

**INQUIRY INTO IMPACT OF THE PHASE-OUT OF  
AUSTRALIAN LIVE SHEEP EXPORTS BY SEA ON NEW  
SOUTH WALES**

**Organisation:** Vets Against Live Export (VALE)  
**Date Received:** 27 August 2024

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# Phase out of live sheep exports by sea

Submission  
August 2024

VETS AGAINST LIVE EXPORT

## BACKGROUND

Vets Against Live Exports (VALE) was established in 2011 and currently has over 200 members. Since its establishment, VALE has analysed available data on the live export industry, particularly information pertaining to sheep welfare during voyages to the Middle East. VALE has published scientific papers including a seminal paper on heat stress that preceded the *Awassi Express* exposé in 2018 providing evidence that heat stress was being ignored by Government and industry (Caufield et al 2014). VALE also repeatedly exposed the lack of science behind space allocations for sheep (historically based on marine safety rather than animal welfare science). This was also ignored but increased space since 2018 has drastically reduce shipboard mortality. VALE has always been proactive in highlighting scientifically valid animal welfare concerns with the industry only instituting change reactively or when it was legislated.

VALE has made submissions to nearly all live export enquiries since 2011. VALE also met with the Independent Panel in March 2023 and made a formal submission on the phaseout of live sheep exports by sea in June 2024. A VALE representative also accepted an invitation to speak at the Parliamentary Inquiry in June 2024.

The majority of this submission pertains to Terms of Reference Point g: examine animal welfare concerns relevant to the determination to cease live sheep export by sea by the Federal Government.

## EXECUTIVE SUMMARY

1. This submission supports the Australian Government's policy to phase out live sheep exports.
2. The export of live sheep by sea from Australia has long been in decline contributing 0.1% Australia's agricultural exports. Australian chilled sheep meat exports are 58 times the value of the live sheep export trade (\$4.5 billion v \$77 million in 2022-2023). The numbers of sheep and lambs slaughtered (and consequently meat produced) has been steadily rising since 2022 with a 10.7% increase in sheep slaughter in March 2024. The statistics are inconsistent with claims of pending economic collapse of the sheep industry as a consequence of the phase out of live sheep exports.
3. The report of the Independent Panel indicates that the phase out is entirely feasible with manageable adjustments to flock composition.
4. Claims that rural veterinarians will be negatively affected by the phase out are contrary to veterinary industry analysis.
5. There is a limited number of ships still able to carry sheep under Marine Orders 43. With a declining fleet of available ships, and no new ship builds planned, this industry is not going to be revived regardless of farmer sentiment. The three ships carrying the majority of sheep for the last 5 years, the MV *Maysora*, MV *Al Kuwait* and MV *Al Messilah*, have been notably absent in April and May 2024 despite sheep farmers calling for increased live export and claiming hardship. The exporters should be questioned as to why they did not avail themselves of the opportunity to export in April and May 2024 and whether their ships are still compliant with Australia's maritime requirements.
6. The Australian live export industry has always claimed to have had strict regulations and self-imposed standards. In 2004, the Keniry Enquiry found that the industry was unable to self-regulate and this led to government regulation and development of the Australian Standards for the Export of Livestock (ASEL). The industry continued to experience major animal welfare issues with regular high mortality voyages. Even after the leaked confidential submission from shipboard veterinarian Dr Lynn Simpson highlighted systemic welfare problems, the industry did not address the issues and high mortality voyages, mostly due to heat stress, continued with mortalities such as 7.28% in one voyage 2013, 4.36% in one voyage in 2016, 2.51% in another voyage in 2016 and 3.79% in 2017. It was only public exposure of a heat stress event and stricter government regulation which effected some animal welfare improvements. Independent Observer reports from 2018 still show around 70 per cent of reports contain issues of non-compliance with the Australian Standards for the Export of Livestock (ASEL).
7. Some critical live export research from universities and welfare data from sheep travelling under ideal conditions has never been published (Appendix A). Failure of publication is consistent with poor industry transparency and may have hindered analysis of, and improvements in, animal welfare of sheep on ships.
8. Claims that Australia is the only country that regulates animal welfare standards in other countries and invests in training and auditing to ensure those standards are met are incorrect. Australia has no ability to regulate animal welfare standards in any other country. Auditing that exists in foreign countries for the Export Supply Chain Assurance System (ESCAS) is not independent or transparent and ESCAS non-compliance is frequently reported.

9. A phaseout was recommended in 2024 as it was in 1985 (Senate Enquiry) as there are inherent welfare risks to sheep associated with this trade which cannot be resolved. Profit for sheep as commercial commodities regardless of suffering has underpinned this trade for over 40 years. The Australian Government has a responsibility to ensure that Australian welfare standards are world-class and this cannot be the case whilst this trade exists. New Zealand and United Kingdom, both recognised world leaders in animal welfare, have both legislated against live animal export and it has been ruled as illegal in a Brazilian court also.

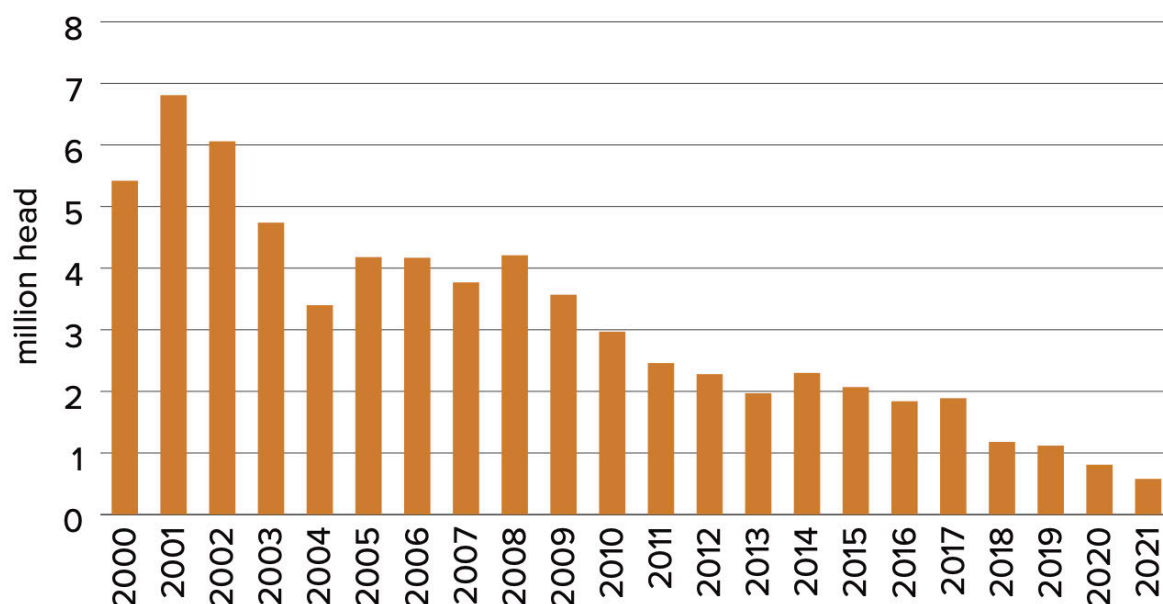
## SUBMISSION DETAILS: PHASE OUT OF LIVE SHEEP EXPORT BY SEA

This submission supports the Australian Government's policy to phase out live sheep exports. The industry has a track record of over 40 years of poor animal welfare which continued even after the 2018 media exposé. New Zealand ended their substantially more valuable live export cattle trade in two years. The time-frame of 4 years is too long to satisfy animal welfare concerns but VALE accepted the Independent Panel Recommendation of that time frame as enabling a definitive end to the trade.

### Industry decline and value

The export of live sheep by sea from Australia has long been in decline (Figure 1) contributing a mere 0.1% of Australian agricultural exports.

*Figure 1 Australian Sheep Live Exports 2000–21 (DAFF – Department of Agriculture, Fisheries and Forestry)*



Source: DAFF

Australian chilled sheep meat exports are 58 times the value of the live sheep export trade (\$4.5 billion v \$77 million, 2022/23, Australian Bureau of Statistics). The chilled sheep meat export trade to the Middle East alone is 8 times the value of the entire live sheep export trade (\$632 million v \$77 million, 2022/23, Australian Bureau of Statistics). Sheep slaughtered in the March 2024 quarter increased 10.8% to 2.6 million and increase has been steady since March 2022. Mutton production in the March 2024 quarter increased 5.4% to 63,183 tonnes. Lambs slaughtered have steadily increased since March 2022 and in the March 2024 quarter increased 5.3% to 7.1 million with lamb meat production in the March 2024 quarter increasing 5.5% to 170,163 tonnes. These figures from the Australian Bureau of Statistics<sup>1</sup> are inconsistent with current claims of pending economic collapse of the sheep industry as a consequence of the phase out of live sheep exports.

<sup>1</sup> See: <https://www.abs.gov.au/statistics/industry/agriculture/livestock-products-australia/latest-release> Accessed 10 June 2024

## Decline in live export ship availability

There is a limited number of ships still able to carry sheep under Marine Orders 43 (MO 43). With a declining fleet of available ships, and no new sheep ships built to Australian marine standards in the pipeline, this trade is not going to be revived. The three ships carrying the majority of sheep for the last 10 years, the MV *Maysora*, MV *Al Kuwait* and MV *Al Messilah*, have been notably absent in April and May 2024 despite sheep farmers calling for increased live export and claiming hardship in these months that precede the prohibition period. The exporters should be questioned as to why they did not avail themselves of the opportunity to export in April and May 2024 and whether these ships are still compliant with MO 43.

This assessment by VALE has since been confirmed by long-time export veterinarian and former exporter, Dr Tony Brightling in a very rational opinion piece in *Sheep Central*; positive comments from the farming community followed the article.<sup>2</sup> Dr Tony Brightling stated the following:

*Ban or no ban, the live sheep export trade to the Middle East is in terminal decline – not because of animal welfare, but for purely commercial reasons. The recent uptick in exports to Saudi Arabia, with sheep sold to the trade at historically low prices, is a minor blip in an otherwise steady decline. The fundamental drivers of the trade have changed. The Arabian Gulf States are affluent countries with consumer demands shifting from the traditional fresh meat markets of last century to Western style food supply chains.*

*The sources of live sheep supply have also shifted. Sudan and Somalia are key suppliers of live sheep to the Arabian Gulf States. They have major competitive advantages over Australia – local fat-tail sheep breeds, close cultural ties, proximity to market, lower transport costs, ability to supply regular small consignments and few regulatory constraints.*

*Romania is also a major supplier of live sheep to the region, with greater flexibility of supply, and much lower delivery and regulatory costs compared with Australian sheep. Australia has gone from the major supplier to a bit player in the trade.*

*Livestock ship owners recognised these changes 20 years ago.... By May 2028 there are likely to be only two large livestock carriers accredited to load sheep in Australia – if they are not engaged elsewhere in the world. There will also be a handful of small vessels, that might deliver occasional boutique consignments, but no big number of sheep, and at great cost per head.*

## Industry claims of best practice

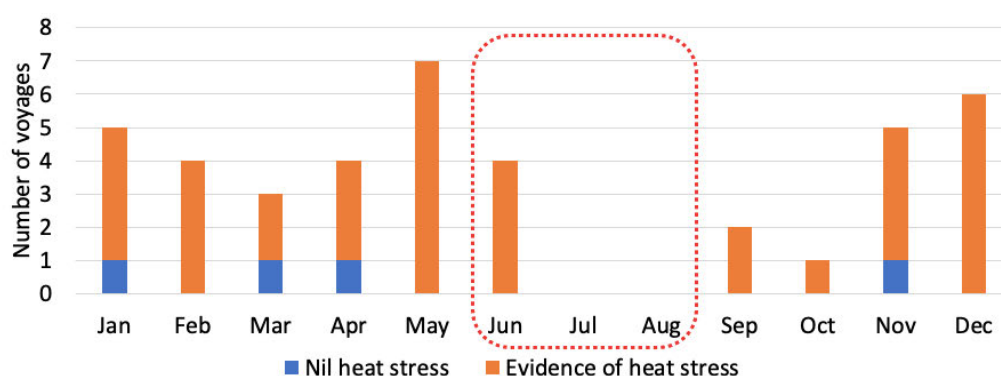
The Australian live export industry has always claimed to have had strict regulations and self-imposed standards. In 2004, the industry's inability to self-regulate led to the Keniry Enquiry with subsequent Government regulation and development of the Australian Standards for the Export of Livestock (ASEL). The industry continued to experience major animal welfare issues with regular high mortality voyages. Even after the leaked confidential submission from shipboard veterinarian Dr Lynn Simpson (Simpson 2012) highlighted systemic animal welfare problems, the industry did not address the issues and the high mortality voyages, mostly due to heat stress, continued including: MV *Bader* 4179 (7.28%) sheep in 2013, MV *Al Messilah* 3027 (4.36%) sheep in 2016 (and MV *Al Messilah* Adelaide consignment losing 2.51% sheep in the very next voyage) with nothing done until the MV *Awassi Express* 2595 sheep (3.79%) voyage in 2017, which was filmed and shown to the Australian public in 2018.

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<sup>2</sup> See: <https://www.sheepcentral.com/opinion-live-sheep-ban-through-a-different-lens/>. Accessed 22 Aug 2024

The industry also claimed to have actively improved since 2018 but Independent Observer Summaries from 2018 show around 70 per cent of reports contain issues of non-compliance with the Australian Standards for the Export of Livestock (ASEL)<sup>3</sup> including carriage of late pregnant ewes giving birth on the ships; advanced pregnancy should be easily detected prior to departure if the industry had rigorous health and welfare checks to comply with ASEL.<sup>4</sup> In addition, with the more comprehensive-format Independent Observer Summaries from 2018-2020, it was evident that despite the changes instituted in 2018, heat stress was still evident on 37/41 voyages for which there was an IO Summary (Figure 2).

*Figure 2: Evidence of heat stress in sheep in IO Report Summaries 2018-2020;( n=41). Note: June to August voyages by most routes are currently prohibited to the Middle East.*



Some critical research from universities funded by industry has never been published (Appendix A) and likewise welfare data from sheep travelling under ideal conditions (MV *Al Kuwait* exemption voyage 2020; Appendix A) has also never been released. Given that this industry requires social licence to operate, one potential explanation would be that the findings were unfavourable. Given that the well-funded research project detailed in Appendix A (exact funding unknown) preceded the heat stress event on the MV *Awassi Express*, it is also possible that adverse findings did not result in constructive pro-active improvement by industry.

It is notable that the review into the Independent Observer program by the Inspector General of Live Animal Exports (IGLAE) highlighted:

- poor co-operation between exporters and the regulator
- potential misuse of statutory declarations to avoid Independent Observer (IO) scrutiny (statutory declarations were the most common reason for failure to deploy an IO)
- that both AMSA and the Department of Agriculture found the reporting of the accredited veterinarians and stockpersons insufficient thus necessitating the presence of an IO – “A post-implementation review into the independent observer program found that reports from onboard Australian Government accredited veterinarians (AAVs) and stockpersons often lacked sufficient detail for the department to make informed regulatory decisions (DAWE and AMSA 2020).”

The industry has a long history of proven poor animal welfare, inadequate proactive responses to poor animal welfare and a lack of transparency. The accredited stockpersons and veterinarians are employed by the exporter and the industry has steadfastly resisted having independent veterinarians onboard every live export ship, something that would improve both transparency and social licence.

<sup>3</sup>See: <https://www.rspca.org.au/latest-news/media-centre/starving-sweltering-and-sick-independent-data-debunks-industry-claims-and-reveals-the-ongoing-truth-of-live-sheep-export/> Accessed 10 June 2024

<sup>4</sup> See: <https://www.vale.org.au/io-reports.html> Accessed 10 June 2024



The Review of the Regulatory Capability and Culture of the Department of Agriculture and Water Resources in the Regulation of Live Animal Exports conducted by Philip Moss in 2018 (Moss Review) acknowledged the tension between the economic value of live exports and animal welfare concerns stating:

*“The live animal export industry is important to the Australian economy, especially to producers and rural communities. However, the welfare of exported animals is also a priority to the Australian community. Members of the public provide Australian agriculture with the social licence to operate and want good animal welfare outcomes. Furthermore, trading partners will continue to require high standards for exports in terms of environmental sustainability and animal welfare practices.”*

*By its nature, live animal exports present a high risk to animal health and welfare. There have been instances of non-compliance with animal welfare standards and instances of animal cruelty that have not been anticipated by the regulatory framework or evoked an appropriate regulatory response*

### **Industry claims of Australian animal welfare regulation in foreign countries**

Claims that Australia is the only country that regulates animal welfare standards in other countries and invests in training and auditing to ensure those standards are met are incorrect. Australia has no ability to regulate animal welfare standards in any other country. Auditing that exists in foreign countries as a requirement of the Export Supply Chain Assurance System (ESCAS) is not independent or transparent (as per the recent Department of Agriculture assessment).<sup>5</sup> ESCAS non-compliance has been repeatedly demonstrated to be unenforceable in countries outside Australia’s jurisdiction.<sup>6</sup>

### **Live export contributed to local processing decline**

Processing animals locally as opposed to exporting them live has the effect of value-adding to the Western Australian economy. The livestock industry has long resisted investigation of expanding opportunities for meat export as an alternative to the live export trade. This resistance has likely resulted in income loss to Australian producers. For example, a Live Corp report (ACIL ALLEN 2022) notes that Indian buffalo meat will continue to be a key competitor for Australian live cattle in South-East Asia. The report states that if Australia ceased live cattle exports to Indonesia, it may be that the short-term response by Indonesia would be to import more processed beef. Thus, there is industry evidence for direct competition between live export and the boxed meat trade. With respect to sheep meat, even as far back as 2014, a survey by ABARES concluded that in the Middle East ‘substitutability between Australian live sheep and sheep meat imports has increased in recent years, largely reflecting growth in incomes, urbanisation, refrigeration availability and popularity of western style supermarkets’. This is underscored by the experience in Bahrain, which stopped importing Australian sheep in 2014, after which sheep meat imported from Australia increased over two-fold. It is also borne out by the comments of former exporter, Dr Tony Brighting (as per previous reference).

Even with live export operating in 2023 and 2024, Western Australian sheep farmers have had an unsustainable business model whereby historic competition between local processors and exporters has resulted in a significantly diminished local processing sector. The phaseout should ensure that the local processing sector is reliable and can meet demand, creating more stability and certainty for farmers with beneficial flow-on effects on regional communities.

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<sup>5</sup> See: <https://storage.googleapis.com/files-au-ag/agriculture-au/p/prj2cea4ebfbf5e6f89f3045/page/ESCAS%20Review%20-%20Stage%201%20Discussion%20Paper.pdf> Accessed 10 June 2024

<sup>6</sup> See: <https://www.agriculture.gov.au/biosecurity-trade/export/controlled-goods/live-animals/livestock/compliance-investigations/investigations-escas> Accessed 10 June 2024

## Effect on veterinarians

Industry claims that rural veterinarians will be affected are not evidence-based and in fact contrary to veterinary industry analysis. Very few veterinarians accompany live export voyages. When the trade was substantially larger in 2014, VALE found that very few veterinarians did more than one voyage annually (Questions to Senate Estimates, May 2015 Q109)<sup>7</sup>, with 30 or more of the 81 voyages that were accompanied by a veterinarian (sheep and cattle voyages) employing just 3/64 eligible veterinarians. It is likely that the majority of the 32 sheep voyages to the Middle East in 2014 were accompanied by three veterinarians only and that that situation is not significantly different between 2018 and 2024.

## Economic effect on farmers

VALE does not analyse agricultural economy so is not qualified to assess this other than basic market analysis from the Australian Bureau of Statistics. It is notable however that the report of the Independent Panel, which had input from employed financial consultants in the agriculture industry concluded that the phase out is entirely feasible with manageable adjustments to flock composition. The Panel noted that *"the WA sheep industry can be profitable and sustainable during the transition period and beyond the end of live sheep exports by sea."*<sup>8</sup> The impact on farmers in New South Wales of not sending 0.5 million sheep from WA to the Middle East is likely to be negligible. Regardless, poor animal welfare cannot be justified on the basis of farmer profit and availability especially when there are alternative avenues to generate farm income.

## Phaseout recommended in 1985 and 2024

Given the historical indifference of the industry to proactive welfare improvement and the fact that a phaseout has been recommended in 2024 as it was in 1985 (Senate Enquiry 1985), it is evident that the industry has a long history of failing to ensure high standards of animal welfare. Profit from sheep as a commercial commodity regardless of suffering has always underpinned this trade. The Australian Government has a responsibility to ensure that Australian welfare standards are world-class and this cannot be the case whilst this trade exists. New Zealand and United Kingdom, both recognised world leaders in animal welfare, have both legislated against live animal export. In South Africa, the NSPCA (National Society for the Prevention of Cruelty to Animals), with its effective legal investigative powers, is repeatedly prosecuting Al Mawashi (the same export company that exports the majority of West Australian sheep) for animal cruelty. A Brazil trial court ruling in 2023 also banned the export of live animals in all ports of the country. Worldwide, it is being recognised that live export is a major animal welfare concern.

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<sup>7</sup> See: [https://www.aph.gov.au/Parliamentary\\_Business/Senate\\_Estimates/ratcliffe/estimates/bud1516/ag/index](https://www.aph.gov.au/Parliamentary_Business/Senate_Estimates/ratcliffe/estimates/bud1516/ag/index) Accessed 20 April 2023 with link no longer available.

<sup>8</sup> See: [https://www.agriculture.gov.au/sites/default/files/documents/3.%20AGR195.1123%20Independent%20panel%20report\\_v9.3.pdf](https://www.agriculture.gov.au/sites/default/files/documents/3.%20AGR195.1123%20Independent%20panel%20report_v9.3.pdf) Accessed 10 June 2024

## APPENDIX 1: UNPUBLISHED RESEARCH

There is evidence that some very pertinent research on some animal welfare issues such as heat stress in sheep on live export ships has been performed but never published.

### Heat load in sheep exported to Middle Eastern Feedlots

VALE has analysed the National Livestock Export Industry Performance Reports which list relevant Meat and Livestock Australia research projects and it is evident that one major research project, aimed at addressing the issue of heat stress onboard live export ships was completed but never been made available.

The first record of this research is from Norman 2015 (Norman GJ. National livestock export industry sheep, cattle and goat transport performance report 2014. Meat and Livestock Australia 2015) with bolding and red font by VALE:

*“6.1.4 Heat load in sheep exported to Middle Eastern feedlots*

*The objectives of this project are:*

- 1. To record the internal temperatures of sheep and their environmental conditions as they undergo transition from Australia into Middle Eastern feedlots, during 5 shipments (2 winter and 3 summer).**
  - 2. Gather data on the pathophysiology of any sheep clinically affected by disease during shipment and at the post-shipment feedlot, along with blood and pathology sample analysis, recorded clinical signs and the history of individual animals.*
  - 3. Gather data on other stressors (such as feeding, management, infectious disease) during the process, by tracking individual sheep through the pre-embarkation feedlot, during road transport to the port, on-board during the voyage to the Middle East, and then during their stay at the feedlot prior to slaughter.*
  - 4. To examine causes of morbidity and mortality by relating any sheep morbidity / mortality to the gathered internal / environmental data.*
  - 5. Use findings to improve risk management and to make recommendations that limit compromise to the health and welfare of the sheep, and that help minimise losses.*
- 50 sheep per shipment for two summer-to-winter, and four winter-to-summer shipments have been monitored. Two of the winter-to-summer shipments and a follow-up summer-to-winter shipment specifically targeted a higher-humidity Middle Eastern port.*
- The data is currently being analysed, with a final report expected to be available later in 2015.”***

Two years later, in Norman 2017 (Norman GJ. National livestock export industry sheep, cattle and goat transport performance report 2016. Meat and Livestock Australia 2017), the annual industry report indicated that the research was complete:

*“Appendix 6.1.1 Heat load in sheep exported to Middle Eastern feedlots*

***This project has monitored shipments of sheep through the pre-embarkation feedlot, shipboard journey and subsequent lot-feeding in the ME. It has recorded body temperatures of sheep throughout this process*** to determine how sheep cope throughout the whole process and whether sheep are becoming compromised, with a view to then better manage animals.

*To date the project has:*

- 1. Gathered data** on the internal temperatures of groups of sheep **from a total of 6 shipments** and the environmental conditions that they experienced as they undergo transition from Australia into Middle Eastern feedlots.
- 2. Gathered data**, for the monitored shipments, on the pathophysiology of sheep clinically affected by disease during this transition and at the post-shipment feedlot, with blood and pathology samples analysed along with

clinical signs and history of individual animals

3. **Gathered data** on other stressors such as feeding, management, and infectious disease during the process, by tracking of individual sheep through the pre-embarkation feedlot, during road transport to the port, on-board during the voyage to the Middle East, and then during their stay at the feedlot prior to slaughter
4. **Related morbidity and mortality of the sheep to the gathered data**, to surmise causes.”

This completed study (W.LIV.3018) has never been published as a scientific paper or as an industry report in the public domain despite having Australian Government funding. The 2018 paper commissioned by the Department of Agriculture (DAWE) and titled *A systematic review of heat load in Australian livestock transported by sea*<sup>9</sup>, stated “We identified a lack of scientific literature relating to heat load in animals transported by sea” and “there has been insufficient independent science”. There was no reference to W.LIV.3018 despite the general study outline being in the public domain (Norman 2015, Norman 2017) and one of the Review’s authors (Barnes) being listed as an investigator (Figure 1).

Figure 1. Livestock Export R&D Program Stakeholder Report 2013 providing information on 2 of the 6 shipments detailed by Norman (2017).<sup>10</sup>

Unpublished project work:

Prepared by: Sharon Dundon

LIVESTOCK EXPORT R&D PROGRAM  
STAKEHOLDER REPORT  
September 2013

This report describes the current status of existing and new projects being undertaken by the Livestock Export R&D Program. Further information can be sought from Sharon Dundon, Live Export R&D Manager on (02) 6773 4517 or [sdundon@mla.com.au](mailto:sdundon@mla.com.au)

W.LIV.3018 Heat load in sheep exported to Middle Eastern Feedlots

Objectives:

1. Gather data on the internal temperatures of sheep and the environmental conditions that they experience during their normal transition from Australia into Middle Eastern feedlots, from 4 shipments (2 winter and 2 summer).
2. Gather data on the pathophysiology of sheep clinically affected by disease during this transition and at the post-shipment feedlot, for the monitored shipments, with blood and pathology samples analysed along with clinical signs and history of individual animals.
3. Gather data on other stressors such as feeding, management, and infectious disease during the process, by tracking of individual sheep through the pre-embarkation feedlot, during road transport to the port, on-board during the voyage to the Middle East, and then during their stay at the feedlot prior to slaughter.
4. Relate morbidity and mortality of the sheep to the gathered data, to surmise causes.
5. Use this data to inform risk management and recommendations to limit compromises to health and welfare of the sheep, and minimise losses.

Researchers have:

- Logged 50 head of sheep per shipment on two winter to summer shipments July and August 2013 through to point of slaughter.

Researchers aim:

- To log 50 head of sheep per shipment for two summer to winter shipments through to the point of slaughter

Budget: \$160K  
Start: July 2013  
Finish: November 2014

Murdoch University  
Anne Barnes  
University WA  
Shane Maloney

## Unpublished data from the MV *Al Kuwait* voyage from Fremantle to Kuwait in June 2020

“Research sheep” were included in the MV *Al Kuwait* voyage from Fremantle to Kuwait in June 2020 (Ruston 2020). They were fitted with temperature loggers and video footage recorded twice daily (see Figure 2).

<sup>9</sup> See: Collins, T, Hampton JO, Barnes AL. A systematic review of heat load in Australian livestock transported by sea. *Animals* 2018;8:164.

<sup>10</sup> Screenshot from <https://aqforceprojects.org.au/file.php?id=214&open=yes> (accessed 2014). The link no longer has a valid security certificate but the same information can still be accessed (12 Jan 2022) in slightly different format.

*Figure 2: June 2020 Animal Welfare Management Plan for MV Al Kuwait (Ruston 2020b).*

*2.2.1.2 Animal physiology and behaviour monitoring*

The voyage will collect additional information including 50 sheep will have;

- Thermoregulatory data through insertion of rumen loggers
- Animal behaviour data collected by video footage twice daily
- Animal welfare monitored by behaviour recorded twice daily

Core body temperature is the most widely accepted method to determine effects of heat load. Core body temperature can be estimated from rumen temperature thus the rumen logger data from this unusual best-case scenario voyage was crucial. The research performed by Murdoch University has never been published

## REFERENCES

ABARES 2014 Live export trade assessment. See:

[http://www.agriculture.gov.au/abares/publications/display?url=http://143.188.17.20/anrdl/DAFFService/display.php?fid=pc\\_leta\\_d9abca20140708\\_11a.xml](http://www.agriculture.gov.au/abares/publications/display?url=http://143.188.17.20/anrdl/DAFFService/display.php?fid=pc_leta_d9abca20140708_11a.xml) (Accessed 20 April 2023)

ACIL ALLEN 2022. The economic contribution and benefits of the Northern live export cattle industry. Final report. 2022. See:

[https://acilallen.com.au/uploads/projects/617/ACILAllen\\_Northern\\_live\\_cattle\\_economics\\_2022.pdf](https://acilallen.com.au/uploads/projects/617/ACILAllen_Northern_live_cattle_economics_2022.pdf) (Accessed 20 April 2023)

Caulfield MP, Cambridge H, Foster SF, McGreevy P. Heat stress: A major contributor to poor animal welfare associated with long haul live export voyages. *The Veterinary Journal* 2014;199:223-228

Moss. P. Review of the regulatory capability and culture of the Department of Agriculture and Water Resources in the Regulation of Live Animal Exports, report prepared for the Department of Agriculture and Water Resources, 2018, viii.

Ruston A. Order for the Production of Documents: Independent Observer report on MV Al Kuwait, Report 219, In: Manager of Government Business in the Senate, Australian Government, Australian Government, Canberra 2020b

Senate Select Committee on Animal Welfare, Export of live sheep from Australia, The Senate, Canberra, 1985

Simpson, L. Submission to the ASEL Review. 2012. Available online:

[https://www.rspca.org.au/sites/default/files/website/Campaigns/Live-export/Live-export-facts/Dr\\_Lynn\\_Simpson-Submission\\_to\\_ASEL\\_Review\\_RS.pdf](https://www.rspca.org.au/sites/default/files/website/Campaigns/Live-export/Live-export-facts/Dr_Lynn_Simpson-Submission_to_ASEL_Review_RS.pdf) (accessed 12 Jan 2022)