Research results: Where to now?

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MEAT & LIVESTOCK AUSTRALIA

Achievements report

AMPC mla MEAT & LIVESTOCK AUSTRALIA

Program Achievement Report

Food Safety
Market Access Science
2016-17



Meat & Livestock Australia – Research Development & Innovation
&
Australian Meat Processor Corporation – Process Hygiene, Quality

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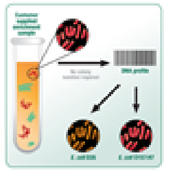
Food safety Feedback form on project direction

*More than one box can be ticked for each topic area

*Topic 1 - STEC screening and confirmation test methods:



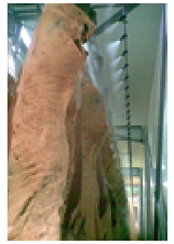
- ☐ I do not test for STECs or have no interest
- ☐ I am interested in choosing new screening methods
- ☐ I am interested in the new confirmation methods
- ☐ I would like some help/info on choosing a new test (pros and cons list)
- ☐ The cost benefit of the new test method
- ☐ If a new screening/confirmation test becomes available I would like to be:
  - ☐ informed of the method
  - ☐ interested in supplying my samples to be involved with the new test
  - ☐ interested in implementing new test methods

*Topic 2 - Shelf life of products/ shelf life model/ the cold chain:

- ☐ I have no interested in this topic
- ☐ I would like help interpreting my time temperature results
- ☐ I need help with my product shelf life data/results
- ☐ I am interested in doing work on understanding our supply chain/cold chain
- ☐ I am interested in doing work on improving our supply chain
- ☐ I would like to find out more on:
  - ☐ Shelf life of beef and lamb ☐ Chilled / ☐ Frozen / ☐ Others as _____
  - ☐ Shelf life model
  - ☐ Domestic market cold chain
  - ☐ Export market cold chain

*Topic 3 –New interventions for reducing pathogenic organisms:

- ☐ I do not want to use and/or care about interventions
- ☐ I am interested in finding out more
- ☐ I am interested in trialling the interventions at my plant
- ☐ Interested in comparing current interventions at my plant with the new intervention
- ☐ I am interested in trialling another type of intervention



Please turn over

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Outline

1. STEC screening and confirmation test methods
2. Shelf life : prediction and management
3. New antimicrobial intervention
4. Contact with MLA

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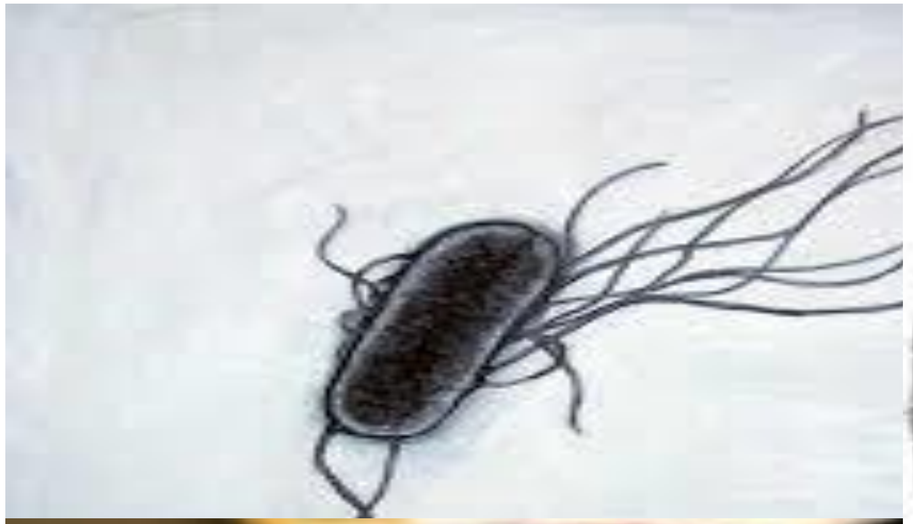
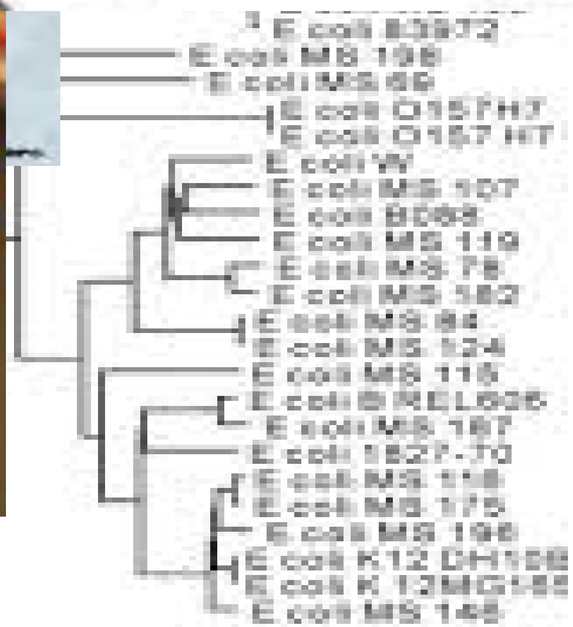
STEC (Shiga toxin-producing *E. coli)* screening and confirmation test methods





STEC screening and confirmation test methods

Manufacturer	Test type	Name
Hygiena	Classical	BAX System Real-Time PCR STEC Suite.
Thermo Fisher Scientific	Classical	RapidFinder STEC
Qiagen	Classical	Mericon E. coli STEC O-Type
Biotecon Diagnostics	Classical	Foodproof STEC LyoKit
FSIS*	Classical	Detection and Isolation of non-O157 Shiga Toxin-Producing Escherichia coli (STEC) from Meat Products and Carcass and Environmental Sponges
BioControl	Advanced	Assurance GDS MPX for Top 6 or 7 STEC
Roka Bioscience	Advanced	Atlas STEC EG2 Combo Detection Assay
PALL	Advanced	GeneDisc System
Neogen	Confirmatory	NeoSeek STEC

stx
eae
O serogroup

Classical with additions

* Primers & probes – MLG 5B, Appendix 1.01

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Screening Test and Confirm Positives

Test system	Test category	Positives (n=100)	Confirmed positives detected
FSIS	Classical	85	11/12
QIAGEN	Classical	82	12/12
BAX	Classical	67	11/12
RAPIDFINDER	Classical	64	11/12
BIOTECON	Classical	64	11/12
GDS	Advanced	56	10/12
PALL	Advanced	42/94*	10/10*
ROKA	Advanced	39	11/12
NEOSEEK	Confirmatory	16	11/12

12 confirmed positives

- 10 detected by all
- 2 variable detection

eae and O gene barely 4 log/mL

NeoSeek – 16 positives

* Software malfunction resulted in only 94 samples being analysed

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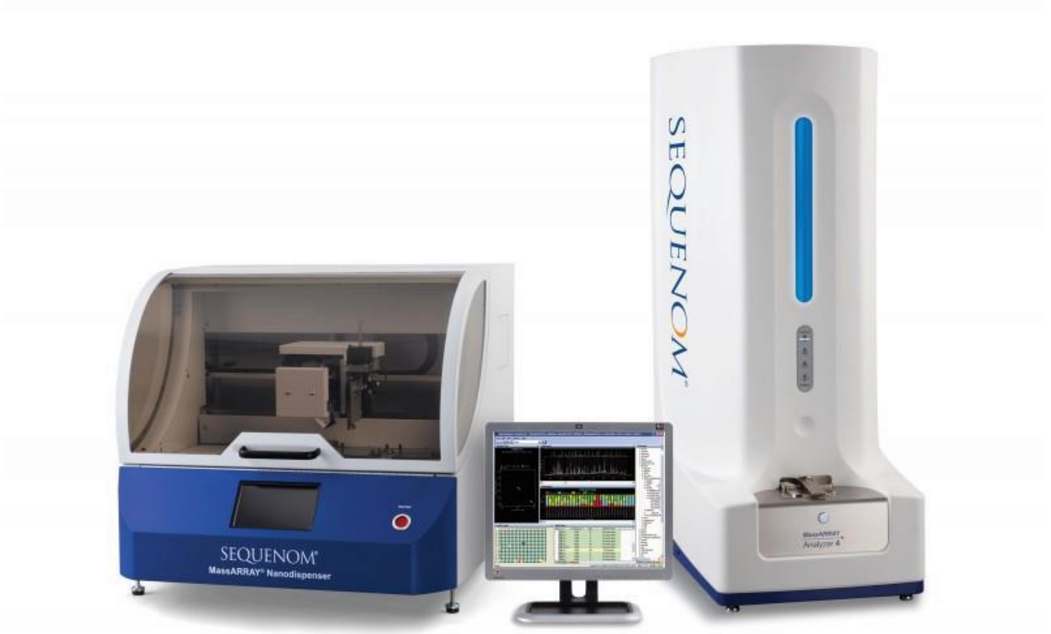
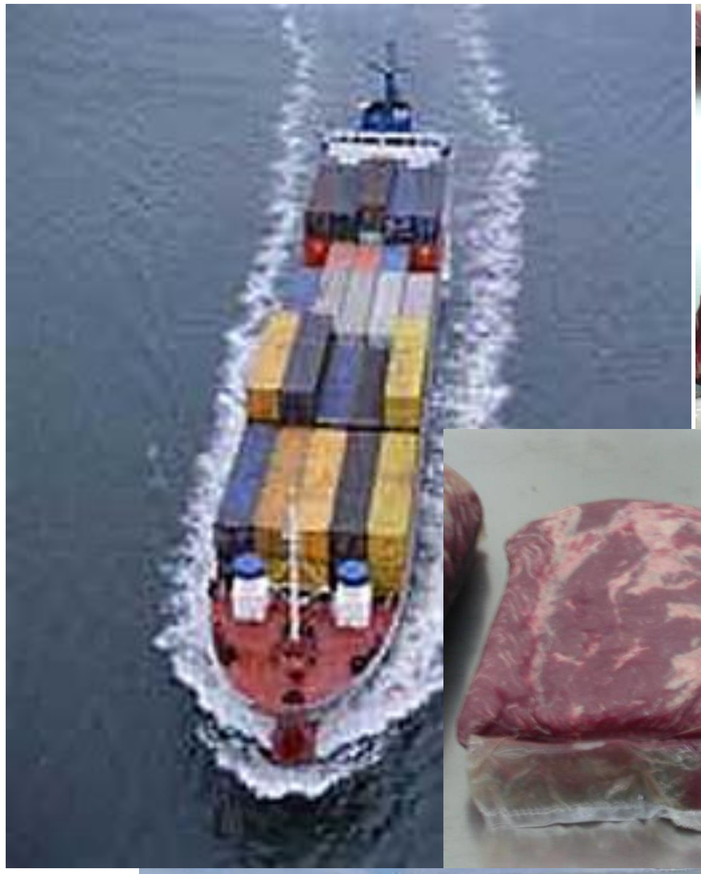
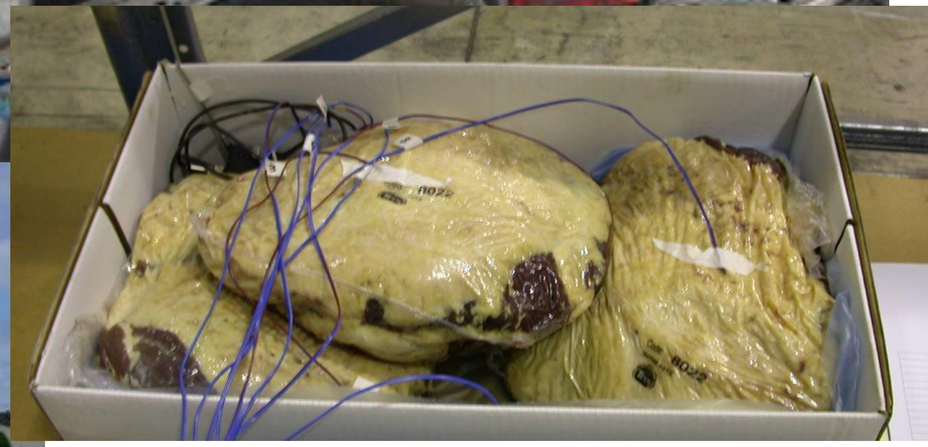
Neogen - NeoSeek

- Identifies >86 independent targets simultaneously for increased specificity
- Designed to identify Top 7 serogroups
- Sample: enrichment broth or simple DNA prep from enrichment broth
- 24 hour turn around from sample receipt
- Around $350 per sample (incl. transport to USA)



Shelf life : prediction and management





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Shelf life the predictive model

Development of work started since 2008

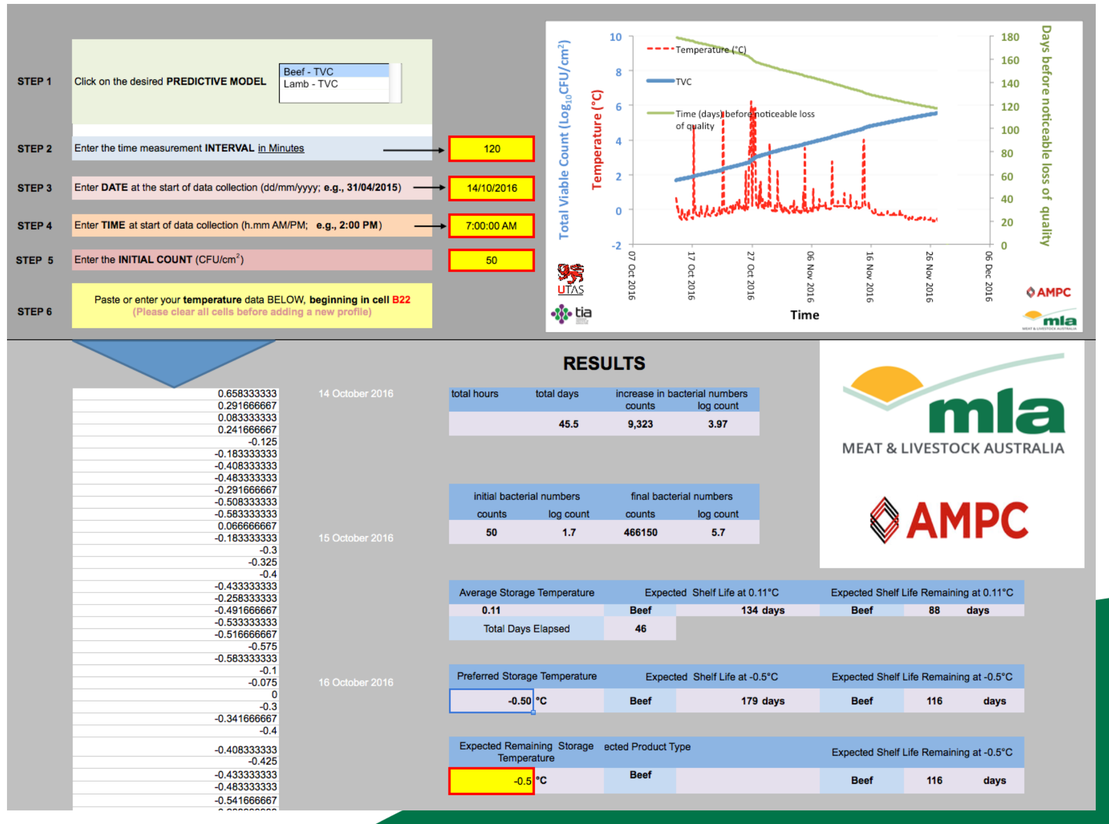
$$\ln(N) = \ln(N_0) + \mu_{\max} A(t) - \ln\left(1 + \frac{e^{\mu_{\max} \cdot A(t)} - 1}{e^{(\ln(N_\infty) - \ln(N_0))}}\right)$$

$$A(t) = t + \frac{1}{\mu_{\max}} \ln\left(e^{-h} + \left(1 - e^{-h}\right) e^{-\mu_{\max} \cdot t}\right)$$

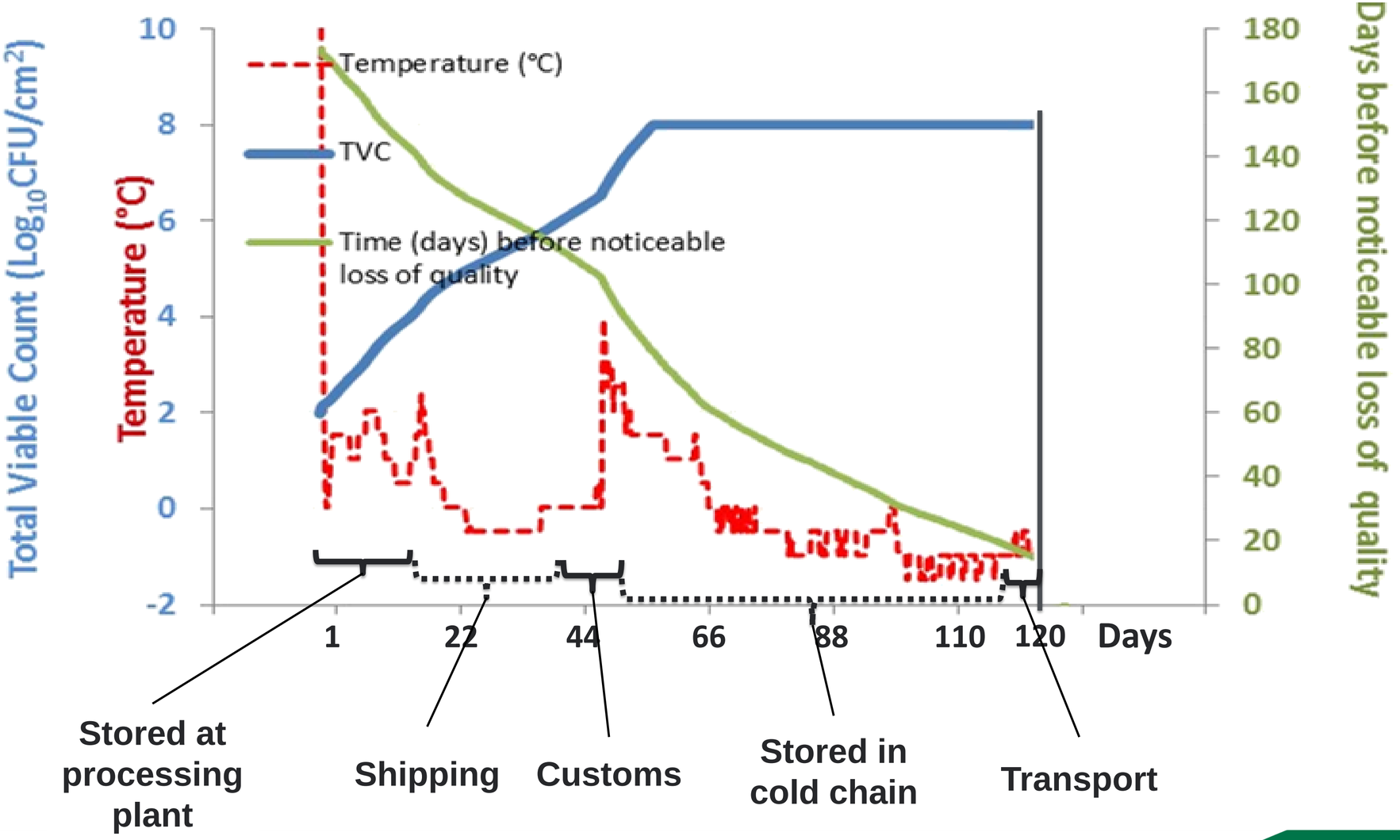
Predicts end of shelf life based on temperature and starting count.

Requirements for the model:

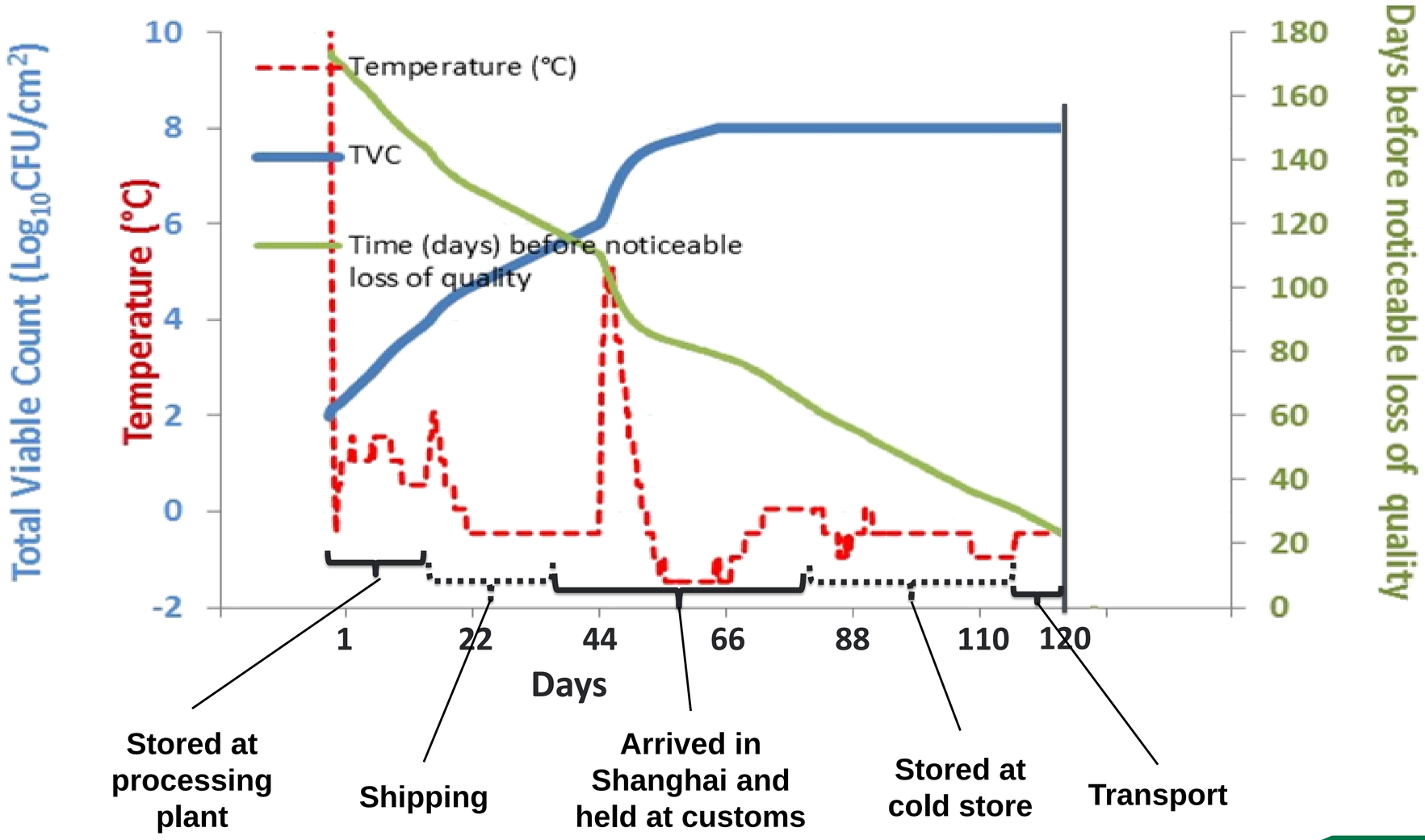
- Species type (Beef or Lamb)
- Temperature profile
- Date
- Starting Micro Count



Time – temperature history and predicted shelf life in cold chain



Time – temperature history and predicted shelf life in cold chain cont

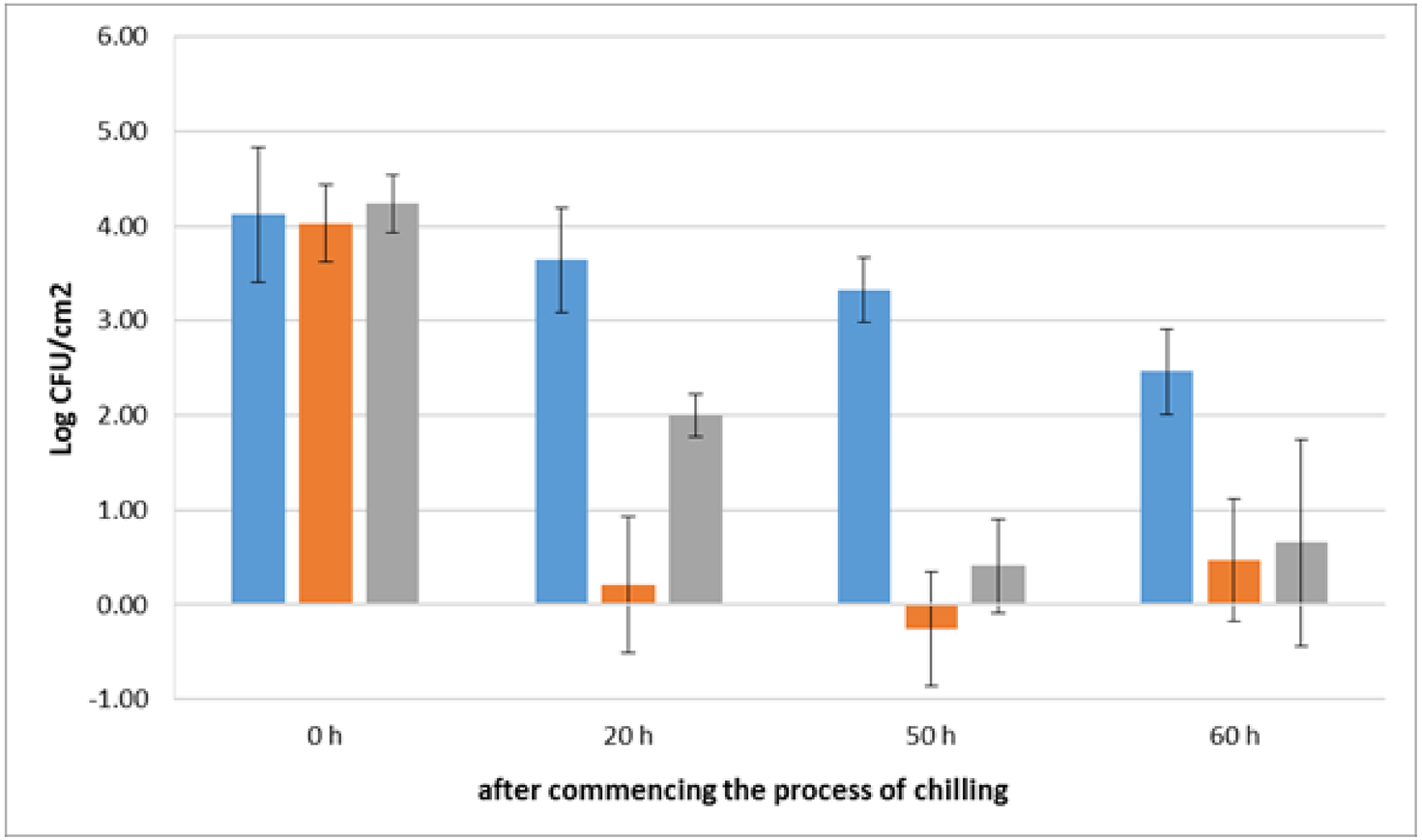


New antimicrobial intervention

New antimicrobial intervention

- Chemical during spray chilling
- Oxidising chemicals (acidified sodium chlorite, peroxyacetic acid)

New antimicrobial intervention results



Population changes of *E. coli* on the foreleg of carcases during spray chilling with water (control; blue), peroxyacetic acid (at 200 ppm; orange) and chlorine dioxide (at 50 ppm; grey).

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Contact with MLA

https://www.mla.com.au/research-and-development/food-safety/

Home > Research & Development > Food safety

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Food safety

MLA invests in the area of food safety R&D projects across the value chain, supporting market access for the Australian red meat industry by enhancing product integrity and technical research.

In MLA's food safety research and development program is part of SAFEMEAT, the food safety partnership between the meat industry and government with the primary role of ensuring delivery of safe and hygienic red meat products to the marketplace.

MLA together with AMPC delivers a coordinated joint Food Safety program to achieve the overall objective of enhancing product integrity. The program is to develop sound scientific basis for food safety management, emphasising microbiological risk management. Identifying knowledge gaps in food safety risks along the farm-to-fork supply chain and then conducting research is vital in improving understanding of foodborne hazards and maintaining the industry's reputation for safe, healthy products.

Key areas of work are:

- Microbiological and chemical food safety
- Risk-based post mortem inspection
- Shelf life and extension
- Process control and Interventions

The R&D-oriented component can be divided into three types of activities:

- The use of scientific approaches to understanding food-safety risks
- The development of systems and new technologies to manage identified risks
- The development and dissemination of information relating to risk management

The program communicates the knowledge of food safety risks in the red meat supply chain, and their control, so that industry, regulators and the marketplace worldwide are aware and satisfied that risks are understood in Australia and are being controlled effectively.

Click here to view program progress report.
Click here for last years report FY 15-16.
Click here for this years report FY 16-17.

Food safety for consumers

LPA & NVDs
NLIS
Meat Standards Australia

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