Snapshot report

Exploring value in pleura removal

Removal of the pleura during dressing and assessment of potential new products

Project code
2024-1109

Prepared by
Ciara Mc Donnell, Adam Fitzgerald,
Carlos Batista, Priya Sarapna Rajoo Naidu,
Gregory Raymond Maloney,
Aarti Tobin, Rozita Vaskoska

Date submitted
06/12/2024

Project description

The pleura is a thin, bi-layered serous membrane of the respiratory system. The parietal pleura, lines the inner surface of the rib cage, while the visceral pleura, covers the lungs. In current processing practices, the parietal pleura remains on the carcase. The pleura is not removed due to uncertainties about labour requirements, yield impacts, and potential uses for the removed pleura. This study examined the ease of pleura removal, reviewed literature and patents on animal pleura, analysed its composition, and identified potential market applications. With 20% of the carcase accounting for 80% of its value, there are opportunities to add value to the underutilised parts of the carcase. Removing and valorising the pleura could unlock value through new products and improved eating quality.

Project content

Pleurae samples were removed from the 2nd - 8th rib from six hot carcases and the time to remove the samples was recorded. Samples were analysed for proteomic and proximate composition. A literature review and patent searches were conducted on animal pleura. A meeting was held with AMPC to discuss several value proposition ideas for innovative pleura applications. Market analysis showed that the top two growth markets for application of pleura-derived products were advanced wound care and pet food. Further market insights were collected to determine value propositions for pleura in these markets.

Project outcome

Parietal pleura can be removed from the hot carcase with relative ease requiring as little as 10 seconds per animal. The proximate compositional analysis found pleura to contain 43.6 % fat, 40.6 % moisture, and 15.4 % protein. Drying and defatting pleura could yield a product which is very high in protein content (97.5 %). When bovine proteomic methods were applied to pleura, they resulted in underestimated collagen content due to method unsuitability to the pleura matrix. Additional amino acid analysis was conducted to further indicate the pleura composition. Within the protein content, the most abundant amino acids were glutamic acid, glycine, alanine, proline and hydroxyproline. Based on the amino acid profile, it is expected that collagen would form the dominant part of the proteome of the pleura. It is estimated that collagen would make up 74 % of the dried and defatted pleura, however this number may be overestimated due to presence of elastin in the pleura which contains around 1 % hydroxyproline by weight.

A literature review revealed that research on parietal pleura is lacking, with most publications from the 1970s focusing on visceral pleura or the medical field. The literature supported the compositional findings of the current study, and following defatting, collagen and elastin were quantified as the major proteins. The literature search also highlighted that pleura is likely to contain highly valuable health promoting molecules, glycosaminoglycans (GAGs), such as hyaluronic acid, heparin, dermatan sulphate and chondroitin sulphate.

The patent search for the term ‘animal pleura’ identified 228 patent families with 36.5 % in medical technology and 26.8 % in pharmaceuticals. In addition, the market analysis showed that the wound management and/or pet-care markets are growing at 6.2 and 5.7 % compound annual growth rates (CAGR), respectively. Leveraging the unique properties of pleura, products could be developed for advance wound management and/or pet-care markets, however, there is a need to consider freedom-to-operate and regulatory hurdles for any future product development.

Benefit for industry

Removal of pleura could lead to improved eating quality of the adjoining cuts and provide the meat industry with a new material for value-addition. Pleura applications in the advanced wound care and pet food markets could lead to increased economic value for the red meat industry.