ✓ No effect under the conditions assayed
- ✓ Concerns with chemical erosion and scale-up of high intensities treatments



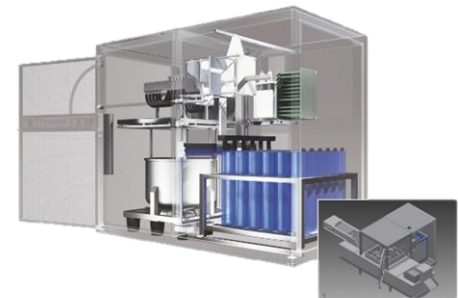
Pulsed electric fields

- ✓ Reduction of Warner Bratzler shear force 5-15% (currently under investigation)

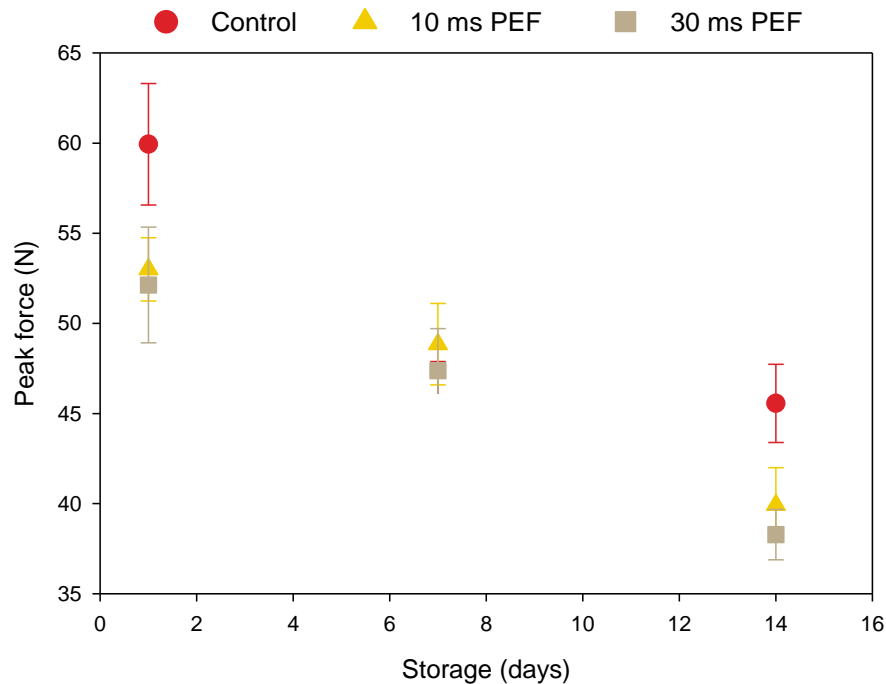


Shockwaves

- ✓ No tested yet, initiate R&D application of shockwave in Australia (from February 2017)



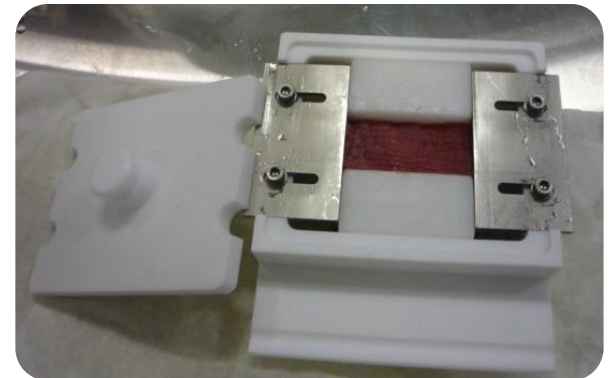
Meat tenderisation by PEF



PEF enhances meat tenderisation (additional 15 % reduction of shear force) after 1 day of storage

PEF treatment (selected conditions) did not significantly affect:

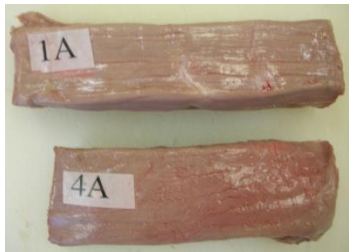
- ✓ pH
- ✓ Colour
- ✓ Drip loss
- ✓ Cook loss
- ✓ Shelf life



Tenderisation of meat using HPP

- 200 MPa / 60°C / 20 min
- varying connective tissue content

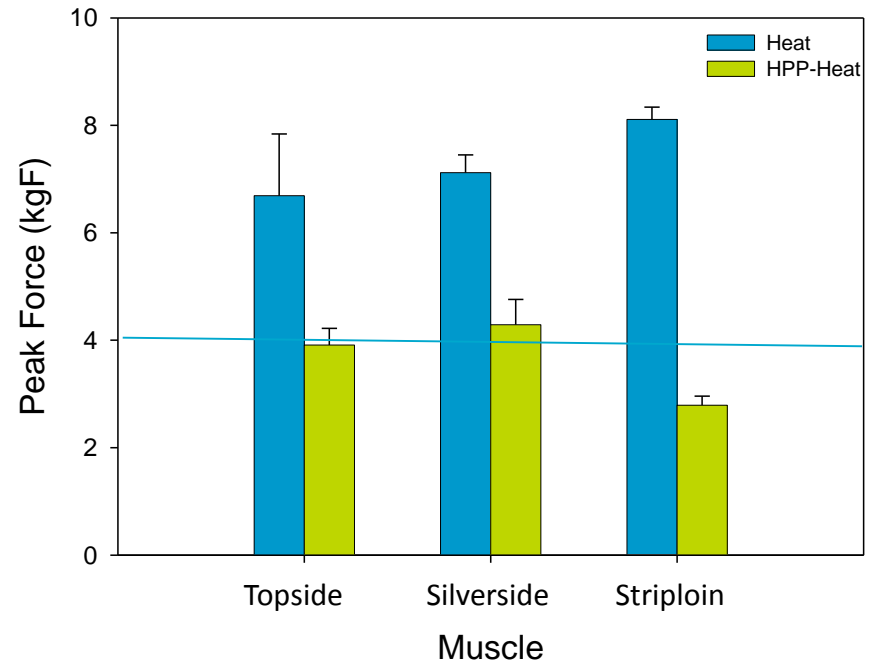
Raw



Heat treatment
60°C, 20 min

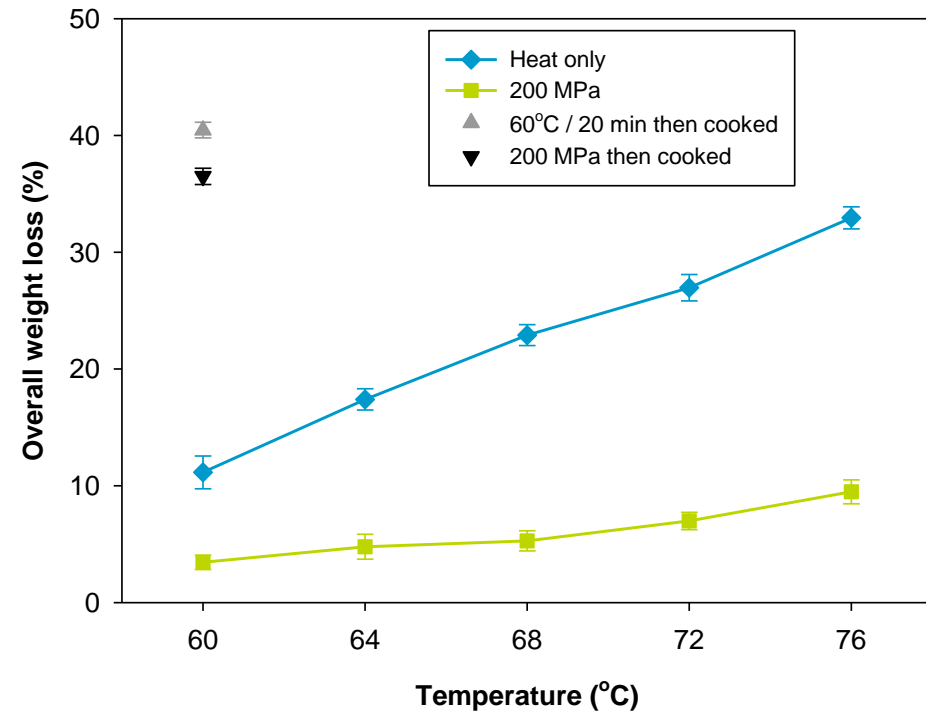
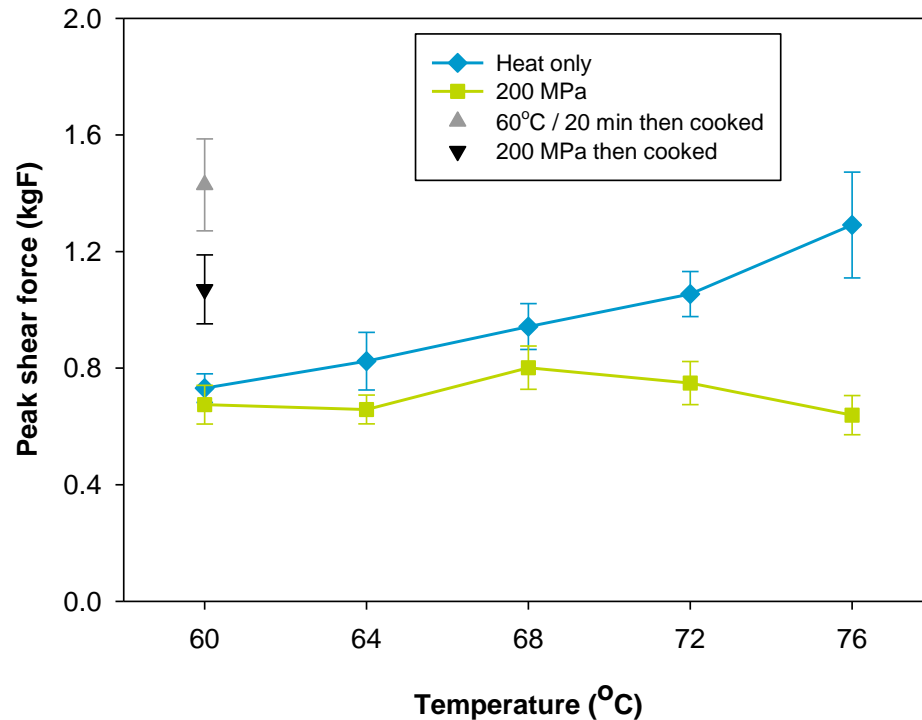


P-H treatment
200 MPa, 60°C, 20 min



200 MPa / 60°C / 20 min ➡ 70°C / 30 min ➡ tender meat

HPP and Heat - improving texture and yield



200 MPa / 76°C / 20 min → tender meat + increased yield

Products from HPP treated meat



Lamb Tagine



Goat Curry



Beef Short Rib

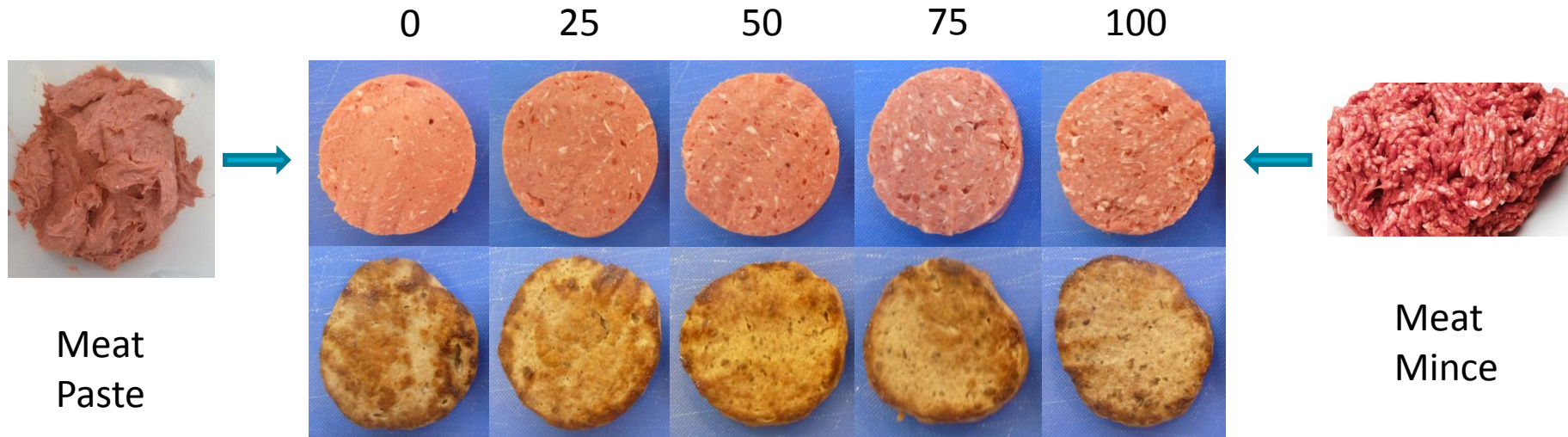


Beef Chuck Soft Taco

Healthy Aging, Convenience and Lifestyle

Megatrends – Forever young, Great expectations,
The silk highway

Impact of microstructure

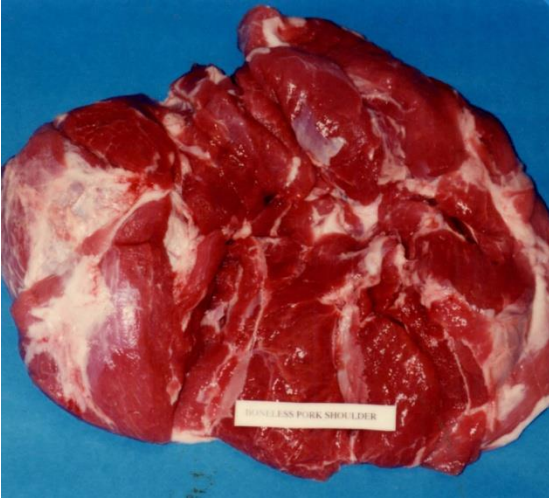


Effect of particle size on

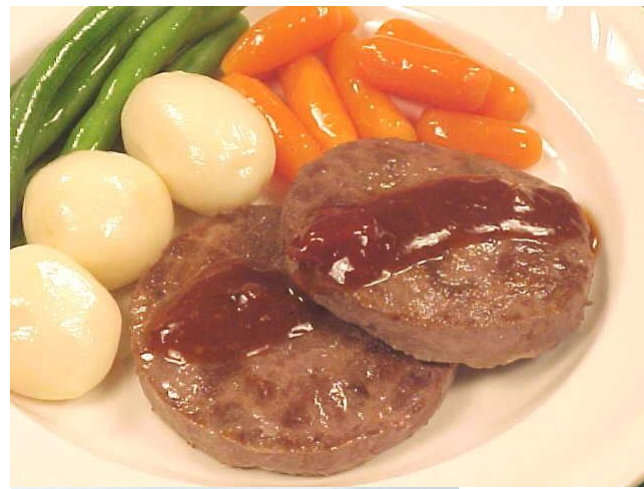
- Oral breakdown
- Sensory perception
- Digestibility

Cold-set Binder Process

- Binders that bind raw pieces of meat together



Cold-set bound product



Meat Products for Elderly/Dysphagia

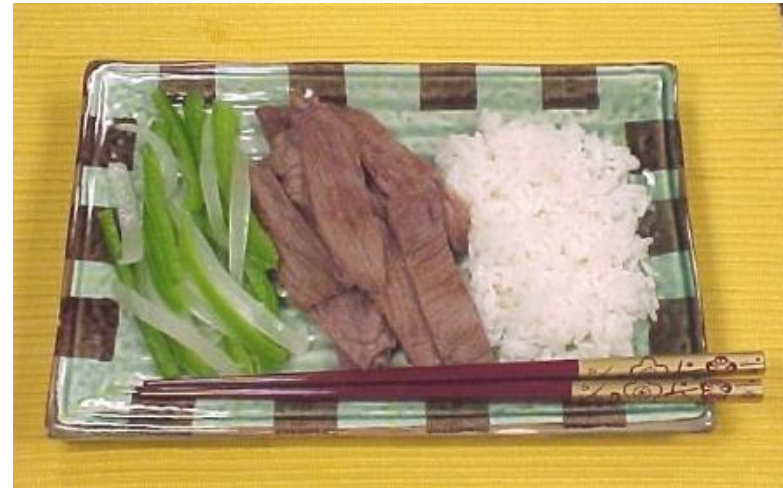


Products for Asian markets (Japan)

Corned Beef



Marinated sliced beef



Beef Curry



Saikoro Cubes (Beef with Wagyu fat)



Salt reduction using HPP

1% Salt in batter

- without HPP 28% cook loss
- with 200MPa HPP 5% cook loss

Sensory

- without HPP dry and crumbly
- with 200MPa HPP firm, sausage snap and texture, juicy



Without HPP

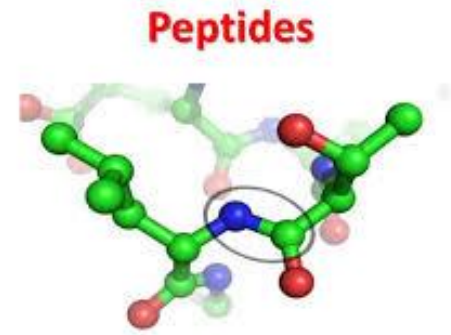


With 200 MPa HPP

Bioactive peptides in meats

Biological activity of peptides

- Antihypertensive
- Immunomodulating
- Antimicrobial
- Prebiotic
- Mineral-Binding
- Antithrombotic
- Hypocholesterolemic
- Antioxidant



➤ **Enhancing the image of red meat**

Improving shelf-life

Megatrends – Planetary pushback, The silk highway

Long aged (20-32 weeks) vacuum packed chilled beef – storage trials

- Impact 3 meat colour scores on shelf-life
 - 1B, 1C (light)
 - 2, 3 (medium)
 - 4 and above (dark)
 - ✓ Achieved shelf-life of 20 weeks at -1°C
- Effect of purge on shelf-life of vacuum packed chilled meat for Egyptian market
 - 3 primals (brisket, eye round, topside)
 - ✓ Achieved a micro shelf-life of 32 weeks at -1°C for brisket and topside



Impact of extended shelf-life chilled beef into overseas markets

- Generate safety and organoleptic (sensory) data in Australia and China to extend shelf-life limits of Australian chilled beef
- Shipping trial commenced in August 2016
- Collaborative research agreement with SAU
- Access to Chinese supply chain partners



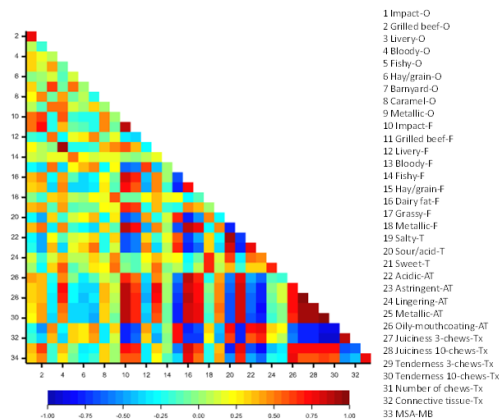
Consumer Insights

Megatrends – Great expectations, More from less, The silk highway

Sensory/Flavour of Meat

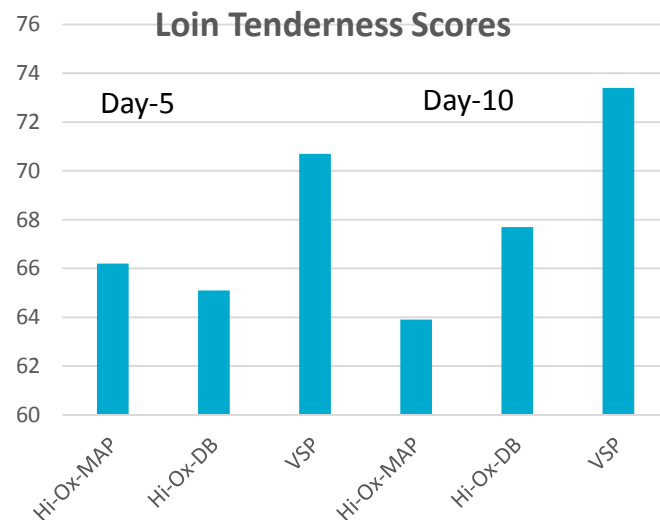
A.MQA.001

Effect of intramuscular fat on beef eating quality, flavour generation and flavour release



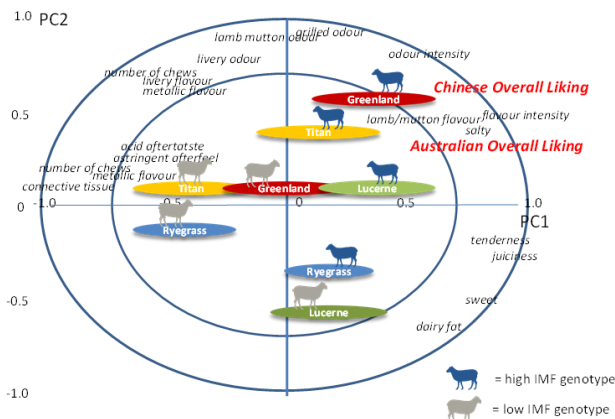
A.MQT.0068

Impact of high oxygen packaging on MSA lamb loin and topside eating quality



A.MQA.007

Influence of nutritional regime (grain, grass, brassica) on sheepmeat texture and flavour



PGG Wrightson Seeds

Future Asian Consumer Insights

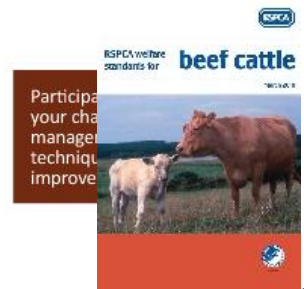
Provenance and clean green message,



Trustworthy distribution networks



Animal welfare.



Freshness/healthfulness



Red Meat Value Chain

Explore relative importance of factors across the red meat value chain through conjoint and other consumer/sensory studies

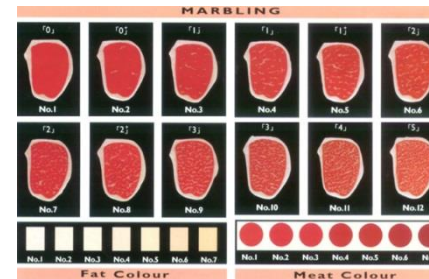
Uniquely Australian



Asian consumer segmentation

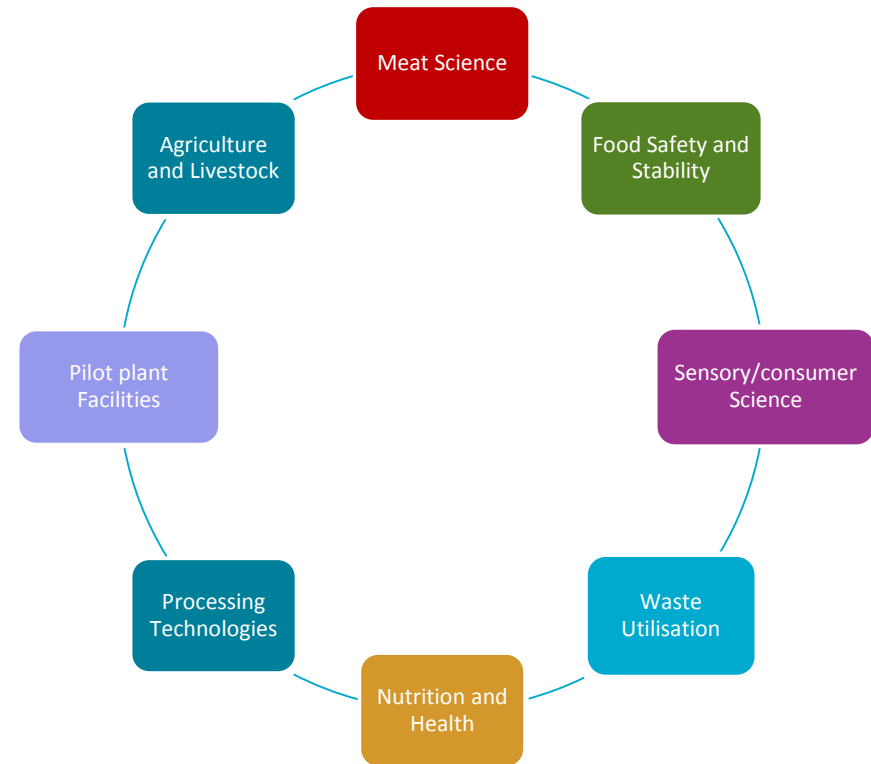


Intrinsic sensory properties



In Conclusion.....

- Need to know our consumers – domestic and export
- Innovation is key for a strong industry in the future
- CSIRO have invested in science to address the future needs of the meat industry
- CSIRO have a range of capability under one roof
 - on farm to in-body function



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Thank You

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