

RD&E PROJECT UPDATE: Managing ammonia emissions and pad moisture

LIVESTOCK EXPORT PROGRAM AND UNIVERSITY OF NEW ENGLAND PROJECT PARTNERSHIP

A four-year Project Partnership between the Livestock Export Program and the University of New England (UNE) is providing the science to develop recommendations on stocking density, bedding and ammonia for live cattle and sheep export voyages. To find out more about the Project Partnership, scan the QR code.



Trial objective

The accumulated manure and urine from sheep on livestock export vessels form a 'pad' that provides a comfortable resting place during the voyage. Under certain conditions, there is a risk that ammonia can be emitted from the pad and concentrations in the air can increase. At certain concentrations, ammonia can cause irritation for workers or livestock.

This trial assessed pad formation and ammonia production of Merino sheep housed at five different stocking densities over a 21-day period, which is a similar length of time to a livestock export voyage from Australia to the Middle East.

This trial, along with others, will enable researchers to develop a risk predictor model for ammonia emissions, which will help exporters and vessel operators to maintain optimal conditions for livestock on export vessels.

Methodology

A total of 260 Merino wethers with an average weight of 41kg were housed in groups in respiration chambers for 21 days.

To replicate commercial conditions, the sheep were shorn one week before arriving at the facility in compliance with the Australian Standards for the Export of Livestock (ASEL). They were also adapted onto a commercial shipper pellet ration, the same feed ration Australian sheep receive on export vessels.





During the trial, sampling was conducted twice daily at eight heights above the faecal pad to measure the ammonia levels in the air.

Other measures collected included liveweight and body condition score on entry and exit from the chambers, water and feed intake of the group, animal health, pad condition, and continuous sampling of chamber gases such as ammonia, oxygen, methane and carbon dioxide.

Detailed sampling of the pad occurred once the sheep had been removed from the chamber after the trial. Pad depth, moisture, pH and bulk density, and the ammonium concentration of the pad, were all measured.

Continuous video footage was also collected for the trial duration and will be analysed to assess group synchronicity and behaviours.

Next steps

This research provides an understanding of the development of the pad and production of ammonia for future trials. Variables such as airflow, bedding application rates, dietary protein composition, on-pad and in-feed ameliorants, and climatic conditions are also being investigated to inform the predictor tool.



SUMMARY

Research objective	The Project Partnership is examining bedding and ammonia management to develop practical predictive tools and interventions to identify and manage risks.
This trial	Examined ammonia emissions from the sheep pad to begin to identify the factors contributing to occurrence on vessels
Future trials	<ul style="list-style-type: none"> • Design and construction of microchambers for measuring ammonia output under different environmental conditions and with various ameliorants • Completion of a causal web for ammonia emissions by assessing the effect of: <ul style="list-style-type: none"> – different rates of bedding – different rates of air flow and ventilation – on-pad treatments – dietary protein composition – temperature – feed additives
Validation	On-board validation of results on a livestock export vessel

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