final report

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EVALUATION OF DRY AGEING BEEF IN TRANSIT TO EUROPE

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Abstract

Before the invention of the vacuum sealed bag in the 1960's, dry ageing of beef was a widely used ageing method to improve the eating quality of beef. Dry ageing is a process whereby meat is hung in a cold, dry space for a period of time, to improve the flavour and tenderness of the meat.

One issue with dry aging, is that it is difficult to make the product viable when exporting via sea freight from Australia due to shelf life constraints – hence the product has limited upside other than domestic consumption. This is due to the period of time required to achieve the sensory benefits of dry ageing (21-50 days), coupled with the long transit times to northern hemishere markets (up to 50 days), can mean that the dry aged beef could be up to 100 days old at the time it lands in the export market.

The project was sucessful in proving the concept that beef could be dry aged in-transit to the northern hemishere markets, giving another supply chain for Australian cattle. However, it heavily relies on the strong and collaborative relationship between the exporter and importer, without this it would have been impossible.

As part of the project, a Cost benefit analysis was undertaken, and reported that based on 10% of Australia's 2017 chilled beef exports to suitable markets for dry aged beef (EU, Japan, South Korea, China, Taiwan, Hong Kong and Singapore), the estimated benefit for utilising the in-transit dry ageing system is an extra $63.23 million/annum to the Australian beef industry.

Executive summary

Dry Aging of beef is a traditional method of aging meat to increase flavour and tenderness. It is a process that occurs when beef is hung in a low humidity refrigerated cool room, for anywhere from 21 to >100 days. The longer the beef is dry aged, the greater the increase in sensory impact (although shrinkage losses continue to increase with the increased period of dry aging).

There has been a significant worldwide upswing in consumers demand, back to the more traditional dry aged beef, which has been led by most of the world's top chefs chasing the most complex flavours in the meat they serve. It is becoming increasing apparent that dry aged beef gives the best expression of the flavour and tenderness of beef. Dry aged beef has become the premium beef eating experience that fulfils consumer preferences for richly and uniquely flavoured products.

Dry ageing beef also increases the price paid for the product in international markets when sold through restaurants, speciality grocery stores and butchers. For example, the average price of a menu item containing dry aged beef was found to be 2 and 2.5 times higher, in the US and EU respectively (vs average price of menu item containing beef [dry aged and non-dry aged]; Fig. 1).

Thus, this project aimed to investigate a potential way to dry age beef in a cost effective manner to customer in the northern hemisphere. First, a land based trial was undertakern in Australia to ensure it was a successful concept, which was then followed by a sea freight trial to the EU.

The project successfully exported Australian dry aged beef via sea freight, in a commercial quantity to a northern hemisphere export market. Although this project and supply model was successful, it heavily relied on the strong and collaborative relationship between the exporter and importer - without this it would have been impossible.

The Cost benefit analysis reported based on 10% of Australia's 2017 chilled beef exports to suitable markets for dry aged beef (EU, Japan, South Korea, China, Taiwan, Hong Kong and Singapore) the estimated benefit for utilising the in-transit dry ageing system is an extra $63.23 million/annum to the Australian beef industry.

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1 Background

Dry ageing of beef is an ageing method that was widely used, before the invention of the vacuum sealed bag. This process can take anywhere from 21 to beyond 100 days and the longer the beef is dry aged, the greater the increase in sensory impact (although shrinkage losses continue to increase with the increased period of dry aging).

Dry aging of beef requires not only the temperature to be held constant at 0-2°C, but it also requires the humidity to be a lot lower than a normal chiller (normal fridges run at approx 95% relative humidity, dry aging needs it to be approximately 70-80% relative humidity).

Dry Ageing fell out of favour with the invention of the vacuum sealed packaging method of meat in the 1960's, as this new method allowed a meat carcass to be fully broken down into primals, sealed in an airtight plastic bag and packed into cartons a day or so after slaughter. This eliminated the requirement for huge areas of refrigerated storage where beef was hung and also eliminated any associated yield losses from shrinkage/evaporation. Wet aging is an anaerobic (no oxygen present) aging method, and whilst is promotes increased meat tenderness, the resultant taste of the beef is different to the traditional aerobic (where oxygen is present) dry aging method. This results in very different biochemical reactions in the meat due to the surface changes, moisture content and microbial community on the surface. Another benefit of wet ageing is that the meat continues to increase in tenderness within the airtight vacuum sealed bag. The shelf life of the product within the vacuum sealed bag is also excellent. Thus, the red meat industry virtually fully adopted this change in ageing and packaging technique, as their meat product could now continue to age and tenderise in transit to their customers, and/or in their customer's warehouses.

In more recent times, butchers and chefs have started to look back at how many of the foods we eat used to be prepared and cooked. This sparked a renaissance of the dry ageing method of beef in the last decade, and the flavour and tenderness that is produced from this age old method is now considered highly desirable. This has caused a significant worldwide upswing in consumer's demand, back to the more traditional dry aged beef, which has been led by most of the world's top chefs chasing the most complex flavours in the meat they serve. It is becoming increasing apparent that dry aged beef gives the best expression of the flavour and tenderness of beef. Dry aged beef has become the premium beef eating experience that fulfils consumer preferences for richly and uniquely flavoured products.

In addition dry ageing beef also increases the price paid for the product in international markets when sold through their restaurants, speciality grocery stores and butchers[1,2]. For example, the average price of a menu item containing dry aged beef was found to be 2 and 2.5 times higher, in the US and EU respectively (vs average price of menu item containing beef [dry aged and non-dry aged]; Fig. 1).

[1] US Dry Aging Beef Market – Opportunity Analysis and Industry Forecast, 2014-2020. Allied Market Research. Report overview accessed, in April 2018, via https://www.alliedmarketresearch.com/US-dry-aging-beef-market

[2] https://www.fei-bonn.de/download/cornet-162-en-englisch.pdf, accessed in April 2018

In the US, dry aged beef accounts for less than 10% of US beef consumption but has a predicted compound annual growth rate of 1.3%[2].

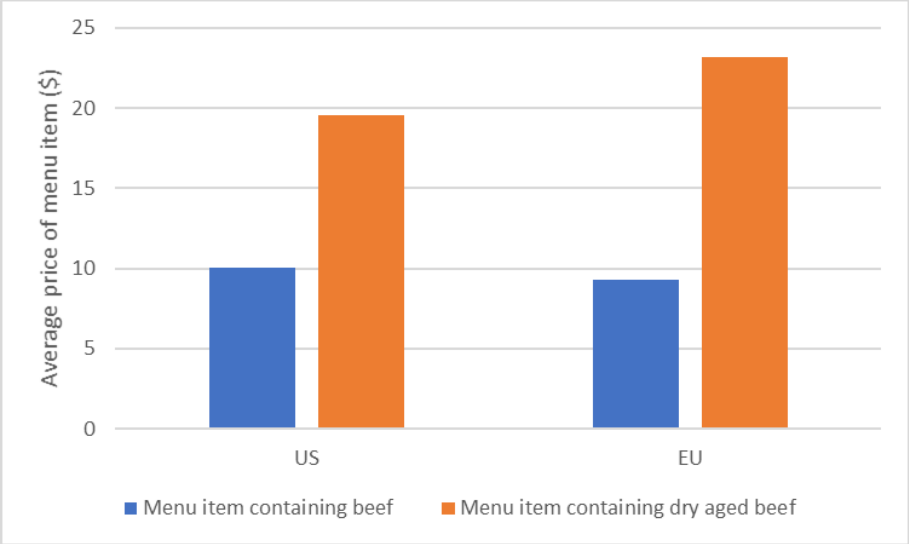

Fig 1: Average price of menu items containing dry aged beef vs beef (dry aged and non-dry aged) for US and EU (2018). Based on raw data from GlobalData's Menu Intelligence.

One of the issues with dry aging beef at a processor level, is that it is very difficult to make the product viable when exporting from Australia – hence the product has a limited market uses other than domestic consumption. Sea freighted transit of beef in a refrigerated shipping container to the export markets of Europe and the USA takes approximately 6-8 weeks. This time period makes it unviable to dry age meat in Australia for 30-50 days, portion, pack and ship as boxed beef in vacuum sealed bags to Europe/USA. This would mean that the beef could be nearing 100 days of age by the time shipping container arrives at its destination, which would be very close to the end of its shelf life. The other alternative to sea freight is air-freighting to Europe/USA, but this is simply cost prohibitive and is generally only suitable for small volumes.

This challeng of being unable to export dry aged beef, was one that faced our company. We dry aged beef of high quality for our own use in Australia, but also wanted to export dry aged beef to Europe.

Thus, this project aimed to investigate a potential way to dry age beef in a cost effective manner to our customer in the northern hemisphere.

2 Project objectives

The objective of this project is to test whether there is a process whereby Australia red meat can be dry aged in-transit to the northern hemiphere export markets.

3 Methodology

3.1 Land Based Trial

A land based trial was run for 8 weeks in June to August 2016 before a full export trial was conducted. The trial used Rumps as the dry ageing material, to be dry aged in a 20 foot container installed with a special steel frame. The conditions are those published by MLA and maintained during the trial. Visual assessment and micro samples were assessed during the trial.

3.2 Dry Age Export Trial

After the land based trial was conducted, a full export trial to the EU occurred. The first container of beef dry aged in transit was exported in 2018. Using the paramaters and setting from the land based trial.

4 Results

4.1 Land Based Trial

A land based trial was run before a full export trial was conducted. The concept was trial on a 20 foot container with the temperature and RH monitored throughout the trial using the recommended DA parameters in MLA project P.PSH.0679. The trial was successful and no mould or spoilage was viewed on any of the meat samples.

4.2 Export Trial Results

Our export shipment trial left our facility on the 28th December 2017, and arrived at it's destination in the EU on the 22nd February 2018, as per normal shipment time. Overall the trial in the container based off the land trail was very successful. No mould whatsoever was observed on the meat upon arrival at its destination. A small tasting session was conducted with some of the customers staff as well to ensure no flavour defects occurred during the process. The overwhelming feedback was that the dry aged beef tasted fresh without any hint of mould or off flavours. Yield was similar to those of the current dry ageing method used in our domestic facility.

However challenges during the trial included:

- Requiring the use of Australian EU eligible beef as that was the export destination
- Supervision of a Department of Agriculture officer
- Correct labelling of product was already required.

Fig 2. A fully portioned dry aged age product

5 Discussion

5.1 Overall Success

Overall, we were extremely happy with the outcome of the trial. The meat upon arrival in the EU was perfectly dry aged, and ate extremely well.

5.2 Sourcing of EU Beef

This trial did take significantly longer to complete than originally budgeted for. The raw material supply of beef for export to our customers market was restricted to only abattoirs that are EU-accredited. This was the primary reason for delays in completing this trial, as we had some difficulty in finding an abattoir that would supply us with the raw product.

5.3 Export Compliance Based Issues

One of the unexpected and most significant issues that was incurred during the full export trial was export compliance based - surprisingly it was the major issue we encountered during the trial. We had not anticipated any issues with compliance, as we had worked closely with the Australian Department of Agriculture throughout the project. We held, what we thought, to be all the relevant permits and certifications to be able to export our product.

Thus, it was a surprise when we encountered issues getting the product cleared into the EU through the port. The issues were primarily based around the lack of official standard definitions of what exactly is dry aged beef, and differences of opinion between how to classify the product. We did however, eventually get the shipment released.

Since our container of beef arrived in the EU some 4 months ago, we have been unable to export any more beef. This was due to continued uncertainty surrounding the definition of our product, and the length of time it takes for this process to reach a conclusion. Pleasingly, we have very recently received notification of our new export licence which will allow us to begin to export meat into the EU.

It is therefore worth noting, any MLA export projects that develops new product or technique to the export markets, that the regulator system is fully tested and vetted by not only the Australian Department of Agriculture, but also the importing country's customs officials.

6 Conclusions/recommendations

The project has successfully exported Australian dry aged beef via sea freight, in commercial quantities to a northern hemisphere export market. Although this project and supply model was successful, it was heavily relied on the strong and collaborative relationship between the exporter and importer. Without this it would have been impossible.