LIVECORP
THE AUSTRALIAN LIVESTOCK EXPORT CORPORATION

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Project overview

Livestock Export Program and University of New England Project Partnership

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University of New England

Providing the science behind recommendations on stocking density, bedding and ammonia for live cattle and sheep export voyages.

February 2021

Background

The number of animals in a pen, or stocking density, has a critical influence on the welfare of livestock exported by sea from Australia, and is one of the key determinants of the sustainability and profitability of the industry.

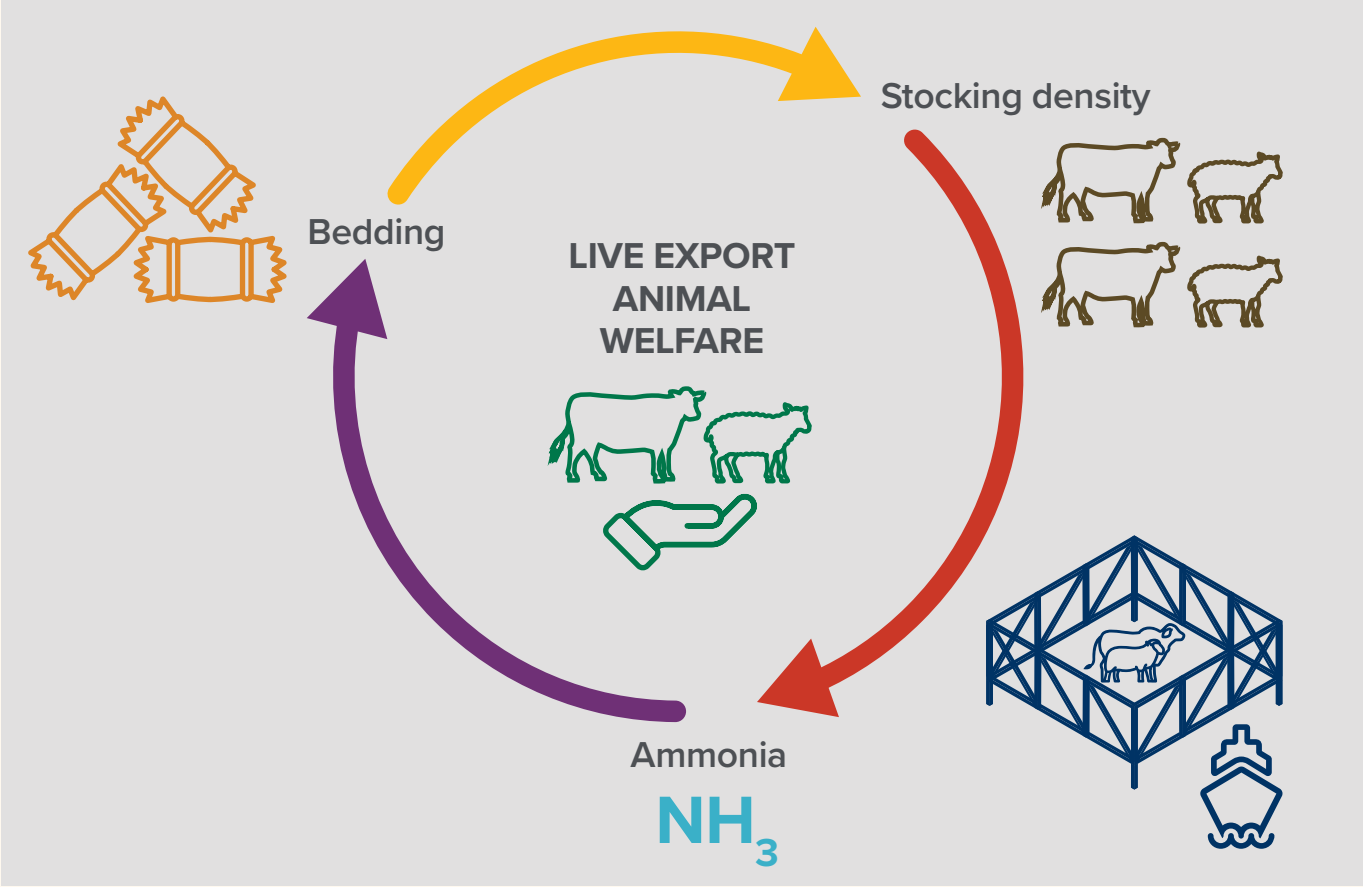
For livestock on board ships, stocking density, the condition of their bedding, and the amount of ammonia in the air can all have an impact on animal welfare. In many ways, these three factors are interdependent.

Stocking densities and bedding requirements on livestock export ships are determined by strict regulation under the Australian Standards for the Export of Livestock (ASEL), administered by the Department of Agriculture, Water and the Environment.

However, there is little scientific understanding of the impact of stocking density on behaviour, how animals use the space provided, or how it affects their overall health and wellbeing. The interaction between the quantity of space provided and the quality of that space, including climatic conditions and access to resources such as feed, is also unknown.

There is also no scientific evidence in relation to the bedding rates outlined in ASEL 3.0, how or why this may affect the amount of ammonia produced and whether air flow will interplay with the production of ammonia under certain bedding application rates.

A long-term strategic partnership has been established between the Livestock Export Program (LEP)* and the University of New England (UNE) to take a holistic, rigorous approach to research and development (R&D) into these key areas.



What is the Project Partnership?

The Partnership is a four-year R&D collaboration which commenced in late 2019. The LEP is providing $1.2 million in funding, with UNE providing significant in-kind contributions of nearly $1 million in salaries and student allocations.

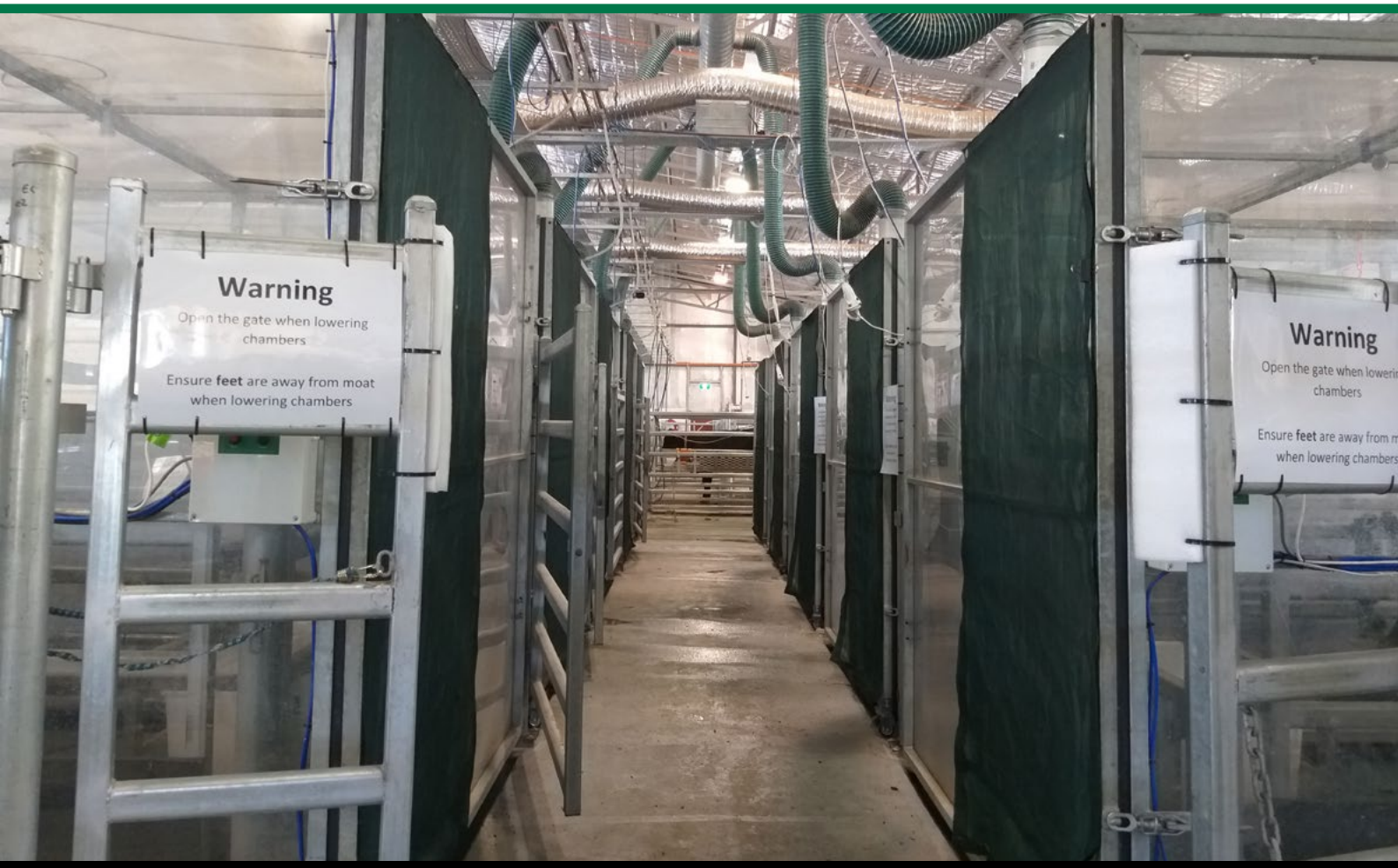
The peer-reviewed research will lead to a scientifically robust understanding of the links between livestock welfare, bedding and ammonia management, and stocking density during the livestock export process.

This research will support industry and government in the development of accurate and effective standards under the current ASEL regulation relating to stocking density, and ammonia and bedding.

Practical predictive tools and interventions for industry to identify and manage risks will also be developed.

The primary objectives of this project are to:

- Investigate the behaviour of sheep and cattle when given ample room and when housed in a restricted space
- Investigate how animal behaviour and welfare change when factors such as temperature and bedding are altered
- Investigate how livestock respond to different levels of ammonia in controlled environments and on board live export ships.



The chambers at UNE being used in the trials to capture and analyse ammonia, methane and other gasses produced by the animals and the manure pad.

Governance

A skills-based working group has been set up for the duration of the Partnership, providing advice on project methodology to ensure the design of the projects supports the interests and needs of industry. This will ensure the research is relevant to on-the-ground challenges and practical implementation, addresses priority areas of concern and provides robust, high-integrity research results.

The working group comprises 11 individuals from throughout the livestock export supply chain, including an independent Chair, representatives from the Australian Government Department of Agriculture, Water and the Environment; LiveCorp; MLA; exporters; and an independent technical scientific advisor from the Livestock Export R&D Advisory Committee (LERDAC).

Benefits to animal welfare

A greater understanding of the interaction between factors such as stocking density, ventilation, the condition of livestock pens and animal welfare will support decision-making by industry and the regulator.

The evidence the Partnership collects will help to accurately predict manure pad moisture and ammonia concentrations during voyages, and the impact of various interventions – allowing better management and improvements to the health and welfare of sheep and cattle on export ships.

It will also enable industry to make scientifically supported recommendations on optimal stocking densities and bedding management for incorporation into future refinements of ASEL.

The conditions on board livestock export ships, including the physical environment and air quality, are an area of concern to many in the community. Continual improvement will provide reassurance about animal welfare.

What are the projects?

Multiple projects will be carried out over the four years of the Partnership. Trials will be carried out on land initially, to enable rigorous, controlled replication of experiments, before the findings are validated on livestock export ships.

Impacts of stocking density

Current regulations regarding stocking density during sea transportation consider the weight of animals when calculating space allowance, but disregard their behaviour.

How a group of livestock choose to use space under ideal conditions, excluding the other stressors involved with sea transportation, is largely unknown.

The Partnership will provide a better understanding of the behaviour of animals under different stocking densities, which will inform evidence-based recommendations on optimal levels for sheep and cattle that minimise the impact on animal welfare.

A series of land-based experiments will examine how both sheep and cattle use space and how this can change under different climatic conditions and with the restriction of different resources, for example, in pens and at feed and water troughs.

The results will then be tested and validated on livestock export ships, under real day-to-day conditions.

Impacts of bedding and ammonia

The condition of bedding provided on ships and the amount of ammonia in the air from manure can impact animal welfare, health and performance outcomes.

Ammonia can also impact the health and safety of the crew.

The primary use of bedding on voyages from Australia is to minimise the incidence of lameness and skin abrasions, and to control moisture in the manure pad. It also helps to maintain lower levels of ammonia, minimise the amount of manure sticking to animals' coats and helps to reduce the moisture in the air.

The Partnership aims to improve the health and wellbeing of sheep and cattle on ships, by identifying optimal pad moisture and ammonia concentrations during the voyage.

Trials will be conducted with sheep and cattle housed in large enclosed transparent chambers that capture and analyse ammonia, methane and other gasses produced by the animals and the manure pad, as well as lab-based experiments with manure in incubators.

Animal-based and lab-based experiments will investigate how air ammonia and pad condition are affected by variables such as bedding, airflow rates, climate, stocking density and animal diet, and interactions between these variables.

The results will be fed into a multi-variate model to help exporters predict the conditions likely to result in unsafe air ammonia levels, or pad degradation, and suggest options for reducing the risk of these. The model will be validated later by research conducted on board ships.

The research will result in the development of practical recommendations for industry on the dietary, airflow, and bedding management practices required to best manage pad moisture and reduce on-board ammonia accumulation.

With these recommendations, the Australian livestock export industry will be able to improve the welfare of animals by having the tools to confidently predict and manage undesirable pad moisture and ammonia conditions.

UNE's Dr Amy Tait and Dr Fran Cowley at the research facility where trials are being undertaken.

Timeline

YEAR	OUTPUT
2020	• Understanding the frequency and synchronicity of behaviours of sheep housed in different group sizes • Assessing pad formation and ammonia production of Merino sheep housed in different stocking densities
2021	• Understanding the inherent welfare impacts of different stocking densities for sheep • Understanding the interaction of quality and quantity of space for sheep
2022	• Understanding the effects of bedding, climate, stocking density and airflows on ammonia production from cattle manure pads • Understanding the welfare impacts of different stocking densities for sheep housed under high heat load conditions • Recommendations of dietary changes and on-pad ameliorants to reduce ammonia production
2023	• Understanding the inherent welfare impacts of different stocking densities for cattle • Understanding the interaction of quality and quantity of space for cattle

* About the Livestock Export Program

The Livestock Export Program (LEP) is a formal joint venture between the Australian Livestock Export Corporation (LiveCorp) and Meat & Livestock Australia (MLA), funded by both marketing and research levies.

The research, development and extension (RD&E) investments are made through the LEP RD&E Program, funded 25% each by the partners, and 50% by the Australian Government, which provides matching funds for research levies.

Around 70% of the annual RD&E budget is allocated to projects aimed at improving the health and welfare of cattle, sheep and goats throughout the live export process, with around 20% spent on improving efficiencies from the farm to countries which receive Australian livestock, and the remainder on maintaining and improving access to overseas markets.