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BRIEF COMMUNICATION: Livestock welfare during transport in New Zealand: Rethinking stock crate design

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Abstract

This brief communication summarises findings from a review of New Zealand transport stock crates. The "one-size-fits-all" approach to multi-purpose crates does not adequately address species-specific behavioural and physiological needs, making it difficult for transport operators to meet animal welfare standards. Issues identified included insufficient ventilation, headspace and weather protections, steep ramps and flooring materials that are not fit-for-purpose. Government and industry standards are out of step with current science and urgently need to be reviewed to improve livestock welfare during transport. Key research gaps must be addressed to inform new and revised standards before any changes are made to future proof crate designs. As the transport industry bears much of the pressure, greater accountability is needed across the entire supply chain. Collective action and system-level change is critical to ensure the long-term sustainability of New Zealand's livestock transport industry.

Keywords: livestock, transport, animal welfare, stock crate design

Introduction

The livestock transport industry is a critical component of New Zealand's livestock production supply chain and plays a key role in managing animal welfare during transport and through to the point of slaughter (MPI 2025). To remain sustainable and meet evolving consumer expectations, the industry must operate in alignment with animal welfare and environmental standards.

In New Zealand, there are no regulatory limits to the duration or distance livestock can be transported, except for young calves (12-hour limit) (MPI 2025). This allows meat companies to transport livestock according to their procurement schedules to meet operational needs, often resulting in long distances, including Cook Strait ferry crossings. A particular concern is heat stress, which can lead to morbidity and high mortality rates (Dobbinson 2020). Livestock are at greatest risk of heat stress when vehicles are stationery and air flow is minimal, for example, on interisland ferries and waiting to unload (Fisher et al. 2004). While extensive research has investigated the welfare of livestock during transport internationally, relatively few studies have investigated welfare risks and design features of stock crates in New Zealand (e.g., Fisher et al. 2004; Dobbinson 2020). Stock crates are generally built to a standard design. However, they are legally restricted by outdated standards (NZS 5413, 1993), which specify minimum requirements for crate design and construction, and road regulations restricting weight, length and height, set by the New Zealand Transport Agency.

This brief communication summarises findings from a review into New Zealand stock crates (MPI 2025), commissioned to ensure crates are fit-for-purpose and comply with animal welfare and health and safety standards.

Materials and methods

The review (MPI 2025) included a scientific literature review, an assessment of best practice guidelines and regulations in New Zealand and overseas, and an analysis of crate design specifications. Other key results came from stakeholder engagement, conducted through face-to-face meetings and four national workshops to identify challenges complying with standards and opportunities for improvement.

Results and discussion

NZ stock crates are uniquely designed for New Zealand road conditions and farm systems, and to meet road restrictions. Over recent years, incremental changes to design have been implemented, mainly driven by the need to comply with regulations (e.g., driver safety, effluent management, back rub) and reduce transport costs (e.g., increase loading capacity), with less consideration about features for improving animal welfare.

This has resulted in a fleet of species-specific stock crates being replaced by multi-purpose crates, with various deck configurations designed to accommodate multiple species of different ages. However, this 'one-size-fits-all' approach poses risks to animal welfare, as many of the design features do not account for species-specific responses to stress, thermoregulatory abilities and behavioural needs of the different types, size or age of livestock. This creates challenges for the industry to meet some of the current animal welfare standards. Some issues identified included:

1) Insufficient ventilation to provide sufficient airflow.

Industry standards restrict the ventilation gap to ≤100mm, largely to prevent effluent escaping and animals' limbs protruding. Fisher et al. (2004) reported temperature/ humidity levels inside crates exceeding levels indicative of heat stress. Further, ventilation gaps are sometimes blocked by floors being folded against the wall or animals themselves, especially when sheep are tightly loaded (MPI 2025). Further research is required to develop science-based guidelines for the optimal configuration and size of ventilation gaps.

2) *Insufficient head space to allow standing in a normal posture.*

Current deck heights, within stock crate pens, fail to meet requirements for some animals to adopt normal standing postures, have freedom to move their head or stand without contacting the ceiling (Figs. 1-2). They do not meet international head space recommendations (e.g., ≥20cm above full standing head height), as summarised in MPI (2005). Evidence-based thresholds for species-specific head space requirements and optimal air flow need to be determined under New Zealand conditions.

3) Cover designs do not provide appropriate weather protections.

Industry standards require that covers are used when livestock are transported on the top deck of the vehicle. These are typically made of mesh or webbed strapping. Although some mesh designs provide some shade, they don't provide sufficient protection from solar radiation. Materials are also not waterproof or designed to protect livestock from rain or snow (MPI 2025), making it difficult to meet regulations for protecting calves from adverse weather. Additionally, compliance with cover use is often lacking due to the inconvenience of fitting them. This increases the risk of injuries or mortalities from animals escaping over the top deck or being struck by low bridges (MPI 2025).

4) *Internal ramps exceed recommended slopes.*

Internal ramps are designed for ease of cleaning, weight and the ability to reach multiple decks. The recommended angle for external ramps to prevent slipping, injuries and baulking behaviour is a maximum of 20 degrees (Grandin 2008). Current ramp designs are approximately 30-35 degrees for new crates and up to ≥40 degrees in older crates. In addition, ramp steps are narrower and steeper than Grandin (2008) recommended for cattle (≤100mm rise, 300mm tread). New stock crates are built with a 230mm rise and a 60mm tread, further increasing the risk of injuries (MPI 2005).

5) *Flooring surfaces do not meet species-specific needs.*

Floors are designed for flexible deck configurations, grip, ease of cleaning, weight and effluent management using steel mesh, perforated aluminium and grip bars. Grip bars are unlikely to meet requirements for animal comfort as they prevent standing in a flat position to maintain balance and increase the risk of animals lying in excess effluent. The 'one size-fits-all' design does not meet species and age-specific needs, including different preferences for lying vs. standing during transport (e.g., pigs and calves are more inclined to lie down compared to adult cattle or sheep).

Figure 1. Lambs (approximately 48-50kg) loaded (11/pen) into a 3-deck crate configuration before and after the floors were closed down. Photo credit: Mairi Stewart

Figure 2. Ewes loaded into the second deck of a 3-deck crate configuration before and after the floors were closed down. Photo credit: John Tacon

During stakeholder engagement, the lack of clarity across some of the industry and government standards and a level of ambiguity was highlighted (e.g., the meaning of normal posture). This creates confusion about what is required and limits the ability to maintain a uniform minimum level of requirements across the supply chain. This is consistent with a study by Duval et al. (2024) where most of the transport regulations assessed across five countries (Australia, Canada, New Zealand, European Union and United States of America), were found to be insufficient or too vague to adequately protect livestock welfare during transport.

Despite relatively new transport regulations in New Zealand, both government and industry standards are out of step with current science and current crate design and use (MPI 2025). The multi-purpose design appears to be ineffective for managing heat stress (Dobbinson 2000) or meeting species-specific needs. This creates challenges for transport operators to meet animal welfare standards. Given predictions that extreme weather events will increase, the risks of heat stress in during road transport will likely increase.

This research highlights the urgent need to review New Zealand's livestock crate guidelines and both government and industry standards. Incremental improvements within the constraints of existing crate designs are unlikely to deliver the required improvements for livestock welfare. The research gaps that must be addressed to inform a review of the welfare standards and a recommended pathway forward were provided in the report (MPI 2025).

Importantly, crate design is only part of the equation. The report also identified operational barriers including procurement processes and pricing pressures, as well as the need for driver education and better preparation of animals prior to transport. As the transport industry bears much of the pressure, greater accountability is needed across the entire supply chain. Collective action and system-level change is critical to ensure the long-term sustainability of New Zealand's livestock transport industry.

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