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Submitted online: <https://haveyoursay.agriculture.gov.au/hsra-review>

Animals Australia submission to the Heat Stress Risk Assessment (Draft Report December 2018) by the Technical Reference Panel

Animals Australia appreciates the opportunity to provide input in response to the Draft Report and to the Technical Reference Panel (TRP) recommendations on the changes required to provide protection from heat stress during sea transport from Australia.

In summary – Key points

Animals Australia strongly supports each of the recommendations of the TRP report as they are soundly based on science, veterinary observations and long-standing evidence. In particular we support the key recommendations 1, 2 and 3 that require that 28 Wet Bulb Temperature (WBT) be the benchmark shipboard heat level for the standard Merino wether used in the HSRA software (Hotstuff) in place of the current mortality threshold indicator (35.5 WBT). This is the **minimum** required to provide a meaningful protective measure for exported sheep.

We note however that this designated 28WBT figure is conservative; scientific studies and real case data from ships (see page 19 of the TRP report) show that once 28 WBT is *merely reached* sheep cannot maintain a safe core body temperature and will experience significant heat stress. It is also important to note that suffering will be prolonged as temperatures in the northern hemisphere summer are notoriously stable, and particularly as there is little diurnal variation¹ (relief is not usually provided overnight) as would occur on Australian farms to assist sheep to shed their excess heat load and to regain homeostasis.

Further, and crucially, the calculations relied upon in the Hotstuff HSRA model and by the TRP (see Figure 2, based on Stacey W.LIV.0277) use *ambient* temperatures to model conditions expected on voyages and in ports. This significantly underestimates the actual temperature and humidity conditions that will be experienced by the animals in pens on the ship decks. The WBT is typically at least 2 and up to 6 WBT² degrees higher in pens than on the ship's bridge (the records used in Stacey W.LIV,0277) due to the effect of the animals' metabolic heat and on-board mechanical facilities contributions.

Please note: Some reiteration of information and evidence provided in our previous detailed submissions is inevitable given the similar issues covered in the McCarthy Review (May 2018), the Australian Maritime Safety Authority shipboard facilities (Marine Orders 43) review (May 2018), the Department of Agriculture and Water Resources (DAWR) HSRA Issues Paper (October 2018), and the ASEL review (November 2018).

¹ Anna Barnes et al, *Physiology of Heat Stress in Cattle and Sheep* (Meat and Livestock Australia & Livecorp) Project Number LIVE.0209 (2004).

² Stockman, C., Barnes, A., Beatty, D., Maloney, S., & Taplin, S., *Electrolyte Supplementation of Export Cattle, and Further Investigations in the Heat Stress Threshold of Sheep and Dairy Cattle* (Meat and Livestock Australia) Project Code LIVE.224 (2008) <<http://www.livecorp.com.au/LC/files/fe/fe617365-311d-466a-bd7a-e91ad228a78e.pdf>>

However, for convenience and to avoid (full) repetition, we provide our submissions to the McCarthy review and to the DAWR Issues paper on HSRA as **Attachment 1** and **Attachment 2** respectively. Relevantly, each has specifically documented the high and unacceptable risks to the welfare of animals during live export (and in importing countries) from heat stress and other challenges posed by this long distance transport. Each submission is extensively referenced in regard to the scientific literature (including industry research) and related shipboard data, and it would be superfluous to merely repeat this here.

Background:

As you will be aware, Animals Australia is a peak animal protection organisation in Australia. We have monitored, investigated, and scrutinised the live animal export trade for more than 30 years and are recognised as a key stakeholder in matters relating to the welfare of animals in this trade.

Along with every animal protection society the world over, we advocate that all animals be slaughtered as close as possible to their farm of origin, in order to avoid the unnecessary stress and suffering that is caused by additional transport and handling.

This principle was emphasised this month in a long distance transport report to the European Parliament ([passed](#) overwhelmingly by MEPs). This is particularly pertinent in the live animal export trade, where our evidence has consistently shown that animals are routinely subjected to unskilled and cruel handling methods, as well as long-haul transport in perilous conditions which result in suffering and often ends with inhumane slaughter practices.

It is irrefutable that - with now almost 40 years of annual mortality statistics; the regulator's investigation reports of high mortality air and sea shipments; onboard veterinarians' reports; video evidence of routine conditions onboard the MV *Awassi Express* during 2017; and, most recently, the redacted reports of the shipboard 'Independent Observers' during 2018 - heat stress causes dire welfare and life-threatening impacts on exported animals.

However, heat stress issues are not confined to sheep travelling to the Middle East from May to October, but rather it affects the welfare of *all* live exported animals travelling from Australia across the equator at *any* time of the year.

Further, as the TRP report indicates, heat stress is also of concern for Australian sheep upon and after arrival in the northern hemisphere as they are held in feedlots prior to slaughter.

Heat stress is only one of the many risks to the welfare of animals in this trade. **Animals Australia is therefore opposed to the live export of animals and advocates for a total phase out.** In the interim, we continue to engage in review processes which may mitigate some animal suffering. It is in this context only that the following input is provided.

Animals Australia's response to each Technical Reference Panel recommendation

1. *That in moving from a heat stress risk assessment (HSRA) framework focused on mortality to one focused on animal welfare, we recommend wet bulb temperature (WBT) should be used as the criterion to ensure exported sheep do not suffer poor welfare outcomes due to excessive heat load. This is the best criterion because WBT most closely influences the physiological impacts of heat load on the animal, and because there is more data available documenting animal responses to varying WBTs than for other criteria.*

Agreed: As advised by the scientists on the TRP (named in Section 9.2) **humidity** is a critical factor in the ability of sheep to regulate their core temperature, thus the importance of WBT as the key indicator of heat stress and suffering.

In addition, as the heat and humidity rises, sheep increase their water consumption and the ventilation is no longer able to dry the onboard sheep pen pad. On voyages to the Middle East in the hotter months, the underfoot pad typically then becomes wet and 'boggy' and ammonia or other noxious gases rise as a direct result of the humidity. These conditions increase the incidence of inappetence and inanition, often leading to enteritis and resultant additional suffering and death³.

Inanition and related enteritis are recognised as the primary cause of sheep deaths on shipments; heat stress caused by rising humidity (particularly) exacerbates this in the months of May to October each year to the extent that the death rate on ships to the Middle East ports is effectively doubled in that period (and has been similar since records began in the early 1980s). DAWR records (from Masters' reports)⁴ show the monthly death figures/percentages of sheep exported to the Persian Gulf (from 2005 – 2017)⁵; the overall death rate escalates in May and reduces only after October. Similar figures, with the same pattern, are available for the Red Sea ports.

2. *The recommended WBT limit for a standardised shipper sheep (56 kg adult Merino wether, body condition score 3, zone 3, winter acclimatised, recently shorn) is 28°C. This threshold is based on the data evaluated by the panel that consistently indicates an unrelenting challenge to homeostasis once sheep are exposed to WBTs above this value. This limit conforms closely with the heat stress threshold derived, but not currently utilised, in the industry heat stress risk assessment model. This provides a straightforward means of implementation, including calculated adjustments within the model for different classes of sheep based on breed, bodyweight, body condition, wool length and acclimatisation.*

³ Clive Phillips (2016) 'The welfare risks and impacts of heat stress on sheep shipped from Australia to the Middle East' 218 *The Veterinary Journal* 78, 83.

⁴ DAWR, *Reports to Parliament*, <<http://www.agriculture.gov.au/export/controlled-goods/live-animals/live-animal-export-statistics/reports-to-parliament>>

⁵ See Appendix A and C of Attachment 2.

Agreed: We understand that the HSRA model (Hotstuff) can already accommodate and adjust for variations in sheep classes, breed, bodyweight, wool length and acclimatisation, and it is only required that the WBT limits used (i.e. heat stress threshold rather than mortality threshold) be altered.

The 28 WBT threshold (as the basis for the 'standard' sheep) accords with all the scientific literature we have viewed (in line with the TRP finding). In addition it is consistent with our examination of AAV daily shipboard reports received under FOI which indicate increased respiration, open mouth panting as recorded WBT temperatures approach and exceed this level on decks.

Indeed we expect this is a *conservative* figure as in the AAV daily reports the temperatures and humidity readings (WBTs) are those taken/recorded mid-morning on ships. Similarly, the AAVs report on animal behaviour will primarily be from the mid-morning rounds – not during the hottest part of the day⁶. As indicated in Recommendation 5, any future assessments of the risks of heat stress on voyages must be based on more accurate indications of the daily maximum and the duration of WBT levels and other readings on shipments.

3. In incorporating Recommendation 2 into the HSRA model, it is recommended that the 28°C WBT welfare limit (once adjusted for sheep class, weight, acclimatisation, body condition, fibre length) be applied as a vertical line to intersect with the 98 per cent point on the distribution of deck WBT probabilities throughout the voyage.

Agreed: This probability limit is appropriate. It is consistent with the industry, Government and farmer views (expressed most recently during 2018 after footage from the Awassi Express was released). For example, the DAWR Secretary stated 'mortality outcomes are not a sufficient measure of the performance of the trade and certainly not of the welfare of the animals involved'.⁷

The risk of adverse welfare outcomes is the key indicator of heat stress risk, and should be adopted instead of the current mortality limit in Hotstuff (i.e. 98% risk of a 5% or higher death rate). It is therefore appropriate that the heat stress limit - which will be aimed at avoiding animal suffering caused by excessive heat load – is set at least at the same risk level as the previous Hotstuff mortality risk level (albeit that was set arbitrarily by the industry).

4. The base stocking density to be used for each class of sheep, that is then subject to adjustments through application of the HSRA model, should be the stocking density determined by the ASEL.

⁶ See pages 8 and 9 of Attachment 2 which discusses and provides full references for the WBT threshold level indicating heat stress to be in the order of 28WBT for the 'standard' sheep.

⁷ See, for example, Hansard Senate Estimates of 24/5/18 of the Senate Committee on Rural and Regional Affairs and Transport Legislation Committee, p 123.

Agreed in principle: However – as ASEL stocking densities are now under review, and the current stocking densities are totally inadequate (including the density reductions imposed during the 2018 northern summer and the current 17.5% reduction), we cannot accept this recommendation in full until an appropriate stocking density regime is regulated.

See page 5 of **Attachment 1** which provides the evidentiary and scientific basis for an allometric allowance for sheep of *k-value* 0.047 which will enable the animals on board to freely access food, water and rest without constant disturbance by others due to crowding. This level of stocking, to provide these basic welfare requirements, are the minimum required by the relevant OIE standards.

5. *That future refinements of the HSRA model examine diurnal and day-to-day variations in deck WBT data. This may help inform further refinements of the HSRA model and the welfare WBT threshold, based on the likelihood of respite from high WBT that sheep may experience for a planned voyage.*

Agreed: It is a key inadequacy that the current model does not factor in the added heat load which occurs when night-time (or other periods) temperatures fail to reduce and provide relief. This is the norm in both the Middle East region and even in equatorial waters (reached just 5 days from Fremantle port) during the period of May to October each year.

This extract from key industry research describes this risk:

Animals transported by ship can be exposed to hot and humid conditions. Voyage reports (eg MAMIC 2000a) indicated that animals travelling to the Middle East during the northern summer (May to October) experienced conditions over 30 °C wet bulb, often for sustained periods of several days, with nil or little diurnal respite. The air entering the decks can be hot and humid, and it can become worse with the addition of heat from the animals, so that animals further from the entry points can be subject to extreme heat and humidity. The continued generation of heat by the animals, and radiation of heat from the ship's surfaces can maintain these conditions day and night, especially in equatorial waters where there is little cooling at night⁸.

6. *Care for sheep welfare should extend beyond the voyage period. Therefore it is recommended that the environmental conditions that sheep may be exposed to at their destinations in the Middle East be considered in the risk assessment process.*

Agreed: We welcome this consideration of the conditions in the several weeks after arrival in the Middle East. This is a current failing of ESCAS - that heat/humidity and feedlot facilities and husbandry is currently not adequately reported on, and therefore considered by DAWR. In fact it is evident that many sheep suffer and die due to heat stress (and other ailments) in Middle East feedlots soon after arrival. In the past this has been as high or higher than those that have died on shipments.

⁸ Anna Barnes et al, *Physiology of Heat Stress in Cattle and Sheep* (Meat and Livestock Australia & Livecorp) Project Number LIVE.0209 (2004).

The industry has current data (see below), but it remains unpublished. This is therefore an aspect of the trade that is still to be independently examined.

Historic studies found some 3% of sheep died in the feedlots, and up to 4% were sent for emergency slaughter. This was reported to be when they were 'debilitated, diseased or injured'. This study charted deaths for two feedlots in the Middle East (in 1988) on all shipments/consignments for a year (12 shipments for one, and 21 for the other) – with over 700,000 sheep in the sample. While sheep were held for about a month after arrival in the Middle East, 49% of the deaths were in the first week⁹.

More recent industry research indicates that the welfare of animals in the Middle East during the northern hot months is of concern, as the following extracts show:

A specific study reported in 2008:

*Ambient temperatures in the Middle East region during the summer months (> 42°C) are higher than those experienced in the regions from which Australian sheep are typically sourced. The religious festivals creating the greatest demand for sheep meat (Ramadān and Eid Al Fitr) currently coincide with the cooler months in Australia and the hotter months in the Middle East. The situation will become more intense over the next 5 years as the start of Ramadān (10 days earlier each year) moves into July and August, the hottest and most humid of the summer months.*¹⁰

In 2014:

*...Anecdotal evidence suggests high pen densities [in ME feedlots] in association with adverse summer conditions may contribute to spikes in mortality rates and contribute to feedlot sickness due to heat loads. However this has not been scientifically evaluated, nor has the optimal amount of space required per animal under such conditions. Research related to pen air turnover on livestock transport vessels indicates more space will allow for more airflow, providing there is air movement (Stacey, 2014).*¹¹

There has now been considerable research on the heat load issues for sheep in Middle East feedlots (and on ships prior) over the past 5 years. However the full MLA-funded reports have not been published due to confidentiality arrangements¹² with feedlot operators and importers. Instead these reports have been shared only with the live export industry.

We have also been informed that DAWR only has the published summaries of those reports¹³ and also that the full reports were not provided to the TRP (though one TRP member is one of the researchers involved).

Extracts from the published summaries of these reports show there is a great deal of information available.

⁹ DW Scharp (1992) 'Performance of Australian wethers in Arabian Gulf Feedlots after transport by sea', 69(2) *Australian Veterinary Journal* 42.

¹⁰ Darryl Savage et al, *Post Discharge Induction Procedures for Sheep in the Middle East* (Meat and Livestock Australia) Project Code B.LIV.0127 (2008) 3.

¹¹ S Dundon and D Mayer (2015) 'Pen Parameters for Improving the Performance of Sheep Imported from Australia to Persian Gulf Feedlots' 126 *Small Ruminant Research* 16, 17.

¹² Personal communication on 21/2/2019 with Sharon Dundon, Manager, Livestock Export Research and Development, MLA, regarding Live Export Program (LEP) research reports - W.LIV.0379; W.LIV.3018 and W.LIV.3038.

¹³ Personal communication on 24/1/2019 with Jim Paradise, A/g Assistant Secretary, Livestock Export Reviews, Animal Welfare Branch, DAWR.

Anecdotal evidence suggests that extreme heat and humidity during summer months in the Middle East causes increased mortalities in Australian sheep kept there in feedlots. From an animal welfare perspective it is important to understand what the threshold for increased mortality is in terms of weather conditions...

Environmental weather conditions were monitored in five feedlots in the Middle East (ME), which are the end point before slaughter for Australian sheep that are part of the live export supply chain. ...

The hottest environmental weather conditions were observed in the months from June through September in the five feedlots. A total of 2,277,502 sheep went into the ME feedlots during the study.¹⁴

A related study from 2013 – 2015 is said to have (among other elements):

Gathered data on the internal temperatures of groups of sheep and the environmental conditions that they experience during their normal transition from Australia into Middle Eastern feedlots, from 6 shipments¹⁵.

A further study in 2016 indicated that:

'...feedlotting in a hot, humid destination exposed the sheep to sustained periods of moderate to high wet bulb temperature' and that 'there was a greater decrease in rumen temperature for sheep under double shade plus fans plus ground wetting than in control sheep kept under single shade'¹⁶.

7. *These recommended refinements to the HSRA model to shift to an animal welfare basis are accompanied by a parallel and ongoing need to measure and record environmental conditions accurately, as well as the monitoring of sheep responses to heat accumulation during the voyage. These data should be used in a feedback loop for future use in the heat stress risk assessment model, and to enable effective, objective, defensible and transparent monitoring and protection of animal welfare of transported sheep. This suggests a need to deploy well maintained monitoring equipment (such as to monitor WBT) at a sufficient number of relevant locations on the livestock decks of ships transporting sheep.*

Agreed:

Whilst ever live export of animals continues, sound measurements of environmental conditions and the sheep's physical and behavioural aspects are crucial. These regular and extensive measurements must be undertaken by skilled and independent people (not industry employees/contractors).

DAWR must monitor reports and ensure uptake of findings.

¹⁴ W.LIV.0379 Monitoring Middle East feedlot temperatures – 2010 to 2015.

¹⁵ W.LIV.0318 Heat load in sheep exported to Middle Eastern feedlots

¹⁶ W.LIV.3018 Phase Two - Heat Management in the Middle East

8. We recognise there are other factors on-board ships that may influence sheep response to environmental heat and therefore recommend that consideration is made to record other factors such as CO₂ and ammonia

Agreed – Recent studies of the impact of ammonia (particularly) are a cause for great (but not unexpected) concern, and is recognised as a key risk factor when temperature and humidity increases on ships, wetting the sheep pad. Both human (crew) and animals will suffer when ammonia and noxious gases rise. Animal suffering is clear from the following extract:

Ammonia increased macrophage activity in transtracheal aspirations, indicating active pulmonary inflammation Feed intake decreased (P = 0.002) in proportion to ammonia concentration, and body weight gain decreased (P < 0.001) at the 2 greatest concentrations. Exposure to ammonia increased (P = 0.03) the frequency of sneezing, and at the greatest ammonia concentration, sheep were less active, with less locomotion, pawing, and panting.¹⁷

Gasses including CO₂ and ammonia must be seen as basic measurement on ships as they contribute to animal and human worker suffering.

Conclusion

As indicated above – whilst ever long distance transport continues, Animals Australia **strongly supports each of the recommendations** of the TRP report as they are soundly based on science, veterinary observations and long-standing evidence and may reduce suffering (though not eliminate it).

However, as argued above, the designated 28WBT threshold figure (for a standard merino sheep) is conservative. Some studies suggest suffering commences at lower WBTs and that prolonged exposure in the northern hemisphere summer is the norm as there is little overnight relief from high WBTs. This will add greater risk and incidence of heat stress as sheep cannot shed heat load. These reforms should therefore be viewed as the absolute minimum in current circumstances to reduce suffering.

Please contact me if further clarification is required.

Yours sincerely,



Glenys Oogjes
Chief Executive Officer

¹⁷ Clive Phillips et al (2012) 'Physiological and behavioural responses of sheep to gaseous ammonia' 90(5) *Journal of Animal Science* 1562.