SNAPSHOT

Pilot study for future storage and transport of carcases using hypobaric storage of meat

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Project Description
This project was a pilot study undertaken to verify whether or not meat (lamb) can be safely maintained in a hypobaric (vacuum) environment for 35 days without appreciable loss of weight or spoilage. Six hypobaric chamber research units located in a chiller capable of being held at around 0 degrees Celsius were used for this project.

Project Content
Lamb loins were held in a hypobaric environment using air as the residual atmosphere in one chamber and carbon dioxide in the other chamber for 5 weeks. Temperature was set at 0 degrees C. The relative humidity in the chambers was maintained at above 95% to minimise weight loss.

The endpoints measured were weight loss, colour, oxidative stability, microbiological quality and shear force as a measure of tenderness. Samples of lamb loins were vacuum packed and held in the chiller containing the chambers as controls. For endpoints other than shear force the study included 4 separate replications with 8 loins in each of the treatment groups and 8 loins as controls. For shear force measurement 8 loins were included in each of replicates 2 – 4 (this was not part of the original project, but was deemed important and so added). The results were aggregated for statistical analysis.

Project Outcome
The results demonstrated that lamb loins can be held in a hypobaric chamber at 0 degrees Celsius with air or carbon dioxide as the residual atmosphere at a pressure of 5.5 Torr and with the relative humidity maintained above 95%. In summary the results showed that:

- The ultimate pH, lipid oxidation and protein oxidation findings after storage were equivalent to that observed with traditional wet aging using a vacuum pack,
- The weight loss during storage was between 6 and 7% which is higher than that observed with wet aging (2-3%),
- Retail colour consistent with consumer expectations breached after 2 days display following removal from storage compared with 2.5 days for the vacuum packed controls,
- In terms of pathogenic bacteria the microbiological quality of meat stored with low pressure air as the residual atmosphere in the chamber was equivalent to traditional wet aging in a vacuum pack,
- In terms of spoilage bacteria meat stored with low pressure air or CO2 as the residual atmosphere in the chamber revealed higher levels than traditional wet aging in a

vacuum pack, and

- In terms of tenderness as measured by shear force the ageing of the lamb in the hypobaric chambers was equivalent to that observed using traditional wet aging in a vacuum pack.

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Benefit for Industry

This pilot study has effectively provided proof of concept for the potential use of hypobaric containers for transport and storage of sheep meat. Development of this concept further will open up opportunities for transport of whole chilled sheep carcases directly into wet markets in countries around the world, but particularly into the Middle East. An additional benefit will be the ageing of the meat during transit.