

Enhancing Retail Colour Stability and Shelf Life of Lamb Meat for Key Markets

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Project Description

This project demonstrated the potential of dietary antioxidants (vitamin E and selenium) at supranutritional levels to reduce heat stress impacts in lamb finished under hot conditions and improve the meat colour stability, shelf life and nutritive value.

Project Content

Consumers choose to buy meat primarily by visual appearance. A meat cut red in colour is more likely to be sold than a cut brown in color forcing the retailers to discount the prices of discolored meat leading to economic losses. The appearance of brown on the meat surface is an oxidative process which reflects the antioxidant potential of muscles. Antioxidants have been reported to influence both lipid and protein oxidation and Vit E (α -tocopherol) and has been extensively documented to minimize lipid oxidation and improve meat color stability ([Ponnampalam et al., 2012](#); [Suman et al., 2014a](#)). However, there is not sufficient work published on the oxidative status of finisher lambs during hot summer days and the impact that may have on the meat quality. Therefore this project investigated the impact of heat stress on the oxidative status of lambs finished during hot summer days. Project further investigated the potential of dietary vitamin E and selenium supplementation during finishing phase to reduce the negative impacts of heat stress on oxidative status of lambs and also investigated the impact on the colour stability of fresh meat and oxidative stability of fresh and aged meat. This project also compared the dietary vitamin E supplementation in a concentrate diet versus finishing on a lucerne based diet to optimize the duration of supplementation and finishing system to maximise vitamin E incorporation in lamb muscles.

Project Outcome

The present research project has shown that heat stress increases the rectal temperature and respiration rate of lambs finished under hot conditions resulting in increased oxidative stress and decreased feed intake compromising the growth rate. This research has also demonstrated that antioxidant supplementation during the finishing phase help the lambs to ameliorate heat stress impacts. Supplementation of vitamin E and Se for 3-4 weeks before the expected heat exposure help the lambs to reduce oxidative stress induced by heat stress and helps to maintain their feed intake resulting in enhanced growth rate and increased carcass weight. Further, this project has also shown that antioxidant intake of lambs can be increased either by finishing lambs on good quality pastures such as Lucerne or by supplementing antioxidants in concentrate diets. Pasture finishing is helpful to improve the colour stability of aged meat and oxidative muscles while the feed lotting with antioxidant supplementation improves the colour of fresh meat. Therefore, it is recommended to finish lambs on quality pastures if the meat is intended for sale after aging. The lambs that have to be transported to key markets under hot conditions should preferably be finished on concentrate diet with antioxidant supplementation for at least 3-4 weeks prior to transportation. To achieve the threshold of vitamin E (3.5 mg/kg) in muscle to improve colour stability, vitamin E supplementation @ 285 mg/kg of diet/ day for 4 weeks is required.



In this project, heat stress was of short duration and hence investigation of HS during the full duration of a finishing period is needed as applied to other hotter climates. Further research is also required to develop economic lamb finishing systems to achieve higher levels of antioxidants in lamb muscles and to test the effects of high antioxidant feeding on the oxidative stability of lamb meat and meat products. In this project, duration of transportation to slaughter was short and hence further research is also required to investigate the impact of long duration of transportation under hot conditions on meat quality (such as live export to middle east) and how the antioxidant supplementation during finishing period may help to reduce these negative effects. In this project, impact of heat stress and antioxidant supplementation on different muscle type was not investigated and hence more research is also required to investigate the impact of heat stress on different muscle types and how the antioxidant supplementation improve the colour stability of particular muscles to develop muscle specific marketing strategies for meat and meat products.

Benefit for Industry

The important findings that will have significant benefits to industry include:

- Lamb should preferably be finished during the cooler season
- During hot summer conditions antioxidant supplementation is required to prevent the decline in feed intake and growth rate
- Lairage before slaughter under thermoneutral conditions help to normalize the elevated rectal temperature and respiration rate in lambs finished and transported under hot conditions
- To achieve the threshold of vitamin E (3.5 mg/kg) in muscle to improve colour stability, vitamin E supplementation @ 285 mg/kg of diet/ day for 4 weeks is required.
- Finish lambs on quality pastures if the meat is intended for sale after aging
- Feed lotting with antioxidant supplementation improves the colour of fresh meat

Contact Information

Australian Meat Processor Corporation Ltd
Suite 1, Level 5, 110 Walker Street
North Sydney NSW 2060
Phone: 02 8908 5500
Email: admin@ampc.com.au
Website: www.ampc.com.au

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