

Impact of transport to Australia's distant markets on the shelf-life of beef and sheep primals, with special reference to the Chinese market (2016.1075)

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Project Description

Australia exports vacuum packed (VP) meat cuts to more than 100 countries, relying on the cold chain during the air or sea voyage to get product to market. The present project followed 200 consignments to Australia's major markets, monitoring temperatures every step of the journey and calculating shelf life remaining for the importer.

Project Content

The project was developed because of two "new" factors: the implementation of slow steaming to optimise fuel use, extending voyages by up to 20%, together with perceived cold chain difficulties in some countries.

The terms of references were to:

1. Provide information on shipping times to each major market
2. Evaluate temperature:time relationships during shipping to each market
3. Assess the effect of temperature:time on the microbiological profile and shelf-life during shipping

The study was based on two sources of information:

- Temperature: time records from data loggers placed in containers; and
- A software tool developed by the University of Tasmania (UTas) for predicting shelf life of VP chilled primals.

Of particular focus was the Chinese market for VP chilled meat cuts which, although small at the time of the study (early-2016), is predicted to become Australia's major, if not *the* major, market.

Project Outcome

Of the 200 consignments followed, almost all arrived at the importer's cold store after a satisfactory voyage, whether by sea or air freight. For example, data downloaded from a logger from a voyage between Melbourne and the UK indicates product was at -0.2°C for the entire voyage, except for "blips" during loading, unloading and transshipping in Malaysia (Fig 1).

Very occasional departures to +1.9°C, were recorded on long hauls to Europe, a "warm" temperature however, which predicts only eight days for marketing beef primals (assuming a mean temperature in-country of 4°C), with shelf life of lamb primals was already exhausted.

The study also monitored a large number of consignments affected by protracted industrial action by longshoremen on West coast USA. Shelf life was reduced during this period (around one year) because total voyage length (from establishment cold store to clearing in-country) was extended by around 10 days.

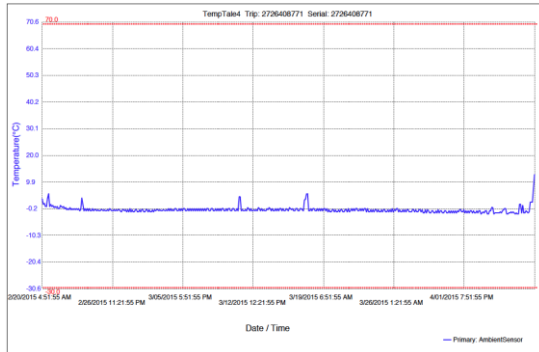


Fig 1: Temperature:time trace generated by TempTale data logger during voyage between Melbourne and the UK

The most important factors which influenced shelf life during transport were:

- Starting bacterial level at vacuum packing
- Temperature and time product is stored before loading aboard the vessel
- Slow steaming
- Journeys extended by disputes or extended trans-shipment times
- Container set point delivering “warm” temperature over whole voyage
- Power-off aboard the vessel, or at loading/unloading (Fig 2)

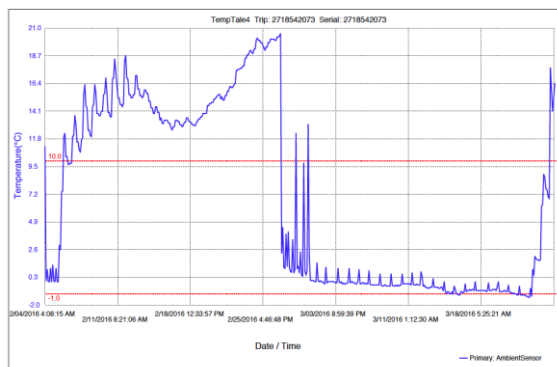


Fig 2: Container remains unrefrigerated between Brisbane and Singapore; product completely spoiled

Benefit for Industry

Companies currently use data loggers solely for insurance claim purposes but could enhance their investment in the technology by integrating logger output with the microbiological profile of a wide range cuts. In particular, this would assist companies intending to service the Chinese market in two ways: by assessing shelf life of lower-value cuts (flanks and briskets), through potential cold chain difficulties.

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