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THE EFFECTS OF VEHICLE DESIGN AND STOCKING DENSITY ON ENVIRONMENTAL CONDITIONS FOR LAMBS ON ROAD TRANSPORT VEHICLES

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The transport of livestock on longer road journeys can expose animals to challenging conditions that may compromise animal welfare. Preliminary field data indicated that slaughter-weight lambs were at risk of heat stress, especially during stationary periods and while vehicles were on enclosed ferry decks. The aim of this study was to evaluate the potential of variations in crate design and stocking density to improve environmental conditions on lamb transport vehicles during summer.

Experiment 1 measured the effects of crate design, and compared a newer, alloy design (3-deck truck, 4-deck trailer) with an older, more ventilated, steel design (3-deck truck, 3-deck trailer). Experiment 2 measured the effects of lamb stocking density, and compared "standard practice" stocking density (≈ 0.20 m^2 per 35 kg lamb) with "low density" loading (reduced by 20%). Each experiment was replicated twice and each journey consisted of travel periods and stationary periods designed to emulate conditions associated with a longhaul road journey incorporating an inter-island ferry crossing. Air ammonia concentrations, temperature and humidity were monitored within each vehicle.

Ammonia concentrations were generally low in both experiments. The temperature humidity index (THI) increased when the vehicles were stationary, especially under conditions designed to emulate an enclosed ferry deck (Figure 1). Values of THI over 80 represent significant heat stress conditions. The ambient climatic conditions during Experiment 1 were not very warm, although there was evidence that THI was slightly lower in the older design crate (Table 1). High ambient temperatures were present during Experiment 2, and THI was significantly lower at low density loading (Table 1).

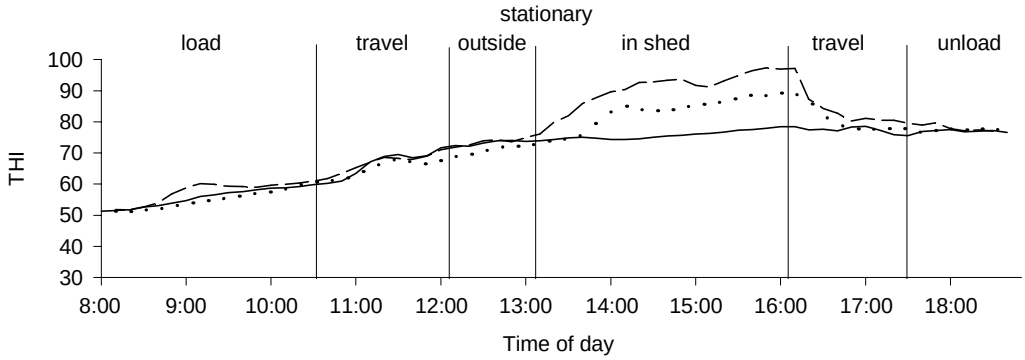

Figure 1. THI responses for a journey in Experiment 2. ---- standard density; ···· low density; — ambient

For a given lamb transport vehicle, a strategy such as lowered loading density may be of considerable benefit during longhaul and inter-island transport on hot days. Vehicle designs incorporating additional ventilation are also likely to be beneficial, but further research is needed to identify the ambient conditions which cause dangerous increases in THI inside vehicles, to permit appropriate action (e.g. reduced stocking density) when ambient conditions are predicted to reach defined limits.

Table 1. The effects of vehicle crate design and stocking density on THI

Journey stage	Treatment		SED	P value
	Newer crate design	Older crate design		
Stationary outside	65.0	62.9	0.08	0.023
Stationary inside shed	76.1	73.6	1.19	0.29
Journey peak value	81.5	78.4	1.40	0.28
	Standard density	Low density		
Stationary outside	71.6	68.9	0.44	0.25
Stationary inside shed	84.3	79.6	0.53	<0.001
Journey peak value	91.0	84.9	0.91	<0.001

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