ALEC Submission

Review of the Australian Standards for the Export of Livestock

Stage 2

SEPTEMBER 2018 (REVISED EDITION – 4 OCTOBER 2018)

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1 About this Submission

1.1 Introduction

This submission by the Australian Livestock Exporters' Council (ALEC) is made in response to the *Stage 2: Issues Paper: Review of the Australian Standards for the Export of Livestock*, published by the ASEL Review Technical Advisory Committee (TAC) on or about 24th August 2018.

ALEC is a member-based, peak industry body representing Australia's livestock export sector. It sets industry policy, provides strategic direction to the industry and represents Australia's livestock export trade in Australia and internationally.

ALEC members account for more than 96 per cent of Australia's annual livestock exports, by volume and value. ALEC's membership also extends to supply chain participants including registered premise operators, ship owners, feed suppliers and other service providers to the trade.

The *Australian Standards for the Export of Livestock* (ASEL) provide a foundation for the live export trade to operate at international best practice standards of animal welfare.

1.2 ALEC Supports science based regulation of animal welfare outcomes for Australian live exports

Over 100 countries export live animals; however, Australia is the only country that regulates animal welfare outcomes from the shores of Australia to final slaughter overseas. Not even countries, such as those in the European Union, often cited as possessing explementary animal welfare regulations, apply anything approaching a similar level of control and oversight.

Despite a lack of similar commitment by all Australia's competitor countries, ALEC supports the application of science based regulation to animal welfare outcomes for Australian live exports. Good animal welfare is good business practice. All the recommendations by ALEC contained in this submission are solidly based on research findings and are aimed at improving the foundation of good animal welfare practices that are already required under ASEL.

1.3 Insufficient consultation time

ASEL is vitally important for Australian live exporters in a number of ways: in determining the regulatory environment within which the industry operates, in delivering an acceptable minimum level of outcomes across all operators (noting some operators will wish to exceed set minimums), in ensuring that the industry as a whole meets community expectations and in profoundly influencing the viability of the trade.

Within this context ALEC wishes to express our substantial concerns that the ASEL Review is occurring with undue haste. Over 70 questions are posed by the TAC in the Stage 2 Issues Paper, many of these being multifaceted and complex. Yet in the space of little more than three working weeks since these questions were published, submissions must be finalised and forwarded to the department. Not only does this timeline prevent necessary membership consultation and input, but it also restricts the scope of material that can be provided and increases the risk that the Review will result in substandard outcomes.

In this context ALEC wishes to note that in the limited time available to prepare this submission, ALEC has been unable to examine in detail the re-formatted ASEL. ALEC will provide any comments on this document at a later date.

1.4 Good Regulation and Making ASEL Truly Outcomes Based

In the remaining chapters of this submission ALEC addresses many of the detailed questions asked in the Stage 2 Issues Paper. Before addressing these detailed questions, however, this section focusses more broadly on ASEL and the essential elements of good regulation. This background is important because the Review is being undertaken to provide quantum improvements in the ASEL regulations (noting that minor interpretive changes can be made through Export Advisory Notices and other mechanisms).

It is ALEC's view that the current ASEL falls short of good regulation and that the opportunity provided by the Review must be grasped to improve not only detailed provisions contained within ASEL, but also the broad thrust of the ASEL framework. In fact, if the ASEL framework is fundamentally recast to more closely resemble good regulation many of the detailed provisions currently contained within ASEL will no longer be required.

A list of the basic characteristics of a good regulatory system should possess can be quite extensive; however, it is generally agreed that such a system should exhibit at least the following five characteristics[1]:

- Clear objectives: At the centrepiece of any regulation must be statements about the policy objectives that are trying to be achieved (the problem the regulation is trying to solve). Policy objectives and principles should be made explicit. Where trade-offs are involved, object clauses should make clear what balance is sought – for example, the need to pursue identified social objectives cost-effectively taking into account wider economic interests – and how such a balance is to be achieved.
- Effectiveness: Regulation must be focussed on the problem to be solved and achieve its intended policy objectives with minimal side-effects and cost. Regulatory measures should contain compliance strategies which ensure the greatest degree of compliance at the lowest cost to all parties. Measures to encourage compliance may include regulatory clarity, brevity, public education and consultation and the choice of alternative regulatory approaches with compliance in mind.
- Outcome focussed: To maximise effectiveness regulations need to focus on outcomes rather than inputs or details about how to achieve the outcomes. Outcome-oriented regulatory systems do not get in the way of innovation. Furthermore, in an outcome-oriented system, industry should have a clear avenue to petition the regulatory authority to use alternative processes, and this process should not be unduly onerous.
- Proportionality: Regulatory measures must be proportional to the problem that they seek to address. This principle is particularly applicable in terms of any compliance burden or penalty framework, which may apply. A proportional based system allocates controls based on risk of not meeting the most important objectives, while those with few or insignificant risks or objectives of lower importance receive less attention. Likewise, enforcement options under a proportionate system should differentiate between the good corporate citizen and the

[1] See, for instance, Commonwealth of Australia, Department of the Prime Minister and Cabinet, 2014, The Australian Government Guide to Regulation, Canberra, March; Council of Australian Governments, 2007, Best Practice Regulation: A Guide for Ministerial Councils and National Standard Setting Bodies, Canberra, October; Victorian Commission for Better Regulation, 2016, Victorian Guide to Regulation: A Handbook for Policy-Makers in Victoria, State of Victoria, November; Agriculture Victoria, 2016, Key characteristics of good regulatory systems, http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/protecting-victoria-from-pest-animals-and-weeds/legislation-policy-and-permits/new-invasive-species-management-legislation/discussion-paper-invasive-species-management-bill/appendix-1-key-characteristics-of-good-regulatory-systems; Riviere, J.E. & Buckley, G.J., 2012, Ensuring Safe Foods and Medical Products Through Stronger Regulatory Systems Abroad, Th National Academies Press, Washington DC.

renegade, to ensure that 'last resort' penalties are used most effectively (rarely) but model behaviour is encouraged. Enforcement measures and the regulatory framework should not have the effect of encouraging otherwise good corporate citizens to subvert compliance measures.

- Consistency and predictability: Regulation should be consistent with other policies, laws and agreements affecting regulated parties. It should also be predictable, in order to create a stable regulatory environment and foster confidence. The regulatory approach should be applied consistently across regulated parties with like circumstances. Rules should be applied consistently and enforced fairly, with the decisions made by regulators being neither arbitrary nor capricious.

While the current ASEL meets a number of the elements of good regulation (see the Guiding Principles listed under Box 1 of ASEL), in other areas it falls short. In particular the current ASEL fails to meet good regulation in that it focusses in its regulatory requirements on inputs (rather than outcomes), is mechanistic and overly prescriptive. Rather than encouraging innovation, the current ASEL tends to stifle it. Alternate methods to those prescribed in ASEL, that may be able to achieve the broad welfare outcomes desired by the Government and community, are often not contemplated. The reformatted ASEL in a number of areas exacerbates this situation by removing departmental discretion.

In a number of areas of live exports ASEL imposes prohibitions. Prohibitions rarely represent good regulatory practice. Rather, the welfare outcomes sought should be clearly established and the market left to determine how these outcomes are best achieved – with a possible ***market*** determination being no trade.

As an example, where a heat stress model has been calibrated it is ALEC's view that it should be used to determine the conditions under which livestock are exported, rather than, for instance, placing blanket prohibitions on the export of certain classes of livestock at certain times of year or arbitrarily changing stocking densities. The model can directly include the desired regulatory outcome and results can be monitored to ensure this outcome is being achieved.

Importantly use of the above approach offers flexibility on how the outcome is achieved. At the moment the Heat Stress Risk Assessment model offers a number of major parameters which can be varied to achieve desired outcomes on controlling heat stress – these parameters being related to selection of livestock, selection of the ship (particularly its ventilation attributes) and the number of stock placed on the ship (stocking densities). Over time, however, further sophistication might be introduced into the model to achieve desired outcomes in a number of new ways (e.g. use of electrolytes, fans, de-humidification, route optimisation, etc).

It is important to appreciate that the ***end result*** of the outcomes based (heat stress model) approach advocated by ALEC and the prescriptive approach currently embedded in ASEL might be the same – the conditions under which livestock must be exported, as determined by the model, may be uneconomic. But in the approach advocated by ALEC the regulation is driven by outcomes, in the other it is driven by one way to achieve the outcome (prohibition on the export of certain classes of livestock at certain times of year). The current approach provides no avenue for innovation or use of a variety of methods in different combinations to achieve the desired outcome.

An analogy may help to further highlight this point. Eating quality is a desired outcome of the meat industry in Australia. In the late 1980s and early 1990s grain feeding, using *Bos Taurus* cattle, was regarded by many as the principle method by which this could be achieved. Meat Standards Australia, however, did not take a narrowly prescriptive approach on the methods which had to be

employed to achieve eating quality. Instead, MSA offers an almost endless array of methods that can be employed to achieve desired eating quality outcome. Sex, breed, hanging method, degree of marbling, cut ageing, ossification and use of HGPs are just a few of about 20 parameters that are used in the MSA model to determine eating quality grade. All MSA cares about is the final grade score, not how it was achieved. Users of the system can adopt whichever combination of methods work best for them in their particular circumstances to achieve the desired eating quality outcome.

ALEC was encouraged by statements made at the commencement of this ASEL review that ASEL would fundamentally be recast as outcomes based regulation. From scrutiny of the 'Reformatted Australian Standards for the Export of Livestock' and from an examination of the questions contained in the Stage 2 Issues Paper, ALEC fears that the new ASEL will fall far short of being truly outcomes based regulation. Simply translating "Standards" in the current ASEL to "Outcomes" in the Reformatted ASEL, while retaining much of the detail of how the regulations operate, does not meet the criteria for truly outcomes based regulation.

It is to be noted that, even though ALEC considers that recasting ASEL in terms of outcomes would represent a significant improvement in design, and has re-iterated this sentiment in addressing many specific ASEL issues raised in the Stage 2 Issues Paper, on other issues ALEC recommendations reference inputs or prescribe certain actions to be followed. This latter approach simply recognises that this is the way ASEL is currently designed and, based on information to hand, despite initial statements on what the Review was to achieve, this may not significantly change.

1.5 Remainder of This Submission

In the remainder of this submission ALEC addresses many of the issues raised in the Stage 2 Issues Paper.

The submission follows the sequence of these issues as presented in the Stage 2 paper.

Research from the joint LiveCorp / Meat & Livestock Australia (MLA) Live Export Program (LEP) is heavily referenced in remaining chapters, as is other research where relevant. The recommendations made by ALEC have been based on research outcomes and are heavily focussed on securing high standards of animal welfare. Many of the recommendations contained in the following chapters will cost the industry more, but if shown unequivocally, based on the best science, to be of benefit in terms of animal welfare outcomes, are supported by the ALEC Board and membership notwithstanding the cost impact.

On many issues the TAC in the Stage 2 Issues Paper sought information on the economic impact of possible changes. In a number of cases ALEC has provided costing information. Assessing economic impact, however, is often extremely complex and time consuming. In the very limited time available to prepare this submission it has not been possible to provide an economic impact assessment for every issue.

2 "Reportable Mortality Rates"[2]

List of recommendations

- That changes in "Reportable Mortality Rates", below those currently specified in ASEL, are not supported unless a clear scientific basis exists for changes. In considering any changes to threshold mortality levels, that if exceeded, trigger a notifiable incident, the TAC should have regard to:
  - length of the voyage;
  - domestic and other standards for notifiable mortalities in intensive livestock systems; and
  - The ultimate objectives of establishing these thresholds.
- To introduce more precision and less ambiguity that the definition of notifiable incident as contained in the reformatted ASEL be modified. In particular, ALEC recommends that the words in the current definition:

  "***Notifiable incident*** *means an incident that has the potential to cause serious harm to the health and welfare of animals. A notifiable incident includes, but is not limited to:*"

  be replaced by

  *"**Notifiable incident** means an incident that has the potential to cause serious harm to the health and welfare of animals. A notifiable incident is triggered by one or more of the following events:".*

ALEC also notes that a number of recommendations contained in the chapters of this submission that follow are relevant to questions posed by the TAC under "Reportable Mortality Rates." These are as follows:

- That ALEC supports the collection of a broader set of animal welfare indicators in addition to the current mortality indicator.
- Notwithstanding this support, ALEC opposes regulating the collection of a broader set of animal welfare indicators at this point in time. Welfare is multi-faceted, with complex links between various elements and limited research undertaken. A body of evidence is needed before changes are made to voyage reporting regulations.
- That no further measures be introduced as 'trigger' reportable levels beyond mortality until extensive experience has been gained in the collection of animal welfare indicators and measures have been subject to scientific scrutiny and validation.

2.1 Current ASEL Standard

The current mortality rates within ASEL which, if exceeded, trigger a notifiable incident are:

Sheep and goats	2%
Cattle and buffalo, voyages >= 10 days	1%
Cattle and buffalo, voyages < 10 days	0.5%
Camelids	2%
Deer	2%

[2] Although this Chapter of the Submission is titled "Reportable Mortality Rates", to conform with the description of this issue used by the TAC, ALEC believes that more precise language should be used – see commentary at the beginning of Section 2.4.

ALEC also notes that the department is now applying a reportable mortality level for sheep of 1%.

2.2 McCarthy Review

The McCarthy Review recommended that "*The reportable mortality level for sheep exported by sea to the Middle East should be reduced from 2% to 1%*".

Commentary on this recommendation by Dr Michael McCarthy is to be found in Section 2.4.

2.3 2018 ASEL Review

The TAC in the Stage 2 Issues Paper posed the following questions regarding "reportable mortality levels".

- Should the current reportable mortality rates (RMR) be revised and, if so, how?
- At what level of mortality should a notifiable incident be declared, thereby triggering an investigation?
- Should there be a relationship between the average mortality rate and the RMR and should it be reviewed annually?
- What should be the stated purpose of an RMR, and what should be the consequence(s) of exceeding the RMR for a voyage?
- Should the RMR also relate to classes of livestock (within species), different areas of the vessel etc. as well as length of journey?
- Should the RMR be replaced by, or supplemented with, reportable levels for more general welfare indicators (e.g. see McCarthy Review report)? If so, what should the welfare indicators be and what should be the reportable level for each?

2.4 Comments on "Reportable Mortality Rates"

In considering whether current "Reportable Mortality Rates" should be revised it is critical to consider the objectives for setting these levels.

It is important to note at the outset that the objective for setting "Reportable Mortality Rates" is NOT to ensure that mortalities above a certain level are reported. The term "Reportable Mortality Rate" may be regarded as a misnomer. All mortality rates are reportable, regardless of level. Given the preceding, ALEC is concerned that the use of the term "Reportable Mortality Rate" may give rise to misconceptions – particularly in the community.

The issue under consideration here is not the level at which mortalities should be reported, but the level at which they should be classified as a notifiable incident, thereby triggering a regulatory obligation to immediately advise the department as soon as possible and within 12 hours. The notification to the department must include the following information:

a) details of the mortalities (e.g. number, species, suspected cause);
b) factors that may have contributed to the deaths; and
c) the current location of the vessel and, if appropriate, its destination and estimated time of arrival.

Shipments that exceed the notifiable limit are routinely investigated in detail by the department. However, it should be recognised that the department has the ability to review the voyage data and investigate any shipment that it sees fit.

These notifiable mortality incidents are used by the department in the regulation of exporters under the Approved Arrangements, depending on the outcome of its investigation:

If it is found that a reportable mortality was due to failings in implementing the approved arrangement, the performance level of the exporter will return to, or maintain a level 1 rating and regulatory oversight by the department will increase. If the incident occurred as a result of a flagrant disregard for systems or processes, or fraudulent or criminal behaviour, the approved arrangement may be suspended and referred to the appropriate authority for further investigation.

Given that immediate notification is required, and an investigation initiated, whenever mortalities exceed the "reportable mortality rate" presumably the objectives of setting the rate are:

- To allow the department to obtain an early warning of potential issues in order for contingency plans to be calibrated and implemented. Also, the department may have a role in determining whether any immediate actions should be taken to prevent further mortalities – and to inform the exporter and AAV of these.
- Using the investigation to glean learnings from the voyage to prevent future high mortality occurrences.
- Taking action against the exporter if there is found to be unacceptable failings in processes, flagrant disregard for systems, criminal behaviour, etc. Through the threat of punitive action, exporters are incentivised to take appropriate measures to ensure high mortality events are avoided.

The first of these objectives suggests that "Reportable Mortality Rates" should be set at levels to isolate only very significant events.

It is ALEC's experience, however, that most of the focus in terms of setting "Reportable Mortality Rates" has been on achieving the last two objectives. Certainly these objectives seem to have been uppermost in the mind of Dr Michael McCarthy in his recent report "Independent Review of Conditions for the Export of Sheep to the Middle East during the Northern Hemisphere Summer". The McCarthy Review recommendation (accepted by the department) of changing the mortality threshold for a notifiable incident for a sheep voyage from 2% to 1% was justified on the following basis:

Most of the answers, in regards to minimising mortality are known. Industry has conducted a large body of 'industry specific research' that addresses most of the industry problems. Reducing the reportable mortality level raises the value of this research and places a greater imperative on adopting and implementing the findings.[3]

Dr Michael McCarthy did not justify why 1% had been chosen over any other level or whether a reduction in the notifiable level was the ***best*** way to raise "*the value of [the] research and place a greater imperative on adopting and implementing the findings*". Unusual circumstances can arise on any voyage – a better way of encouraging adoption of research findings may be to apply thresholds over longer periods of time.

In ALEC's view, tracking and analysing mortalities over time represents a superior method of assessing an exporter's performance - thus addressing the last two objectives of "Reportable Mortality Rates" previously listed. Tracking and analysing mortalities over time also provides a more valid foundation on which to identify and secure areas of performance improvement.

[3] MCarthy, M., 2018, Independent review of conditions for the export of sheep to the Middle East during the northern hemisphere summer, Report to the Australian Government, May.

It is to be noted that Approved Arrangements already provide a mechanism for this to occur:

> *An exporter's mortality rate will be reviewed against its 12-month rolling average every six months, at the time of audit. If an exporter's mortality rate has significantly increased above its average over the past 12 months, the department will notify the exporter and an internal system review may be required. If an exporter's mortality rate continues to increase over subsequent six-monthly periods and exceeds the industry average, a performance or system audit may be conducted by a departmental auditor. The outcomes of the audit may recommend corrective actions be implemented or a change in the exporter's performance rating if it is found that increased mortalities are due to issues in the sourcing, preparation, transport and/or loading of livestock.*

ALEC believes that the Approved Arrangements framework correctly and usefully distinguishes between the use of mortality for *performance measurement or monitoring* from the use of mortality thresholds for *immediate notification / reporting*. Each has a distinct purpose that should not be confused.

In terms of mortality thresholds for immediate notification / reporting, these should continue to represent situations that reflect serious incidents warranting the department's urgent notice and subsequent investigation. The gravity of the other notifiable incidents gives some reference – i.e. piracy / terrorism, rejection of consignment, ventilation breakdown, emergency disease, marine casualty.

ALEC also notes that the currently used mortality thresholds do not relate to domestic standards for notifiable mortalities in intensive livestock systems or (apparently) any other basis rooted in science or community expectations.

2.5 Role of Other Animal Welfare Indicators

The TAC has also requested consideration of whether "Reportable Mortality Rates" should be replaced by, or supplemented with, reportable levels for more general welfare indicators.

It is to be noted that a research project has been initiated by the MLA / LiveCorp Live Export Program (LEP) in order to recommend meaningful, practical, animal welfare indicators that could form the basis of a continuous improvement and performance benchmarking framework. Further details on this project and other related projects are to be found in the next chapter of this submission.

ALEC submits that this project should be completed before decisions are made on additional indicators to measure. Additionally, very significant levels of data would need to be collected before any consideration is provided to defining notifiable incident trigger levels based on such indicators.

ALEC further submits that mortality remains an ideal regulatory measure for triggering a notifiable incident and investigation, rather than using other / additional welfare measures. Mortality provides an easily recognisable, permanent, census level measure of a consignment that captures a wide range of disease, health and welfare issues. Other welfare indicators, by comparison, are open to significantly greater measurement error, involve greater interpretation and often comprise a number of different elements, including qualitative components. It is also not uncommon to use, a number of different welfare indicators in combination to determine the state of the animal (with challenges with how individual components are weighted relative to each other). For these reasons ALEC cautions against defining notifiable incident trigger levels for other animal welfare indicators on which data might be collected at this time. This is particularly the case given the consequences

that may apply from exceeding a notifiable limit in terms of government investigation and reputational damage / stigma.

2.6 Clarification of "Notifiable Incident"

As a final comment ALEC notes that a "notifiable incident" in the current ASEL is ill defined and open to interpretation. Currently the definition is as follows:

> *"Notifiable incident means an incident that has the potential to cause serious harm to the health and welfare of animals. A notifiable incident includes, but **is not limited to** [our emphasis]:*
>
> *a) a shipboard mortality rate equal to or greater than a reportable level;*
> *b) disablement of ventilation, feeding and/or watering systems on a vessel carrying livestock, causing a serious adverse effect on animal welfare;*
> *c) rejection of livestock at an overseas port;*
> *d) diagnosis or strong suspicion of an emergency disease in a consignment of livestock;*
> *e) marine casualty of a vessel carrying livestock;*
> *f) disablement of a vessel carrying livestock, such that assistance is required for return to port; and*
> *g) an act of terrorism or piracy."*

Given that a notifiable incident is not confined to points a) to g) the question then becomes what defines "*a **potential** to cause **serious** harm to the health and welfare of animals*" [our emphasis]. These are undefined terms.

2.7 ALEC Recommendations on Notifiable Incidents, including those triggered by mortalities exceeding threshold levels

- That changes in "Reportable Mortality Rates", below those currently specified in ASEL, are not supported unless a clear scientific basis exists for changes. In considering any changes to threshold mortality levels, that if exceeded, trigger a notifiable incident, the TAC should have regard to:
  - length of the voyage;
  - domestic and other standards for notifiable mortalities in intensive livestock systems; and
  - The ultimate objectives of establishing these thresholds.
- To introduce more precision and less ambiguity that the definition of notifiable incident as contained in the reformatted ASEL be modified. In particular, ALEC recommends that the words in the current definition:

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ALEC also notes that a number of recommendations contained in the chapters of this submission that follow are relevant to questions posed by the TAC under "Reportable Mortality Rates." These are as follows:

- That ALEC supports the collection of a broader set of animal welfare indicators in addition to the current mortality indicator.

- Notwithstanding this support, ALEC opposes regulating the collection of a broader set of animal welfare indicators at this point in time. Welfare is multi-faceted, with complex links between various elements and limited research undertaken. A body of evidence is needed before changes are made to voyage reporting regulations.
- That no further measures be introduced as 'trigger' reportable levels beyond mortality until extensive experience has been gained in the collection of animal welfare indicators and measures have been subject to scientific scrutiny and validation.
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3 VOYAGE REPORTING REQUIREMENTS

LIST OF RECOMMENDATIONS

- That ALEC supports the collection of a broader set of animal welfare indicators in addition to the current mortality indicator (noting that a range of information beyond mortality is already collected and provided to the department under the voyage reporting requirements).
- Notwithstanding this support, ALEC opposes regulating the collection of a broader set of animal welfare indicators at this point in time. Welfare is multi-faceted, with complex links between various elements and limited research undertaken. A body of evidence is needed before changes are made to voyage reporting regulations.
- That no further measures be introduced as 'trigger' reportable levels beyond mortality until extensive experience has been gained in the collection of animal welfare indicators and measures have been subject to scientific scrutiny and validation.
- That prescription in automation for data collection be avoided at this time until such technology can be mapped and developed against a defined set of meaningful indicators.
- That the department publish an annual report summarising and interpreting the data collected on routine voyages in a manner that enhances community accessibility, rather than publishing raw voyage reports. Voyage reports / the data contained within them could be released where an investigation into a reportable mortality has been carried out.

3.1 CURRENT ASEL STANDARD

Current voyage reporting requirements under ASEL are to be found in Appendices 5.1 and 5.2 of ASEL.

3.2 2013 ASEL REVIEW

The TAC Issues Paper identified that the 2013 ASEL Review Steering Committee discussed the following difficulties raised in submissions, that the reports:

- Do not include pen or specific area reports smaller than the deck / tier level;
- Are not standardised and therefore are administratively burdensome;
- Include few animal welfare indicators other than respiratory type, faeces type and feed and water consumption; and
- Focus on mortality and environmental reporting.

The Review identified a range of potential changes to the report to expand the data collected.

3.3 MCCARTHY REVIEW

The McCarthy Review recommended the use of a panting score and a heat stress score as a mandatory requirement in the daily reports for sheep voyages and this has now been implemented by the department.

McCarthy also noted that:

> "*In general, the existing reporting system is probably outdated and new technology is available that may revolutionise the reporting process, particularly with the advent of automated environmental monitoring*" and concluded that "*It is, therefore, folly to try to be too prescriptive about reporting at this point. The whole landscape should be mapped out and studied by those with knowledge of the equipment required and the information technology involved. This could be commissioned as an industry funded project*."

3.4 2018 ASEL Review

The TAC posed the following questions in relation to voyage reporting:

- What further changes, if any, do you think are necessary to the voyage reporting requirements of the standards?
- Should the voyage reporting changes recommended by the McCarthy Review and then instituted by the department be applied more broadly?
- Some stakeholders would like voyage reports to be publicly available, while others argue that this approach may limit candour. What is the best approach to balance public transparency with frankness in reporting?
- Should there be on board real-time monitoring of animals and vessel conditions? If so, what should these be and what would be the cost?
- Should there be specific recording and reporting of additional environmental parameters on vessels during voyages? What might these be, and can or should reportable 'trigger' levels be set?
- Should there be specific recording and reporting of animal welfare indicators during, and at the conclusion of a voyage? If so, what might these welfare indicators be, how frequently should they be measured and can/should reportable trigger levels for these measures be established?
- If reporting requirements are increased, what might be this cost and who would pay?

We also note under the Issues Paper chapter addressing the level of mortalities that should trigger a notifiable incident the TAC posed the following question:

- Should the RMR be replaced by, or supplemented with, reportable levels for more general welfare indicators (e.g. see McCarthy Review report)? If so, what should the welfare indicators be and what should be the reportable level for each?

3.5 Significant Data Already Collected

In any consideration of voyage reporting requirements it should first be noted that significant amounts of data are already collected for each live export voyage. *Daily* reports must be submitted to the department containing an extensive array of information, including:

- data related to the vessel,
- information on relevant personnel,
- observations related to the livestock on-board the vessel (e.g. feed and water consumption, faecal consistency, signs of heat stress, respiratory rate and character),
- weather data (e.g. dry and wet bulb readings),
- births, and
- mortalities and hospitalisations.

In addition to these daily reports an extensive end of voyage report must also be submitted.

A critical issue before mandating the collection of any new data is: can better use be made of existing data and can this data be made more accessible?

3.6 Relevant Research into Voyage Reporting Requirements

The LEP project entitled *Development and assessment of animal welfare indicators – quantifying welfare improvements in the live export industry* is a critical part of defining the measurement of welfare moving forward and is the basis on which a move from mortality to welfare can over time be pursued on a scientifically rigorous basis.

This critical project was previously commenced as part of an industry reform proposal initiated by ALEC to develop meaningful indicators of welfare along the supply chain that would move performance measurement away from a focus on mortality, support transparency and reporting to the community, and enable benchmarking of exporters and the industry.

The project is being delivered by Murdoch University and, after an initial literature review and survey to identify potential indicators across the supply chain, is now in a pilot phase. In this phase a range of potential measures – including qualitative behavioural assessments – are being trialled. This project has a final reporting date in 2021. Along that pathway, however, there are a range of steps that will be rolled out, including the adoption of app based real time data collection platforms (currently being piloted) and analysis and development of technologies to increase automation (both of the indicators and underlying data of relevance).

Conditional on research outcomes, it is envisaged that the reporting and transparency measures in the industry can be structured around clear animal welfare indicators that:

- Are meaningfully linked to the welfare of the animal;
- Have scientifically set thresholds on which performance is measured;
- Can be collected and measured, and which have clear collection / sampling protocols;
- Are understood within the context of each other;
- The measurements against these indicators can be clearly interpreted in assessing the welfare of the livestock; and
- Can allow proactive identification of developing risks (i.e. early warning) to support interventions before issues arise.

The research challenge to achieve the above is significant and the selection of indicators is not an easy task. They need to underpin the collection of meaningful and comparable data - too many indicators will result in ambiguity and a lack of focus, while too few may not allow appropriate coverage of the range of animal welfare issues. Some of the aspects of welfare that the project will need to consider include that:

- Welfare is multi-faceted – many different elements contribute, in varying degrees, to whether an animal is in a 'good welfare state'.
- Each element can have multiple degrees of variation that need to be considered and tied back to an acceptable welfare state (for example, there can be variations in the duration and severity of exposure / experience that are relevant, and the scale in terms of how many within a group are affected).
- The patterns and interactions of welfare need to be understood individually and collectively – for example, is panting at a high level for a short time worse than panting at a moderate level but for a longer period?
- Indicators need to be linked back to a welfare state through validated science.
- Indicators need to be assessed / measured consistently (can people easily recognise the differences, what level of training / education is needed)?
- Indicators need to have collection protocols that are meaningful – for example, welfare measures have to be based on sampling and if factors like duration are relevant then there needs to be consideration of how monitoring can occur continuously.

Part of ensuring the animal welfare indicators project can achieve its goal and be implemented will be the availability of supportive collection and analytical technology. Automation is likely to be critical in this regard to:

- Increase the irrefutability of the data;
- Reduce the reliance and workload impact on on-board personnel to collect data – particularly important under a welfare measurement system where there will be a reliance on sampling.
- Enable the collection and rapid analysis of large volumes of information to allow for early warnings / alarms of potential issues to be alerted to on-board personnel and others that can check and respond.

Recognising the importance of integrating this technology into the industry and regulatory systems, the LEP has a number of projects in this space that it has been pursuing alongside the welfare indicators project. Current projects and activities – which the LEP expects will expand as there is more clarity on the indicators that may need to be collected – include:

- Trials of automated environmental monitoring for ammonia, temperature, humidity and carbon dioxide (initially on-board aircraft);
- Development of automated sheep counting technology to provide irrefutable counts at loading and unloading (and in turn, irrefutable mortality figures); and
- Mapping and scoping of proof of concept trials with a university provider for technologies that could support the automated measurement of animal welfare indicators from the animal welfare indicators project (for example, behavioural measures such as panting).

There will of course be logistical challenges that need to be addressed in this process – including on-board power / battery, processing capacity, connectivity and transmission of data and ability of technology to withstand the environmental conditions (i.e. seawater).

ALEC believes that the above projects will provide a rigorous, science based structure for reporting, triggers and indicators that will benefit animal welfare and provide a clear framework for performance into the future.

Taking into account the above and looking to the immediate term, ALEC does not support the use of new animal welfare indicators as triggers for notification. The indicators need to be used in a dynamic and proactive manner that promotes continuous improvement and benchmarking by the industry, rather than as a retrospective punitive measure.

The consequences for exceeding a trigger level presently are significant – they include a public investigation, risks to licences and livelihoods and reputational damage / stigma. These triggers need to be very clearly established and understood in terms of their relation to acceptable animal welfare to be used in a regulatory context. They also need to be able to be unambiguously expressed, achievable and able to be collected. Indicators arrived at by ad hoc judgment over science will not benefit welfare, the industry or the regulator.

For the time being, mortality remains an unambiguous and dependable trigger that can be relied upon in a regulatory structure and which provides a meaningful indicator of welfare. Mortality remains the most complete measure for this purpose as it is absolute and simple to measure (yes / no), can only occur once, is recognisable by anyone (regardless of language, education or training), can provide a census level indication of performance without the need to continuously monitor an entire vessel and captures a wide range of causes with one measure (i.e. salmonella, heat stress).

3.7 ALEC Discussion of Voyage Reporting Requirements

The current voyage reporting information appears to primarily be used to inform analysis during an investigation. While the information collected – which as noted by the TAC goes beyond mortality – is not fully validated for use as indicators, it provides data at a level that is suited to diagnosis /

analysis in breaking apart problems. This continues to appear to be the most reasonable use of the information until a revised structure can be implemented.

In this vein, it is largely for the regulator to determine what it needs to inform its investigations or analysis. However, there are some key points that ALEC would make in this regard:

- Voyage reports need to be concise and focused on delivering against a regulatory objective to ensure they do not unnecessarily occupy the time of the stockperson or AAV away from caring for the animals.
- Given the government's introduction of Independent Observers onto vessels, it would be questioned whether it is appropriate to significantly expand the reporting requirements until the respective roles are determined.
- More data is not necessarily better – and as opposed to simply expanding the information needed, it would be better to make sure that any information collected is necessary, meaningful and clear – and will be used.
- Noting that the McCarthy Review recommended, and the department has implemented, the use of new/revised pant scores and heat stress scores in the daily reporting for sheep, it is suggested that if the ASEL Review is to recommend their inclusion on an ongoing basis that they be subject to wider scientific scrutiny to confirm the scores are the most appropriate and that the correlations / interpretations drawn are correct. This is important noting that, once enshrined in ASEL, such scores and definitions will become the standard across the regulatory and industry data collection frameworks.

In terms of balancing frankness of reporting with public transparency, ALEC notes that significant information is already made publicly available including:

- The six monthly reports made to Parliament – including ports of loading, discharge, livestock carried, mortalities and exporter name
- Reports are published of reportable mortality investigations on the department's website
- The LEP publishes annual Transport Performance Reports (available on the LiveCorp website)

ALEC also believes that it is critical that the regulatory structure support transparency and frank communication within the supply chain and between the on-board personnel, the regulator and the exporter. Requiring routine reports from successful shipments to be published is an unnecessary impost on those exporters that are performing and adds an additional function to the regulator.

In terms of public transparency, ALEC recognises this is important, particularly where issues arise, and voyage reporting data forms an important part of what is released in investigation reports. However, on a more regular basis the release of this information for public transparency needs to also consider community accessibility. Voyage reports are raw data and very few community members will be able to meaningfully interact or interpret the data. In fact, it is likely that based on the data currently collected that it would be open to misinterpretation. In ALEC's view, to extend public transparency on these voyages, the department should be responsible for developing a structure that collates and interprets both the Independent Observer reports / footage / photos and the voyage report data in a way that is accessible to the community and puts it in an appropriate statistical context. Such a report would greatly enhance the accessibility to the community and serve to increase transparency for normal voyages without affecting frankness or unnecessarily creating the regulatory need to publish substantial new materials. Noting this, where issues arise there is a need for greater transparency and information released in the investigation reports should include voyage reports and, where available, Independent Observer reports.

3.8 Economic Impact of Changes to the Voyage Reporting Requirements

The economic impacts of changing the voyage reporting requirements is difficult to ascertain; however, were there to be the premature introduction of 'reportable triggers' for welfare indicators that have not been validated, the economic impacts would be significant.

3.9 ALEC recommendations on Voyage Reporting Requirements

Based on a review of the scientific literature, ALEC recommends the following in relation to voyage reporting requirements:

- That ALEC supports the collection of a broader set of animal welfare indicators in addition to the current mortality indicator.
- Notwithstanding this support, ALEC opposes regulating the collection of a broader set of animal welfare indicators at this point in time. Welfare is multi-faceted, with complex links between various elements and limited research undertaken. A body of evidence is needed before changes are made to voyage reporting regulations.
- That no further measures be introduced as 'trigger' reportable levels beyond mortality until extensive experience has been gained in the collection of animal welfare indicators and measures have been subject to scientific scrutiny and validation.
- That prescription in automation for data collection be avoided at this time until such technology can be mapped and developed against a defined set of meaningful indicators.
- That the department publish an annual report summarising and interpreting the data collected on routine voyages in a manner that enhances community accessibility, rather than publishing raw voyage reports. Voyage reports / the data contained within them could be released where an investigation into a reportable mortality has been carried out.

4 HEAT STRESS RISK ASSESSMENT

LIST OF RECOMMENDATIONS

- That 3A.4 (ii) in the reformatted ASEL be amended as follows:
  "for shipments travelling through waters in the Arabian Sea north of latitude 11˚N, an agreed heat stress risk assessment must be completed and indicate the risk is manageable as per the testing criteria in this Standard".
- Where applicable within ASEL the months of heat stress risk for voyages to and through the Middle East be recognised as June to September.
- ALEC recommends that research be undertaken to better understand the importance of heat stress across all significant markets and to explore the further application of the HSRA model as required.

Recommendations included elsewhere in this submission or to be included in ALEC's submission to the Heat Stress Technical Reference Panel

- That space allocations for livestock be determined as the maximum space allocations calculated from the allometric equation or from an assessment of heat risk.
- ALEC recommends that caution be exercised in making significant changes to the primary objective in the HSRA model. Significant changes should not be made until a new objective has been identified *and tested* that is simple to collect and explain, robust, reliable and repeatable. Until a new measure has been identified, scientifically validated and tested, the HSRA objective should remain focussed on mortalities. While maintaining this focus it would be possible to lower the current 5% mortality setting in the objective.
- Notwithstanding the recommended HSRA focus on mortalities, ALEC members are committed to collecting a range of animal welfare indicators on-board vessels and these being published. A research project is underway to determine meaningful, practical, indicators. While these indicators are being understood and scientifically validated, collection of a defined set of indicators should not be regulated. Once the indicators are thoroughly understood and scientifically validated, regulation of a defined set of indicators could occur with performance threshold values set for exporters to meet.

4.1 CONSIDERATION OF HEAT STRESS

While the application of allometric equations / k-values can provide an effective means of estimating space for a behaviour – such as lying (see Chapter 11 of this Submission), they do not necessarily take meaningfully into account the variety of factors that can contribute to the ability of a group of animals to thermoregulate and deal with environmental challenges[4]. For voyages to or through MENA during the northern summer, animals will experience various degrees of heat challenge depending on factors such as wet bulb temperatures, ventilation, species, breed, acclimatisation, fat depth, wool / hair etc.

In response to the need to address heat stress, the industry has developed the Heat Stress Risk Assessment (HSRA) model. This model has been designed by engineers and has been subject to independent review and validation. The model has also been continually updated, to reflect new knowledge and refine assumptions, since it was first developed in 2003. A requirement that all

[4] While it may be theoretically possible to determine a k-value that takes into consideration thermoregulation, it would represent a very blunt instrument.

sheep and cattle shipments travelling to or through MENA be stocked according to the HSRA model is not fully specified in ASEL, but this represents current Australian Government policy.

The HSRA model combines data on:

- weather conditions;
- vessel configuration;
- parameters for the voyage to be undertaken; and
- characteristics of livestock to be carried

to generate heat stress risk estimates and determine the maximum stocking density for sheep and cattle on individual voyages to the Middle East. It uses over a decade's volume of weather data to derive estimates of heat stress risk and calculate maximum stocking densities. The software is designed to compute minimum space allowances based on ensuring that the heat stress risk is reduced below a 2% chance of a 5% mortality (as identified in ASEL v2.3) for each individual line of livestock on each deck.

Since the implementation of the HSRA model there has been a significant reduction in livestock mortality rates (see Figures 4.1 and 4.2). The HSRA model has undoubtedly played a large part in this outcome, but it is recognised that there have also been other contributing factors such as the introduction of ASEL, changes to Marine Order 43, improvements in vessels, management practices and changes to the livestock types exported.

Figure 4.1: Live sheep export mortality rates 1988-2017

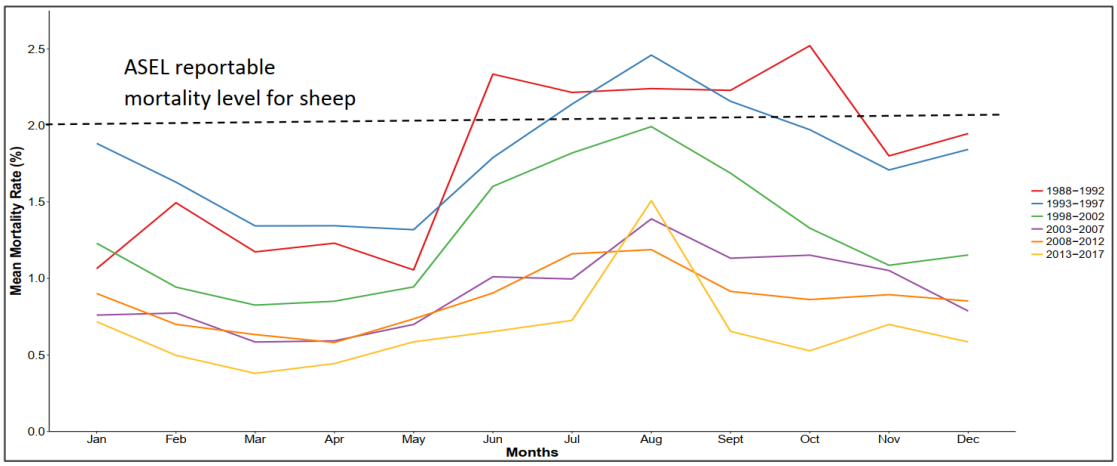
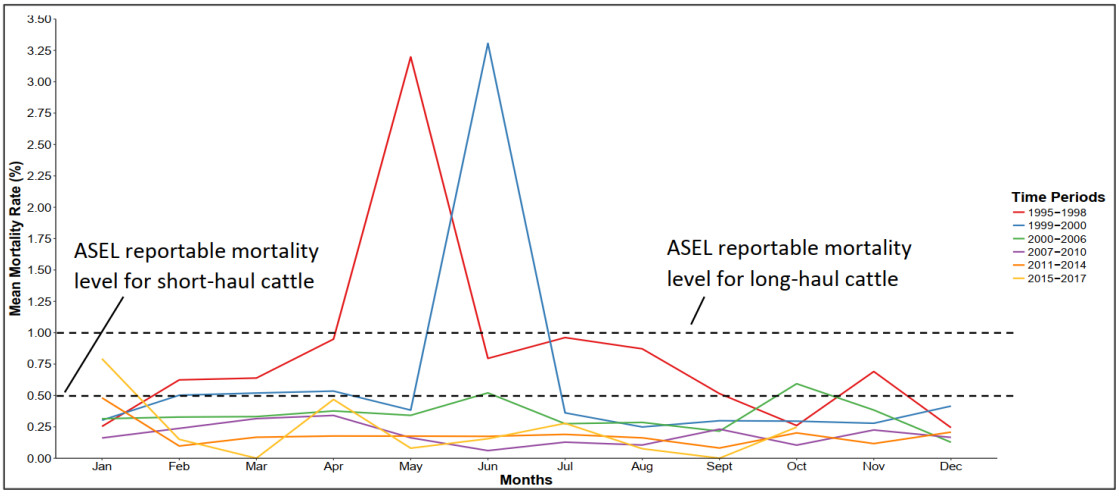


Figure 4.2: Live cattle export mortality rates 1995-2017



4.2 2018 ASEL Review

Within the 2018 ASEL Review he department has established a separate process, involving a Technical Reference Panel, to provide expert advice on the HSRA model.

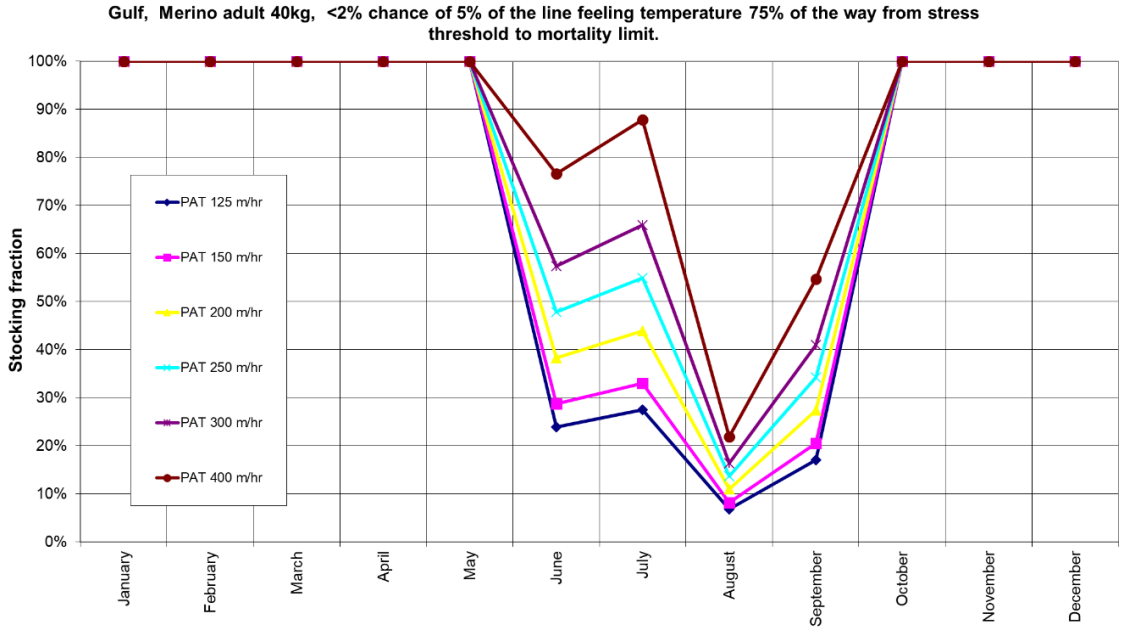
Despite this the TAC continues to be involved in a consideration of where and when the HSRA model should be applied. The TAC posed the following questions in relation to heat stress:

- Should paragraph 3A.4 (a) (ii) be amended to include other geographical locations?
- Is the restrictive period of May to October for voyages departing to the Middle East appropriate? Are these the high risk months for heat stress for animals being exported to the Middle East? If not, what months should be considered as high risk?
- Are there different high risk months for different markets that aren't considered in the standards?

4.3 Months of Heat Stress Risk

Material included in the McCarthy Review based on the HSRA weather data provides evidence that the months of heat stress risk are June to September (see, for instance, Figure 4.3, reproduced from the McCarthy Review).

Figure 4.3: The allowable stocking fraction for sheep to the Middle East with the animal welfare criterion backed away from mortality limit 25% of the way to the heat stress threshold.



This is also recognised in the Heat Stress Risk Assessment Issues Paper:

> *"The wet bulb temperature (WBT) of the environment experienced by ships rises during the trip from Australia to the Middle East, depending on the season and the route travelled. During the winter months, the WBT rarely approaches 26°C, while during the summer months, between* ***June and September****, the WBT averages around 28°C, and maxima above 33°C have been recorded over the western approaches to the Straits of Hormuz. There is little diurnal variation in WBT during shipping through these regions"*[5] [our emphasis].

[5] Department of Agriculture and Water Resources, 2018, Heat Stress Risk Assessment Issues Paper, Commonwealth of Australia, Canberra, September. The statement in this paper reliied upon MAMIC/Maunsell Pty Ltd, 2003, Development of a Heat Stress Risk Assessment Model, Meat & Livestock Australia, Report LIVE.116, Sydney.

Based on this evidence, ALEC believes that the months of heat stress risk for voyages to and through the Middle East should be recognised as June to September.

4.4 GEOGRAPHIC INDICATORS

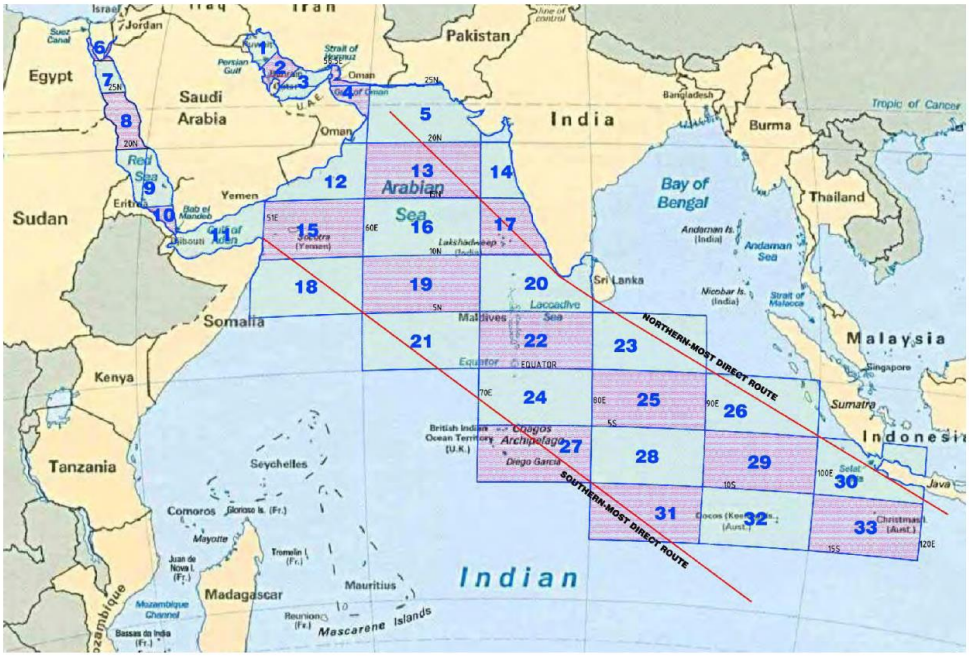
Maunsell Australia Pty Ltd in their original report to the LEP on the development of the HSRA model devoted considerable effort in determining the regions where heat stress was likely to be an issue. The degree of heat stress experienced is critically dependent on wet bulb temperatures experienced throughout the voyage as well as stocking densities and characteristics of the animal and the ship.

Maunsell Australia examined wet bulb temperatures by region using maritime data purchased from the National Climatic Data Center in the US. This data includes a range of weather observations, including wet bulb temperatures, collected from voluntary observing ships and drifting and moored buoys in the Red Sea, Persian Gulf, Arabian Sea and Indian Ocean.

The oceanic regions studied by Maunsell Australia were subdivided into 33 separate zones (see Figure 4.4):

- The Persian Gulf was divided into 4 zones, representing the northern, central and southern regions of the Gulf plus the Gulf of Oman;
- The Red Sea was subdivided into four latitudinal zones, with an additional zone for the Gulf of Aden.
- The open oceanic zones were generally divided into boxes of five-degree latitude and ten-degree longitude, increasing to ten-degree square latitude / longitude boxes south of 10°S where the wet bulb regime was considered more benign.

Figure 4.4: Zones used by Maunsell Australia in studying wet bulb temperatures.



The findings of Maunsell Australia can be summarised as follows (for further details the reader is referred to the report itself):

- The north of the Persian Gulf exhibits the highest average wet bulb temperatures due to a combination of shallow waters and northern most location. Maunsell Australia reported that in this zone the mean wet bulb temperature peaks around 33°C in late July to early August.

- Specific locations on the western approaches to the Straits of Hormuz also exhibit very high wet bulb temperatures.
- In the central and southern parts of the Persian Gulf mean wet bulb temperatures in August are 29°C, with maximum values known to exceed 33°C.
- For the eastern approaches of the Straits of Hormuz highest mean wet bulb temperatures are reached relatively early in the summer in June and July when the wet bulb averages 28.7°C.
- Compared to the Persian Gulf, the greater depth of the Red Sea acts to limit variations in wet bulb temperatures. The hottest region in the Red Sea is in an area defined by the shallower waters of the northern approaches to the Straits of Mandeb, particularly near the Farasan Islands to Hanish Islands region (at the southern end of the Red Sea). July is the most humid month with the mean wet bulb temperatures peaking at a mean of 28.4°C. In many areas of the Red Sea mean wet bulb temperatures, even in July and August, only rise to 26°C.
- In the Gulf of Aden wet bulb temperatures peak earlier than all other parts of the Middle East Oceans – reaching a mean value of 27.7°C in June.
- The open oceanic waters of the Indian Ocean are characterised by generally lower mean wet bulb temperatures than experienced in the Persian Gulf and the Red Sea, as well as the Gulfs of Oman and Aden:
  - Highest mean wet bulb temperatures are in the region between 15°N and 10°N from 50°E to 70°E where they peak at 26.7oC in June.
  - The region between 5°N and 10°N between 70°E and 80°E, to the west of the southern tip of India, experiences mean wet bulb temperatures above 26°C early in the season.
  - The near equatorial region – from 5°N to 5°S are characterised by a relatively uniform wet bulb temperature distribution – mostly around 25°C to 26°C. There is a slight peak in the period from April to June.
  - South of 5°S there are periods of time between March and May when the mean wet bulb temperature is elevated close to 26°C.

The conclusions that can be drawn from above are as follows:

- The Persian Gulf represents the most challenging geographical area in terms of heat stress risk.
- Areas of the Red Sea and Gulf of Aden also represent a challenge, although at considerably lower levels than the Persian Gulf.
- Open oceanic waters generally present lower heat stress risks, being characterised by lower wet bulb temperatures that also tend to be more uniform throughout the year.

It is evident that the HSRA model, as currently formulated, addresses the areas of greatest heat stress risk – notably, voyages to or through the Persian Gulf and Red Sea. Outside these areas the risks, on available evidence, are considerably lower.

ALEC notes that, following the McCarthy Review, the department required additional heat stress mitigation measures for sheep "*consignments .. exported by sea between the months of May and October travelling through waters in the Arabian Sea north of latitude 11˚N*".

This geographical definition takes into account livestock shipped from Australia to destinations in the Middle East, North Africa or Pakistan as well as a number of other destinations. It is supported by ALEC.

4.5 ALEC RECOMMENDATIONS ON THE HSRA MODEL OBJECTIVES AND ANIMAL WELFARE INDICATORS

Based on a review of the scientific literature ALEC makes the following recommendations in relation the HSRA model objectives and animal welfare indicators:

- That 3A.4 (ii) in the reformatted ASEL be amended as follows:
  "for shipments travelling through waters in the Arabian Sea north of latitude 11˚N, an agreed heat stress risk assessment must be completed and indicate the risk is manageable as per the testing criteria in this Standard".
- Where applicable within ASEL the months of heat stress risk for voyages to and through the Middle East be recognised as June to September.
- ALEC recommends that research be undertaken to better understand the importance of heat stress across all significant markets and to explore the further application of the HSRA model as required.

<u>Recommendations included elsewhere in this submission or to be included in ALEC's submission to the Heat Stress Technical Reference Panel</u>

- That space allocations for livestock be determined as the maximum space allocations calculated from the allometric equation or from an assessment of heat risk.
- ALEC recommends that caution be exercised in making significant changes to the primary objective in the HSRA model. Significant changes should not be made until a new objective has been identified *and tested* that is simple to collect and explain, robust, reliable and repeatable. Until a new measure has been identified, scientifically validated and tested, the HSRA objective should remain focussed on mortalities. While maintaining this focus it would be possible to lower the current 5% mortality setting in the objective.
- Notwithstanding the recommended HSRA focus on mortalities, ALEC members are committed to collecting a range of animal welfare indicators on-board vessels and these being published. A research project is underway to determine meaningful, practical, indicators. While these indicators are being understood and scientifically validated, collection of a defined set of indicators should not be regulated. Once the indicators are thoroughly understood and scientifically validated, regulation of a defined set of indicators could occur with performance threshold values set for exporters to meet.

5 Bos Taurus Exports to the Middle East During the Northern Summer

List of recommendations

- That Bos Taurus exports continue to be allowed during the northern summer, subject to an acceptable heat stress risk assessment.

ALEC also notes recommendations contained in elsewhere in this submission that are relevant to consideration of Bos Taurus exports to the Middle East during the northern summer:

- ALEC recommends that caution be exercised in making significant changes to the primary objective in the HSRA model. Significant changes should not be made until a new objective has been identified *and tested* that is simple to collect and explain, robust, reliable and repeatable. Until a new measure has been identified, scientifically validated and tested, the HSRA objective should remain focussed on mortalities. While maintaining this focus it would be possible to lower the current 5% mortality setting in the objective.
- That 3A.4 (ii) in the reformatted ASEL be amended as follows:

  "for shipments travelling through waters in the Arabian Sea north of latitude 11˚N, an agreed heat stress risk assessment must be completed and indicate the risk is manageable as per the testing criteria in this Standard".
- Where applicable within ASEL the months of heat stress risk for voyages to and through the Middle East be recognised as June to September.

5.1 Current ASEL Standard

The current (2018 reformatted draft) ASEL states:

> *1A.3.2 (c) (iii): Bos taurus cattle from an area of Australia south of latitude 26° south must not be sourced for export to the Middle East from May to October unless an agreed livestock heat stress risk assessment indicates the risk is manageable as per the testing criteria specified in this Standard.*

ASEL also specifies minimum stocking densities for the export of southern cattle to MENA. The densities for May to October are 10 – 15 % higher than for November to April.

5.2 2013 ASEL Review

The ASEL Review Steering Committee proposed two options for the export of *Bos taurus* cattle to the Middle East from May to October. The options were:

- A prohibition on the export of Bos taurus to the Middle East during May to October, or
- The status quo, being:
  - *Bos taurus* cattle bred in an area of Australia south of latitude 26° south must not be sourced for export to or through the Middle East from May to October unless a livestock heat stress risk assessment agreed by the department indicates that the risk is manageable.

5.3 2018 ASEL Review

The Stage 2 Issues Paper notes that a number of submissions argued that Bos taurus cattle originating from southern Australia are at significant risk of heat stress if transported during the Middle Eastern summer.

In relation to *Bos taurus* exports, the TAC has posed the following questions.

- Should Paragraph 1A 3.2 (c) (iii) be retained in its current form?
- Should Paragraph 1A 3.2 (c) (iv) be retained in its current form?

5.4 Relevant Research into Bos Taurus Exports to the Middle East during the Northern Summer

In 2000, Drs Ainsworth and McCarthy produced the LEP report – Best Practice Standards for the Preparation & Husbandry of Cattle for Transport from Australia (LIVE.102 & SBMR.003). The report:

- Identified that temperature and humidity stress to cattle shipped during the Northern Hemisphere summer is one of the most significant threats to health and welfare on long haul voyages and that *Bos indicus* breeds are physiologically better suited to cope with heat stress than *Bos taurus* breeds; and
- Recommended that industry source *Bos indicus* infused cattle for export during the most stressful period. In the case of the Northern Hemisphere, it identified this period as from the beginning of May through to the end of October. Where known heat sensitive *Bos taurus* animals are sourced south of the 26th parallel during the northern hemisphere summer it recommended that they be provided with a reduced loading density in the order of 10% than that described in the then Live Export Accreditation Program (LEAP) standards.

LIV.102 / SBMR.003 noted that while the principles were relatively well evidenced, the cut-offs were not validated or based on strong science.

In the late 1990s and early 2000s there were some critical incidents where there were large mortalities in cattle associated with heat stress, with other factors such as ventilation playing a role. These incidents were investigated and the reports clearly identified the specific risks and the relative increase in mortality associated with *Bos taurus* cattle from southern Australia loaded in an Australian winter for shipment to a Middle East summer. The investigations conducted on cattle voyages around this period reported that the major cause of death on voyages was heat stress, followed by respiratory disease and trauma. The recommendations and findings from these investigation reports led to the development of the Heat Stress Risk Assessment (HotStuff) computer model to assist in heat stress risk assessment and mitigation and its implementation.

The elevated heat stress risk of *Bos taurus* cattle compared to *Bos indicus* cattle has been a consistent feature of many reports and more broadly is well documented. For example, the report into the Becrux mortality incident noted that the vessel contained about 75 per cent *Bos taurus* and 25 per cent *Bos indicus* cattle, but that there was zero evidence of either mortality or morbidity involving the *Bos indicus* animals. Similarly, research from Richard Norris in Western Australia noted in four research voyages for the LEP that all deaths from heat stress were in *Bos Taurus* animals and none were in *Bos Indicus* animals (SBMR001 and SBMR004A).

As noted above, in 2004 Maunsell Australia completed the foundational development of the HotStuff heat stress risk assessment program for the LEP (LIV.116). It considered available animal physiology data, shipboard data and weather information to set the parameters for the software program. The initial report identified that:

- The vessels current in 2003 could largely export *Bos indicus* cattle with relative safety year-round (Figure 5.1 – noting that no destocking is required for PATs above 250 m / hr). *Bos taurus* cattle were different and required lower densities to manage the risks (Figure 5.2).
- Figure 5.2 also shows how the application of HotStuff – where it considers the characteristics of *Bos taurus* cattle – applies a destocking rate that eventually prevents exports.

In 2007 – 2018 (post HotStuff implementation), there has been only one report concerning a voyage to the Middle East during May to October. In this report (Portland to Turkey), heat stress was noted as a contributing factor, but not the primary cause in any death. The major cause of death was respiratory disease and the heaviest deaths were recorded on the deck with the lowest maximum temperature records.

The voyage trends and the findings from the investigation report are consistent with a long-term LEP research project completed in 2016 (*Identifying the causes of mortality in cattle exported to the Middle East,* LIV.252). This project described the causes in more than 200 cattle deaths from 20 separate cattle voyages, mostly to the Middle East but also including some other long-haul destinations. Heat stress was recorded as the primary cause of death in only 2 of the 215 mortalities recorded for the study and noted as a complicating factor in a further nine mortalities. Other primary causes that were responsible for relatively more deaths in the study included respiratory disease, musculoskeletal conditions (including injuries), ketosis in pregnant animals, septicaemia and enteric disease.

Separate to the project, further analysis of a dataset compiled in that project was completed by the researcher at the request of LiveCorp, comparing two time periods for mortality rates in southern loaded cattle going to the Middle East. The two time periods were 1995 to 2006 (representing exports before HotStuff came into effect) and 2007 – 2012 (representing exports after HotStuff came into effect). The results (Figure 5.3) show a dramatic reduction in mortality rate – particularly for voyages loaded in the Australian winter – as a result of the implementation of HotStuff.

These findings are consistent with the LIV.252 report and suggest that heat stress risk has been controlled to the point where it is no longer a primary cause of death in southern loaded cattle travelling to the Middle East during May to October. Although, it should still be noted that this does not suggest that heat stress has been eliminated and it may still contribute to some morbidity or mortality.

Noting the following points made in this Chapter and in Chapter 1 of this submission:

- heat stress now causes only a relatively small number of mortalities in cattle exported to the Middle East;
- the HSRA model requires vastly reduced stocking densities to the Middle East during the northern hemisphere summer months;
- prohibitions rarely represent good regulation; and
- regulation is best framed with reference to the desired outcome – in this case control of heat stress,

ALEC recommends that exports of Bos Taurus cattle to the Middle East continued to be assessed using the HSRA model.

Figure 5.1: Allowable stocking fraction of ASEL for 300 kg Bos indicus from Southern Australia to the Gulf, fat score 3, acclimatised to 15°C wet bulb

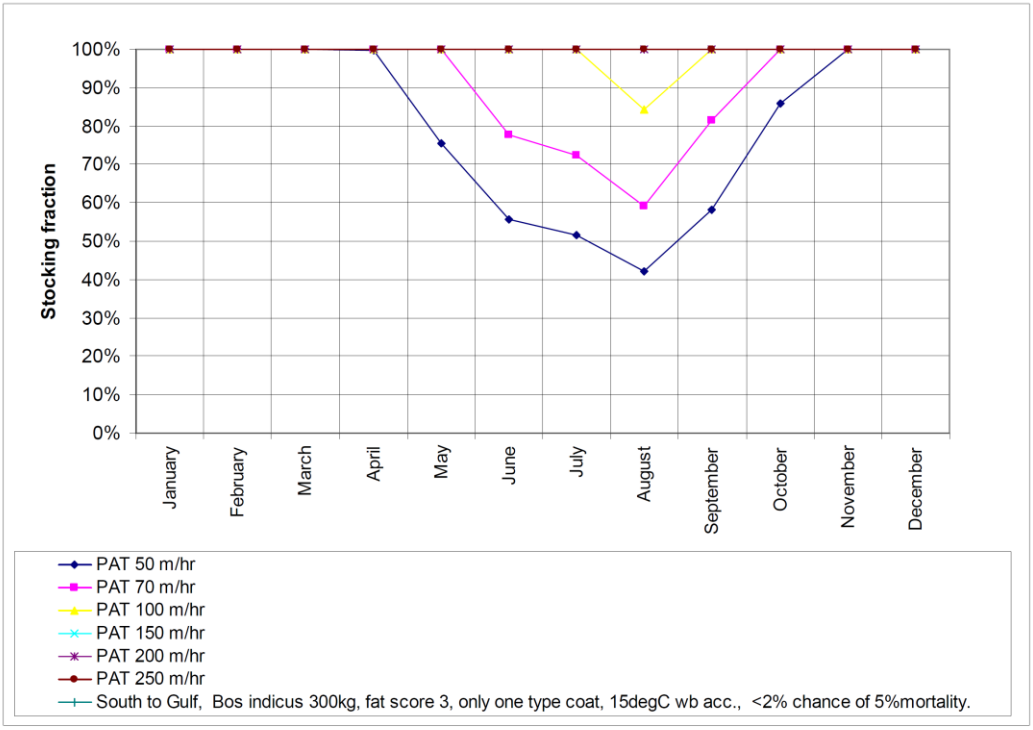


Figure 5.2: Allowable stocking fraction of ASEL for 300 kg Bos Taurus cattle from Southern Australia to the Gulf, fat score 3, acclimatised to 15°C wet bulb, mid-season coat

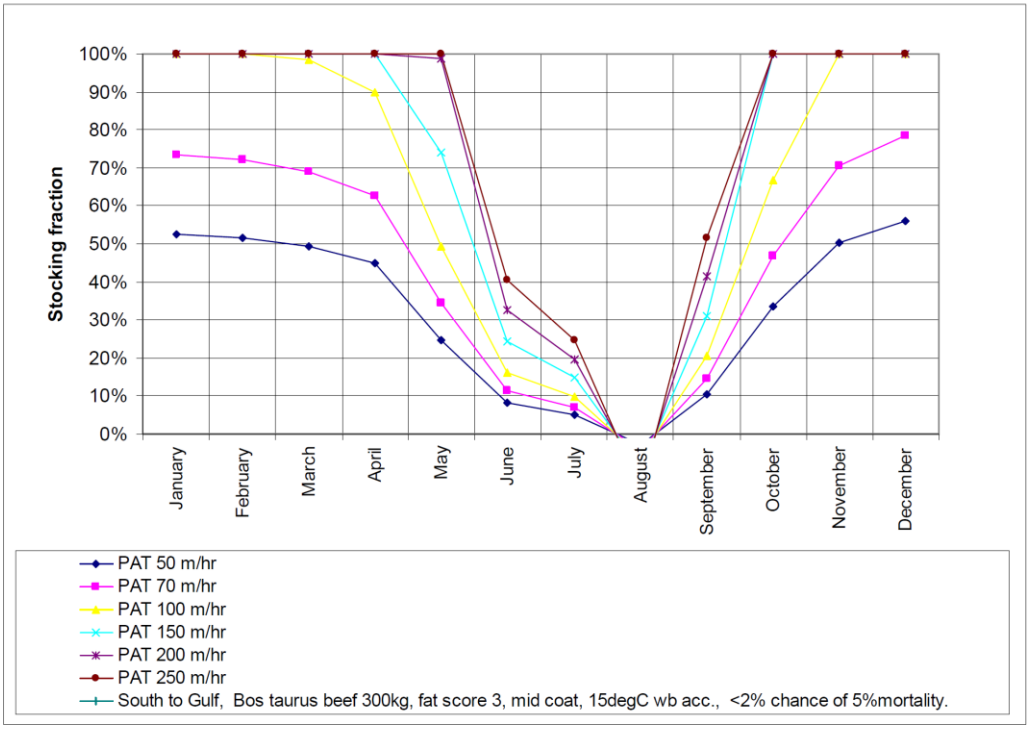
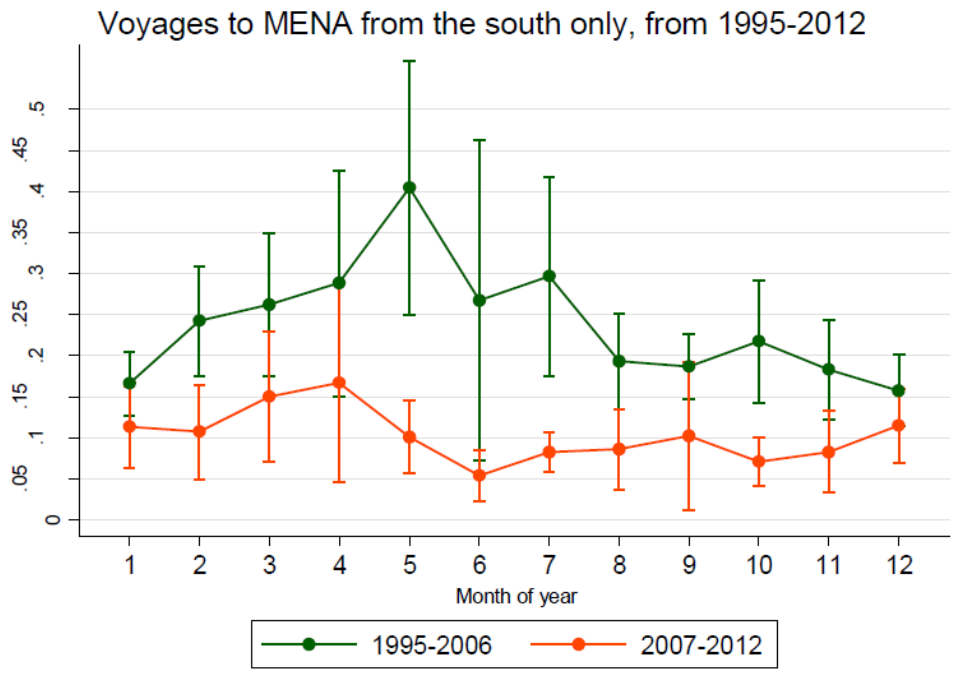


Figure 5.3: Average voyage cattle mortality (deaths per 1000 cattle days) by month of loading for voyages involving cattle loaded in southern Australian ports and travelling to MENA



Note: bars represent 95% confidence interval

5.4.1 Geographic indicators

As previously noted, rather than referring to the Middle East, ALEC recommends that heat risk assessment be conducted for "*consignments .. exported by sea travelling through waters in the Arabian Sea north of latitude 11˚N*".

This geographical definition takes into account livestock shipped from Australia to destinations in the Middle East, North Africa or Pakistan as well as a number of other destinations.

5.5 Economic Impact of Changes to Requirements Relating to Bos Taurus Exports to the Middle East during the Northern Summer

The impact of prohibiting exports of *Bos taurus* to the Middle East during the northern summer (particularly if defined as May to October) would be major and could prevent Australia maintaining commercial relationships and trade with Israel because of the inability to consistently supply. This trade has recently fluctuated in volume but in the last five years has accounted for around 30,000 to 100,000 head annually (averaging roughly 70,000 head/ year).

5.6 ALEC Recommendations on Bos Taurus Exports to the Middle East during the Northern Summer

Based on a review of the scientific literature, ALEC recommends the following in relation to Bos Taurus exports to the Middle East during the northern summer:

- That Bos Taurus exports continue to be allowed during the northern summer, subject to an acceptable heat stress risk assessment.

ALEC also notes recommendations contained in elsewhere in this submission that are relevant to consideration of Bos Taurus exports to the Middle East during the northern summer:

- ALEC recommends that caution be exercised in making significant changes to the primary objective in the HSRA model. Significant changes should not be made until a new objective has been identified *and tested* that is simple to collect and explain, robust, reliable and repeatable. Until a new measure has been identified, scientifically validated and tested, the HSRA objective should remain focussed on mortalities. While maintaining this focus it would be possible to lower the current 5% mortality setting in the objective.
- That 3A.4 (ii) in the reformatted ASEL be amended as follows:
  "for shipments travelling through waters in the Arabian Sea north of latitude 11˚N, an agreed heat stress risk assessment must be completed and indicate the risk is manageable as per the testing criteria in this Standard".
- Where applicable within ASEL the months of heat stress risk for voyages to and through the Middle East be recognised as June to September.

6 TIME OFF SHEARS / HAIR SHEEP, GOATS AND ALPACAS

LIST OF RECOMMENDATIONS

- That clause 1A.3.4 in the Reformatted ASEL be amended as follows:

  For export by sea, all sheep must:

  …

  (ii) have wool not more than 25 mm in length unless approved by the relevant Australian Government agency based on an agreed heat stress risk assessment model

  (iii) either be:

  a. 10 days or more off shears when sourced, or

  b. are to be shorn at least one clear day (not including the day of shearing and the day of loading) before export, in which case they must be accommodated in sheds on the registered premises where there is a risk of hypothermia.

- That, for reasons outlined in the review of research, no standard be imposed for the length of hair on goats, hair sheep and alpacas.

6.1 CURRENT ASEL STANDARD

The current ASEL standards relating for sheep are outlined below.

Standard 1.19:

Sheep must only be sourced for export if they:

a) have wool not more than 25 mm in length, unless approved by the relevant Australian Government agency based on an agreed heat stress risk assessment model; and
b) are 10 days or more off shears; or
c) are to be shorn during the 10-day period before export, in which case they must be accommodated in sheds on the registered premises.

Standard 3.9 – Export to the Middle East

b) All sheep for export to the Middle East by ship during the period from May to October held in paddocks in the registered premises must have wool not more than 25 mm in length, unless approved by the relevant Australian Government agency based on an agreed heat stress risk assessment model and must be at least 10 days off shears on arrival at the premises.

There is currently no standard within ASEL for hair sheep, goats and alpaca with fibre length in excess of 25 mm.

6.2 2013 ASEL REVIEW

6.2.1 Options regarding length of wool / hair

Two options were considered in the 2013 ASEL Review in relation to the length of wool / hair on animals to be exported. Both options amend the current standard and include a blanket ban on the export of sheep with wool in excess of 25 mm. The options also apply to goats and alpacas as well as sheep. The options considered are listed below:

Option 1 – allow departmental discretion on length of hair for goats, sheep and alpacas

Sheep, goats and alpacas must only be sourced for export if they:

a) have wool not more than 25 mm in length
b) have hair not more than 25 mm in length, unless approved by DAFF based on a heat risk assessment model agreed by DAFF and at least an additional 10 percent space provided.

Option 2 – blanket ban on the export of goats, sheep and alpacas with hair in excess of 25 mm

Sheep, goats and alpacas must only be sourced for export if they:

a) have wool not more than 25 mm in length
b) have hair not more than 25 mm in length.

6.2.2 Options regarding time off sheers

Similar to the consideration of length of hair for sheep, goats and alpacas, the 2013 ASEL Review did not propose status quo as an option for time off shears. Rather two options were put forward.

Option 1 – two days off sheers

Sheep, goats and alpacas must only be sourced for export if they:

c) if they are 10 days or more off shears; or
d) are to be shorn at least two days (not including the day of shearing and loading) before export, in which case they must be accommodated in sheds on the registered premises.

Option 2 – three days off shears

Sheep, goats and alpacas must only be sourced for export if they:

c) are 10 days or more off shears; or
d) are to be shorn at least three days (not including the day of shearing and the day of loading) before export, in which case they must be accommodated in sheds on the registered premises

6.3 OIE Guidelines

The OIE Terrestrial Animal Health Code 7.2.7 (3) (f) states the following in relation to fitness to travel:

> *"hair or wool length should be considered in relation to the weather conditions expected during transport."*

6.4 2018 ASEL Review

In relation to time at Registered Premises the TAC has posed the following questions:

- Should there be a minimum period of time off-shears and/or wool length to apply for all wool sheep being sourced for export?
- Should all hair sheep and alpacas be subject to the same requirements as wool sheep?
- Should the standards be amended to alter the specifications currently in place prescribing time-off periods for shorn wool sheep and shorn hair sheep? If so, what would you suggest?
- Are any other changes necessary to the requirements for wool sheep and hair sheep?
- Should the current standards regarding timing of shearing prior to loading for export by sea be revised?

6.5 Relevant Research on Hair Sheep, Goats & Alpacas / Time off Shears

6.5.1 Research on hair sheep, goats and alpacas.

No research would appear to justify changes proposed under Options 1 or 2 of the 2013 ASEL Review as they apply to hair sheep, goats and alpacas.

The project *Physiology of heat stress in cattle and sheep* (LIVE.209) was completed in 2004 and helped define the heat stress thresholds for different classes of livestock, including Awassi rams. The project conducted controlled experiments and confirmed that Awassi rams had a higher heat stress threshold than Merino wethers.

Development of a heat stress risk management model (LIVE.116) was completed in 2004 and developed the first version of HotStuff. In the background calculations, HotStuff identified different heat stress thresholds and mortality limits for Awassi and Merino sheep (woolly verses hairy) and incorporated scaling based on animal parameters using the available science. For Merinos, this included a 12 per cent de-rating of sheep with wool in excess of 25 mm. Awassi sheep were taken to be one variety – 'hairy.'

Hair breed sheep have been shown in a number of international studies to be more heat tolerant than wool breed sheep under farming conditions in hot and humid environments.[6] It is to be noted that almost all hair sheep breeds originated in hot climatic regions and hair sheep breeds have short hair coats.

There is no data on heat tolerance effects of shearing hair breed sheep, as they are not typically shorn[7]. However, given the fleece characteristics and length of the naturally short haired sheep types, it is difficult to identify a benefit that would accrue from shearing such animals.

It is also to be noted that feral / rangeland goats are hairy and the proposed amendments to ASEL would appear to require such animals to be shorn prior to export by sea. At present, such shipments only occur to Brunei in small numbers, however, shearing these animals would appear to be unnecessarily impactful on animal welfare and the minimisation of stress.

Shearing goats and alpacas is also a completely different task and skill set than shearing sheep. While these are primarily air-crated, identifying suitably skilled personnel for shearing if sea shipments were to occur could be a challenge.

The following is also noted:

- The inclusion of goats and alpacas within this standard (under any option) is not strongly substantiated and there appears to be minimal understanding of how the arbitrary application of the sheep thresholds (e.g. 25 mm, days off shearing, holding in sheds) would benefit or impact these species.
- The blanket application of the requirements and proposed conditions across all three species (for wool or hair) suggests strongly that there was minimal evidence considered in the ASEL Review to justify the inclusions. They are different species, and even recognising the breadth of variation between and within breeds, it should not be assumed it is appropriate or necessary to apply the sheep conditions arbitrarily. Anecdotal information for goats, for instance, appears to

[6] See, for example, Degen, A., 1977, Fat-tailed Awassi and German Mutton Merino sheep under semiarid conditions. 3. Body temperatures and panting rate, Journal of Agricultural Science, Vol. 89, pp399-405; Amaral, D., Barbosa, O., Gasparino, E., Akimoto, L., Lourenco, F. & Santello, G.A., 2009, Efeito da suplementacao alimenter nas respostas fisiologicas, hormonais e sanguineas de ovelhas Santa Ines, Ile de France e Texel. Acta Scientiarum, Animal Sciences, Vol. 31, pp403-410; McManus, C., Louvandini, H., Paim, T., Martins, R., Barcellos, J., Cardoso, C., Guimarães, R.., Santana, O., 2011, The challenge of sheep farming in the tropics: aspects related to heat tolerance, Revista Brasileira de Zootecnia, Vol. 40, pp107-120; Ross, T., Goode, D., Linnerud, A., 1985, Effects of high ambient temperature on respiration rate, rectal temperature, fetal development and thyroid gland activity in tropical and temperate breeds of sheep, Theriogenology, Vol. 24, pp259-269; Wildeus, S., 1997, Hair sheep genetic resources and their contribution to diversified small ruminant production in the United States, Journal of Animal Science, Vol. 75, pp630-640

[7] See, for example, Graham, P., White, A., 2010, Sheep enterprises- what are the differences?, AFBM Journal, Vol. 7, pp33-42 and Notter, D., 2000, Potential for hair sheep in the United States, Journal of Animal Science, Vol. 77 E-Suppl, pp1-8.

suggest a much higher tolerance to heat stress and a much lower tolerance to shearing stress – particularly in hair breeds and rangeland animals

- No evidence has been provided to industry to substantiate the addition of hairy sheep, goats or alpacas or for the restrictions or mitigations proposed as options in the 2013 ASEL Review – specifically:
  - The need to shear animals to less than 25 mm of hair; or
  - Either banning the export of animals with hair more than 25 mm or the need for a heat stress risk assessment to be conducted, which applies at least a 10 per cent addition in space above ASEL.
- ALEC opposes a blanket allowance of 10% additional space. Ideally, space allowances should be calculated as the maximum from allometric calculations or an appropriately calibrated heat stress risk assessment model.

Recognising the significant questions raised above about the actual welfare risks, based on evidence available to ALEC, suggestions of a ban on the export of sheep with hair in excess of 25 mm or / and the subsequent mandating of shearing of hair sheep, goats and alpacas is excessive and unwarranted. In this context it is also important to recognise stresses that may be caused by shearing.

Finally, ALEC also notes that the difference between a hairy or woolly sheep, goat or alpaca is poorly defined and needs further clarification.

6.5.2 Research on time off-shears for sheep.

After the 2013 ASEL review, the LEP engaged Andrew Fisher from the Animal Welfare Science Centre to complete a literature review of the current science relevant to the pre-export shearing of sheep (*A Review of Pre-export Shearing of Sheep*). This review is available to the TAC on request. Amongst other things the review identifies the following:

- Shearing of sheep is aversive to the animals and produces a strong physiological stress response that returns to baseline approximately an hour after shearing. Adverse consequences of this stress response are likely to have resolved within 24 hours.
- Where shearing causes tissue trauma, inflammation and the risk of infection may persist for several days until the physiological effects of the tissue trauma are resolved and wound scab formation is complete. The exact duration of susceptibility to infection is not known and is likely to be variable with the nature of the cut and the degree of challenge from the environment.
- Fisher identified that no conclusions could be drawn on the duration of psychological stress caused by shearing, other than to determine that if present it is not reflected in any physiological changes beyond the day of the procedure.
- Apart from the physiological stress response, shearing alters metabolic and thermoregulatory responses in sheep.
- Wool-bearing sheep benefit from being recently off-shears in terms of reduced risk of heat stress arising from hot and humid conditions, especially where solar radiation is not a significant contributor to the heat stress risk. The heat stress benefits appear to increase as wool length becomes shorter – rather than the benefits applying as a step-change centred on the 25 mm threshold.
- The report concluded that the 10-day minimum period off shears in the current ASEL is not justified by the duration of the stress response itself to shearing, but appears to be based on risk management associated with feed intake, hypothermia and infection susceptibility off-shears.

Following the AWSC literature review, an opportunity arose within the sheep feedlot trials conducted by Murdoch University under the LEP inanition project to assess whether there is a feed intake lag following shearing. The research project (by Lourdes-Angelica Aguilar Gainza)[8] assessed a sample of 20 animals and examined the effect of day of shearing on the time spent at the feed and water troughs, as well as the effect on observed behaviour. Sheep were randomly allocated days 1 – 6 to be shorn, and RFID tags were used to record the total time spent at the feed and water troughs.

The project concluded that:

- There was no difference in time spent at the feed and water troughs for sheep shorn on any day, and therefore the null hypothesis that shearing had no effect was retained. The results also found that there was no difference in observed behaviour.
- For this group of sheep, shearing could occur on any day that the sheep were at the pre-embarkation feedlot and that current management practices did not disrupt feeding behaviour (that is, the amount of time the sheep will spend at the feed and water trough) and observed behaviour.

From a practical perspective, an important factor that also needs to be considered is that there is only a finite period where sheep are held in the Registered Premise (around 3 – 5 days) and this yarding period represents the most significant preparation cost. Any amendments to the standards need to avoid perversely pushing the shearing event back too far in the process towards the receival event (i.e. where the sheep are recovering from the land transport leg / curfews etc.).

In summary, ALEC notes that the research supports, at a minimum, sheep not be shorn the day prior to export / loading.

- Adopting this as a standard would allow a full day for the physiological stress to resolve and for the animals to have a complete day between shearing and loading to rest, eat and drink prior to loading or curfewing.
- It also avoids exporters having to shear closer to when the animals are received into the depot and where it could disrupt the rest / recovery from the land transport journey / curfews etc. This allows for better management of the animals' welfare and prevents unnecessarily having to extend the yarding period, with the associated costs.
- Using an allocation by day (e.g. the day before the day of loading) would appear to be a better and more easily applied and enforced standard than basing it on minimum hours (e.g. within 48 hours).

With respect to the possibility of shearing causing tissue trauma, etc. ALEC notes that if significant these are unlikely to be resolved within the two to three days considered in the 2013 ASEL Review options. ALEC also notes existing provisions in ASEL that require sheep to be rejected is they exhibit "significant lacerations", "discharging wounds", and "abscesses".

6.6 ALEC RECOMMENDATIONS TIME OFF SHEARS / HAIR SHEEP, GOATS & ALPACAS

Based on a review of the scientific literature, ALEC makes the following recommendations to the TAC on time off shears / hair sheep, goats and alpacas.

[8] Aguilar, L., Wickham, S., Barnes, A., Miller, D., Fleming, T., Collins, T., 2016, The effect of shearing on sheep feeding and behaviour, Proceedings of AVA Annual Conference, Adelaide, 2016, pp168-179, May

- That clause 1A.3.4 in the Reformatted ASEL be amended as follows:

  For export by sea, all sheep must:

  …

  (iv) have wool not more than 25 mm in length unless approved by the relevant Australian Government agency based on an agreed heat stress risk assessment model

  (v) either be:

  c. 10 days or more off shears when sourced, or

  d. are to be shorn at least one clear day (not including the day of shearing and the day of loading) before export, in which case they must be accommodated in sheds on the registered premises where there is a risk of hypothermia.

- That, for reasons outlined in the review of research, no standard be imposed for the length of hair on goats, hair sheep and alpacas.

7 Maximum Weight of Cattle and Buffalo

List of recommendations

- That the current maximum weight provisions in ASEL continue to apply.
  - This includes provisions allowing the department to approve export of cattle in excess of 650 kilograms with a management plan detailing additional measures relating to pre-loading arrangements, loading and pen arrangements, additional veterinary arrangements and monitoring and inspection.

7.1 Current ASEL Standard

Standard 1.9 of ASEL states:

> *Cattle and buffalo sourced for export as slaughter and feeder animals: ….*
>
> *b) must have an individual liveweight of more than 200 kg and less than 650 kg or, if outside these weights, have written prior approval from the relevant Australian Government agency;*

7.2 2013 ASEL Review

Two options were identified by the ASEL Review Steering Committee in 2013 in relation to maximum cattle and buffalo weights.

Option 1 – retain current provisions

No change – the standard to remain as above.

Option 2 – lower the maximum weight to 500 kgs

> *Cattle and buffalo sourced for export as slaughter and feeder animals: ….*
>
> *b) must have an individual liveweight of more than 200 kg and less than 500 kg or, if outside these weights, have written prior approval from the relevant Australian Government agency.*

During the 2013 ASEL Review there was discussion about also removing the department's discretion to approve animals in excess of the maximum weight (being either 500 or 650 kg).

7.3 2018 ASEL Review

In relation to maximum cattle weights the TAC has posed the following questions.

- Should the maximum weight for sourcing and exporting cattle and buffalo be the same?
- Should cattle and buffalo exported for feeder and slaughter purposes have a different maximum weight to cattle and buffalo exported for breeder purposes?
- Is 500 kg appropriate? Is 650 kg? Should it be higher/lower and why? What are the animal health and welfare risks? Are there any mitigating measures that must be taken?
- Is a weight restriction appropriate and are there extra conditions that should apply or should it be more specific, for instance, a body condition score and breed?

7.4 Relevant Research into Maximum Weight of Cattle for Export

Heavy cattle have been recognised in many research projects as having a higher susceptibility to risks of musculoskeletal conditions and leg and feet injuries.

Within existing regulations, however, there are particular provisions applying to heavier cattle in order to address risks.

Additional space allowances are provided within the current ASEL in relation to heavy cattle. All exports of cattle from southern Australia to MENA at any time of year receive 10+% space allowance. The space increase is not limited to 10%, for example, the stocking densities provide 15% additional space for 550 kg *Bos taurus* any time of year.

In addition, Export Advisory Notice 2016 – 12 provides further arrangements for the export of heavy cattle in excess of 650 kilograms. This includes a requirement for a heavy cattle management plan detailing additional measures relating to pre-loading arrangements, loading and pen arrangements, additional veterinary arrangements and monitoring and inspection.

During the ALEC and LiveCorp arranged AAV Workshop in Melbourne in December 2016, there was agreement that heavy cattle were a higher risk category and needed to be managed differently. However, there was no consensus on what 'heavy' cattle were or what the best method of risk mitigation was given the differences between breeds, species and gender. It was also noted that welfare risks for heavy cattle were a complex function of pen space, trough space and feed availability. There was no suggestion that heavy cattle should not be exported.

The final report from the AAV workshop provided the following finding and proposed pathway forward in relation to heavy cattle:

> *Cattle of 500+ kg are recognised as higher-risk animals. Data on the relationship between weight and animal welfare outcomes should be collected to enable the current threshold of 650 kg to be reviewed.*

To summarise the research findings, minimal data is available to assess effectively the association between weight and mortality / morbidity risks. As such, while there is a broadly accepted principle that heavier animals are a higher risk, the data is not available at the needed level of detail to substantiate either the status quo or a change to the standards. The enhanced industry data collection systems being developed through the animal welfare indicators project with Murdoch University will provide a key mechanism to obtain statistics necessary to complete a reliable analysis.

There is also not a reliably demonstrated failing in exporters' addressing the welfare risks that may exist for cattle between 500 and 650 kilograms that would substantiate the costs or burden of further regulatory intervention. Rather – in addition to the general importance of ensuring health and welfare – there are strong commercial reasons for exporters to ensure that provisions are made to address the particular needs of heavy cattle.

7.5 Economic Impact of Reducing the Maximum Weight of Cattle Exported

The economic impact of reducing the maximum cattle weight (being the weight above which a further heavy cattle management plan would be required) would be to reduce productivity and increase costs.

It would be expected that the impacts would primarily fall on exports of slaughter cattle and heavy breeders (bulls).

7.6 ALEC RECOMMENDATIONS ON THE MAXIMUM WEIGHT OF CATTLE

Based on a review of the scientific literature, ALEC recommends:

- That the current maximum weight provisions in ASEL continue to apply.
  - This includes provisions allowing the department to approve export of cattle in excess of 650 kilograms with a management plan detailing additional measures relating to pre-loading arrangements, loading and pen arrangements, additional veterinary arrangements and monitoring and inspection.

8 TIME IN REGISTERED PREMISES

LIST OF RECOMMENDATIONS

- That sheep and goats to be exported by sea are held at Registered Premises for a minimum of 5 clear days (excluding the days of arrival and departure) before export.
- That the minimum of 5 clear days apply regardless of season and whether sheep and goats are held in sheds or paddocks.
- That the existing ASEL requirements for the minimum time that cattle and buffalo spend in Registered Premises continue to apply, except that the minimum time for extended long haul voyages be increased from two days to three days.

8.1 INTRODUCTION

A contentious issue in the 2013 ASEL review was the minimum time sheep and cattle were required to spend in Registered Premises. This section of the ALEC submission re-examines this issue in light of the latest research findings and provides recommendations on amendments to ASEL for the TAC to consider.

8.2 CURRENT ASEL STANDARD

8.2.1 Minimum time in Registered Premises for sheep

In relation to time spent in Registered Premises by sheep to be exported by sea the current ASEL standards specify the following:

Section 3.8:

For preparation of sheep and goats in premises south of latitude 26° south that are held:

a) in paddocks during any or all of May, June, July, August, September and October, premises must have procedures to ensure that:
   i. sheep and goats to be exported by sea are held at the premises for 5 clear days (excluding the days of arrival and departure) before export;
   ii. livestock are fed ad libitum during that period; and
   iii. during the last 3 days of that period, livestock are fed ad libitum, but only on pelletised feed equivalent to that normally used during an export journey.

b) in paddocks during any or all of November, December, January, February, March and April, premises must have procedures to ensure that:
   i. sheep and goats to be exported by sea are held at the premises for 3 clear days (excluding the days of arrival and departure) before export; and
   ii. livestock are fed ad libitum during that period and only on pelletised feed equivalent to that normally used during an export journey.

c) in sheds during any or all months of the year, premises must have procedures to ensure that:
   i. sheep and goats to be exported by sea are held at the premises for 3 clear days (excluding the days of arrival and departure) before export; and
   ii. livestock are fed ad libitum during that period and only on pelletised feed equivalent to that normally used during an export journey.

8.2.2 Minimum time in Registered Premises for cattle

In relation to time spent in Registered Premises by cattle and buffalo to be exported by sea the current ASEL standards are as follows:

S3.8A:

The minimum length of time that livestock must remain in a registered premise prior to departure is as follows:

a. *for cattle or buffalo:*
   i. *a long haul voyage — 2 clear days;*
   ii. *for a short haul voyage in a vessel with multiple port loadings or multiple port discharges — 1 clear day;*
   iii. *for a short haul voyage in a vessel with 1 port of loading or 1 port of discharge — 24 hours.*

Note: In calculating the number of clear days exclude the first day (arrival day) and last day (departure day).

8.3 2013 ASEL Review

8.3.1 Minimum time in Registered Premises for sheep

No agreement was reached by the ASEL Review Steering Committee in 2013 on the minimum time sheep were required to spend in Registered Premises.

Rather two options were identified.

Option 1 – retain current provisions

No change – the standard to remain as above.

Option 2 –increased time in registered premises

For preparation of sheep and goats in premises south of latitude 26° south that are held:

a) *in paddocks during any or all of May, June, July, August, September and October, premises must have procedures to ensure that:*
   i. *sheep and goats to be exported by sea are held at the premises for 7 clear days (excluding the days of arrival and departure) before export;*
   ii. *livestock are fed ad libitum during that period; and*
   iii. *during the last 3 days of that period, livestock are fed ad libitum, but only on pelletised feed equivalent to that normally used during an export journey, and ensure that residual hay is not present.*

b) *in paddocks during any or all of November, December, January, February, March and April, premises must have procedures to ensure that:*
   i. *sheep and goats to be exported by sea are held at the premises for 7 clear days (excluding the days of arrival and departure) before export; and*
   ii. *livestock are fed ad libitum during that period and only on pelletised feed equivalent to that normally used during an export journey.*

c) *in sheds during any or all months of the year, premises must have procedures to ensure that:*
   i. *sheep and goats to be exported by sea are held at the premises for 7 clear days (excluding the days of arrival and departure) before export; and*
   ii. *livestock are fed ad libitum during that period and only on pelletised feed equivalent to that normally used during an export journey.*

8.3.2 Minimum time in Registered Premises for cattle

No agreement was reached by the ASEL Review Steering Committee in 2013 on the minimum time cattle and buffalo were required to spend in Registered Premises.

Rather two options were identified.

Option 1 – inclusion of extended long-haul voyages

The minimum length of time that cattle and buffalo must remain in a registered premise prior to departure is as follows:

a) *a long haul voyage — 2 clear days;*
b) *for a short haul voyage in a vessel with multiple port loadings or multiple port discharges — 1 clear day;*
c) *for a short haul voyage in a vessel with 1 port of loading or 1 port of discharge – 24 hours; or*
d) *for an extended long haul voyage — 3 clear days.*

Note: In calculating the number of clear days exclude the first day (arrival day) and last day (departure day).

Option 2 – increased minimum time in registered premises

The minimum length of time that cattle and buffalo must remain in a registered premise prior to departure is as follows:

i) *for a short haul voyage in a vessel with 1 port of loading or 1 port of discharge – 24 hours.*
ii) *For all other voyages, all cattle and buffalo must remain in registered premises for a minimum of 3 clear days prior to departure for export.*

Note

Within both scenarios, the 2013 ASEL Review recommended retaining the 24-hour quarantine for 1 port of loading, 1 port of unloading short haul shipments.

Both scenarios also introduced the concept of an extended long-haul voyage – defined elsewhere in the 2013 ASEL Review draft as being a voyage exceeding 30 days. Such a change effectively incorporates additional standards / requirements being applied by the department separate to ASEL and now broadly encompassed in Export Advisory Notice 2016 – 15.

8.4 OIE Guidelines

The OIE Terrestrial Animal Health Code 7.2.7 (1) states:

- *In some circumstances, animals may require pre-journey assembly. In these circumstances, the following points should be considered:*
  - *Pre-journey rest is necessary if the welfare of the animals has become poor during the collection period because of the physical environment or the social behaviour of the animals.*
  - *When animals are to be provided with a novel diet or unfamiliar methods of supplying feed or water, they should be preconditioned.*
- *Pre-journey assembly / holding areas should be designed to:*
  - *securely contain the animals;*
  - *maintain an environment safe from hazards, including predators and disease;*
  - *protect animals from exposure to adverse weather conditions;*
  - *allow for maintenance of social groups; and*
  - *allow for rest, watering and feeding.*

8.5 2018 ASEL Review

In relation to time at Registered Premises the TAC has posed the following questions.

- What is the minimum time that sheep and goats should be held in an outdoors registered premises prior to loading aboard an export vessel? Should other provisions be included regarding seasonal factors, feeding and pre-conditioning to shipboard rations? Please provide rationale and evidence for your position.
- What is the minimum time that sheep and goats should be held in sheds registered premises prior to loading? Should other requirements be made for seasonal factors, feeding and pre-conditioning to shipboard rations? Please provide rationale and evidence for your position.
- Should the standards be amended to alter the specifications currently in place prescribing timelines for various classes of livestock to remain at a registered premise prior to export by sea? If so, what would you suggest and what evidence can you provide to support your suggestion?
- What would be the cost implications of any changes to the times livestock must spend in registered premises?

8.6 Relevant Research on Time Spent at Registered Premises

8.6.1 Sheep research.

From a research perspective, time in Registered Premises for sheep has primarily been considered in relation to mitigating the risks of inanition (feed transition) and salmonellosis (disease exposure). The LEP and Western Australian researchers have conducted ongoing R&D in this area for almost 30 years. Key findings are:

- The majority of non-feeders in Registered Premises commence eating once on-board the ship. Nevertheless, sheep observed as non-feeders in Registered Premises have a higher risk of mortality during the voyage when compared to sheep observed as feeders in the Registered Premises [9].
- Inanition and salmonellosis (either independently or in combination) are the major causes of mortality in sheep during export voyages.
- Statistical analyses of large-scale industry data involving sheep prepared at southern ports (Adelaide and Portland) indicate that while mortality rates in Registered Premises are generally very low, the overall daily mortality rate shows a linear increase for each subsequent day in the Premises[10].

[9] See for example: Norris, R., Richards, R. & Dunlop, R., 1989, An epidemiological study of sheep deaths before and during export by sea from Western Australia, Australian Veterinary Journal, Vol. 66, 276-279; Norris, R., Richards, R. & Dunlop, R., 1989, Pre-embarkation risk factors for sheep deaths during export by sea from Western Australia, Australian Veterinary Journal, Vol. 66, 309-314; Norris, R., McDonald, C., Richards, R., Hyder, M., Gittins, S. & Norman, G., 1990, Management of inappetent sheep during export by sea, Australian Veterinary Journal, Vol. 67, 244-247; Higgs, A., Norris, R. & Richards, R., 1991, Season, age and adiposity influence death rates in sheep exported by sea, Australian Journal of Agricultural Research, Vol. 42, 205-214.
Barnes, A., Wickham S., Admiraal R., Miller D., Collins T., Stockman C. & Fleming P., 2018, Characterization of inappetent sheep in a feedlot using radio-tracking technology, Journal of Animal Science, Vol 96, 902-911 and Barnes, A., Wickham S., Stockman C., Miller D., Fleming P., & Collins T., Strategies to reduce inanition in sheep, Final Report Project W.LIV.0142, Meat & Livestock Australia.

[10] Makin, K., House, J., Perkins, N. & Curran, G., 2009, Investigating mortality in sheep and lambs exported through Adelaide and Portland, Final Report Project LIVE.123, Meat & Livestock Australia, August.

- The expected pattern of adaptation to pelleted feed from time of arrival in Registered Premises is for an initial steep rise in the proportion of sheep eating pellets that may last for several days and may reach levels of 80-90% or more by day 3[11].

Most recently, the LEP engaged Murdoch University to conduct research targeted at identifying the feed adaptation curve and inflection point and possible interventions to support greater and quicker adaptation to feed.

The Murdoch University inanition study involved over 8,206 sheep in different groups passing through a Registered Premise for over about a year. Sheep were tagged with RFIDs and then monitored for their feeding and drinking patterns (using readers / monitors at the troughs). Different groups of sheep were monitored for varying lengths of time, for as short as six days, up to 31 days. Further details on this project are provided in the following chapter of this submission on "Management of Shy Feeders and Inanition in Sheep".

Results from the project, relevant to "Time in Registered Premises" included the following:

- Salmonella, combined with inappetence/inanition, was diagnosed as the most common cause of death of sheep in the Registered Premises (over 60% of all deaths).
- Corrected for the day of death, *on average* sheep that died spent 24 minutes at feed troughs, compared to an average of 1 hour 36 minutes for those that remained alive.
- Sheep were defined as inappetent if they spent less time than the mean daily average minus 2 standard deviations, i.e. less than 28 minutes 5 seconds at the feed troughs.
- By day 6 in the Registered Premises (note: not a clear day 6) more than 95% of sheep were not inappetent (using the definition above).

From the study the researchers drew the following conclusions:

- Patterns of feeding and drinking behaviour in Registered Premises do not readily allow identification of animals that warrant singling out for veterinary care or alternative feed arrangements. This result highlights the need for experienced stockmanship in handling these animals.
- It may not be easy or worthwhile to remove inappetent sheep, because it is not always the same sheep that do not eat on any day, and the disruption of the whole group may be counterproductive. Removal of sheep that are not eating prior to the inflection point (about 4-5 days) would unnecessarily take animals from the shipment that will adapt.
- The findings of the project support a requirement for sheep to have 5 clear days adaptation to pelletised feed in Registered Premises. After 3 clear days at Registered Premises there may be over 85% of sheep spending more than the minimum time at the feed trough per day, but the animals may still be establishing normal patterns of eating pellets.
- Control of salmonellosis appears key to reducing mortality. Any feeding interventions must limit exposure to Salmonella e.g. from environmental contamination.

This final point above is important as it highlights the ongoing importance of developing and adopting the salmonella vaccine. This has been an initiative that has been the subject of long-term industry research and which is nearing the point of commercial production of a vaccine. The need to

[11] McDonald, C., Norris, R., Ridings, H. & Speijers, E, 1990, Feeding behaviour of Merino wethers under conditions similar to lot-feeding before live export, Australian Journal of Experimental Agriculture, Vol. 30, 343-348; Barnes, A., Wickham, S., Fleming, D., Collins, T. & Stockman, C., 2013, Inanition tracking in pre-embarkation feedlots, Proceedings of the Australian Sheep Veterinarians Conference, Perth, 26-29 August.

mitigate salmonella exposure also cautions against unnecessarily extending the time in Registered Premises (e.g. beyond the 5 clear days recommended by the researchers).

Based on the Murdoch University research it appears appropriate and justified to amend the minimum Registered Premises times for all classes of sheep under ASEL to 5 days.

8.6.2 Cattle research.

To the knowledge of ALEC no research has been conducted into the welfare implications of varying the time spent by cattle in Registered Premises.

Some best practice guidelines have been produced, but the authors of these publications recognised that parameters identified in these reports for:

- time in Registered Premises, and
- rest after extensive road transport

are not validated by evidence and represented little more than "best guesses".

The current trade to nearby Asian neighbours allows for short preparation times and in turn short delivery times (generally). Benefits from settling or transitioning cattle pre-export are uncertain and it does not appear to have direct impacts on their welfare during the voyage or performance post arrival (e.g. in feedlots, where they readily settle). Mortalities for cattle voyages less than 10 days are extremely low.

8.7 Cost impact of changing minimum time requirements in Registered Premises

There would be substantial impacts from any significant changes to minimum time requirements in Registered Premises.

8.7.1 Sheep cost estimates.

For sheep the costs of agistment and feed at a Registered Premises are about 75 cents per head per day.

If the minimum time in Registered Premises was increased from 3 to 7 days, as was proposed under Option 2 of the 2013 ASEL Review, assuming all sheep are kept at the Premises for the minimum number of days, and using average export data over the last five years, including the seasonal pattern for these exports, the increase in cost to live sheep exporters of implementing Option 2 would be $5.1 million per annum[12].

Even if the minimum time in Registered Premises was increased from 3 to 5 days, as is indicated by the research, costs would increase by $2.3 million per annum.

These increased costs may be offset by some benefits, if a longer period in Registered Premises contributes to reduced mortality. Further, if inanition risk is minimised it may help to manage the risks / susceptibility to disease or heat stress challenges during export. Since these benefits are uncertain they have not been quantitatively assessed and included in the above.

[12] Estimates in this section have been derived from detailed information by load port, including seasonal variations in exports by port. In making these estimates we have assumed that 66% of sheep exported through Fremantle are held is sheds and sheds are not used in Portland or Adelaide.

8.7.2 Cattle cost estimates.

Similar considerations apply to cattle as apply to sheep: time in Registered Premises / quarantine can quickly equate to substantial costs. For example, if yard costs for cattle are assumed to be $2.40 / head / day and stock feed to be $4.00 / head / day, a single day adds $6.40 per head.

Information on average cattle and buffalo exports over the last five years has been combined with voyage duration data to calculate the costs to exporters of changing the minimum time requirements for cattle and buffalo in Registered Premises. Shown in Table 8.1 are increased costs that would be incurred in the export of live cattle and buffalo from implementing Option 2 of the 2013 ASEL Review. As can be seen from Table 8.1 the total increase in costs is considerable – just over $4 million per annum.

Table 8.1: Costs incurred from increasing time in Registered Premises for cattle and buffalo as specified under Option 2 of the 2013 ASEL Review.

Voyage duration	**Increase in RP costs**
Extended long haul	$0.184 million
Long haul	$3.122 million
Short haul	$0.534 million
Short haul - single ports	$0
TOTALS	**$3.839 million**

ALEC accepts that the cost estimate shown in Table 8.1 represents an upper estimate of the actual cost increase for two reasons:

- For some cattle and buffalo a period in quarantine is necessary prior to embarkation and these may exceed ASEL requirements on minimum time periods in Registered Premises - long haul voyages generally have longer protocol mandated quarantine periods.
- The cost estimates in Table 8.1 assume that both under the existing ASEL requirements and those that would apply with Option 2 all cattle and buffalo only spend the regulated minimum time period in Registered Premises. Under both the existing ASEL requirements and those under Option 2, some circumstances may exist where cattle and buffalo spend greater than the minimum required time in Registered Premises.

8.8 Conclusion

Time spent in Registered Premises has substantial implications for the total costs of exporting live animals.

The cost of implementing Option 2 of the 2013 ASEL Review substantially increases the time sheep, cattle and buffalo would spend in Registered Premises, would add over $6 million of annual additional costs and is not justified by current animal welfare research.

Some changes are, however, justified by animal welfare research: in particular, increasing the minimum time from 3 to 5 days that sheep and goats spend in Registered Premises. Despite increases in costs of about $2.3 million per annum associated with this measure, due to its potential role in enhancing animal welfare, this measure is supported by ALEC.

8.9 ALEC RECOMMENDATIONS ON TIME IN REGISTERED PREMISES

Based on a review of the scientific literature ALEC makes the following recommendations to the TAC on stocking densities in Registered Premises.

- That sheep and goats to be exported by sea are held at Registered Premises for 5 clear days (excluding the days of arrival and departure) before export.
- That the 5 clear days apply regardless of season and whether sheep and goats are held in sheds or paddocks.
- That the existing ASEL requirements for the minimum time that cattle and buffalo spend in Registered Premises continue to apply, except that the minimum time for extended long haul voyages be increased from two days to three days.

9 MANAGEMENT OF SHY FEEDERS AND INANITION IN SHEEP

LIST OF RECOMMENDATIONS

- That the minimum time in Registered Premise be changed to five clear days, in line with R&D recommendations.
- That ASEL not preclude the use of chaff / hay during the Registered Premise period recognising that research has identified that its use as a supplement for 2 – 3 days can support the transition of animals that do not appear to be feeding well, or that are noted on entry as quiet or depressed (refer to Appendix D in the reformatted ASEL, "*Registered premises hold times and feed requirements*").
- That rejection criteria for inappetent and ill thrift sheep remain, with a focus on the pre-loading inspections.
- That there remains a focus on minimising exposure to salmonellosis including:
  - Minimising to the extent possible the period sheep are held in registered premises.
  - Supporting LEP research to develop and implement a salmonellosis vaccine.
  - Pelletised feed must be placed in troughs to minimise exposure to salmonella contamination (ASEL 2A.2.ii)

9.1 CURRENT ASEL STANDARD

ASEL specifically mentions that ill-thrift or inappetence (inanition) is a criterion for rejection.

The ASEL overview for Standard 3 – Management of Registered Premises also states:

> *Some classes of sheep have in the past been considered a higher risk to inanition and salmonellosis and therefore are restricted from export at certain times of the year. Specific Australian research is currently examining these issues. Note. Standard S3.9 may need to be amended in the future, in response to this research.*

Specifically, standard 3.9 restricts exports of full mouth wethers with a body condition score greater than 4, broken mouth sheep and pregnant ewes, and only provides for the export of pastoral and station sheep, lambs and sheep held on trucks for more than 14 hours if they are housed in sheds.

ASEL also specifies minimum time periods for sheep to be held in Registered Premises prior to export and conditions on the feeding during this period.

9.2 2013 ASEL REVIEW

The 2013 ASEL Steering Committee considered the policy of exporting sheep from southern ports to the Middle East in winter months, with a view to mitigating feedlot and shipboard losses in adverse weather conditions, and mitigating losses from heat stress and inanition during the voyage.

There was a lack of consensus within the Steering Committee to make any substantial revisions to the standards with respect to this issue. The Steering Committee agreed to a standard specifying that fodder must be provided in troughs to livestock at the registered premises, and not from the floor/ground. It was identified that the provision of adequate shelter at registered premises would be useful in mitigating losses; however, the standards currently already state the need for shelter or other appropriate protection.

In the absence of additional specific research, the Steering Committee was unable to identify new standards to address this issue. Further consideration of the issue, including recommendations for additional research, was deferred to future reviews.

9.3 2018 ASEL Review

In relation to inanition and shy feeders the TAC has posed the following questions.

- What measures should be required to reduce the incidence of inanition and salmonellosis in sheep? Are the current requirements in the standards adequate to manage shy feeders and inanition in sheep?
- If not, what changes would you suggest?
- What would be the cost implications of any proposed changes to these requirements?

It is also noted that the draft standards developed from Phase 1 include the following provisions related to feeding in the Registered Premise:

> *Standard: Premises registered for the preparation of livestock for export must meet the following:*
>
> *(a) To ensure adequate supply of feed and water:*
> *a. feeders, self-feeders and water troughs must allow for complete cleaning of all surfaces and prevent spoilage of feed during inclement weather, and minimise faecal contamination and injuries.*
> *b. all fodder must be placed in troughs so that animals do not eat from the ground/floor.*
> *c. all pelletised livestock feed at the registered premises must be stored in a manner that maintains the integrity and nutritional value of the feed, and protects it from weather, pests and external contaminants (including chemical spray drift) and from direct access by animals.*
> *d. feed trough allowance for sheep and goats held in paddocks at the registered premises is to be calculated on a paddock by-paddock basis and must be:*
> *i. for ration feeding, no less than five (5) cm length of feed trough per head*
> *ii. for ad libitum feeding, no less than three (3) cm length of feed trough per head*
> *iii. during any or all of May, June, July, August, September and October feeding must occur from fully sheltered feed troughs, with the exception of areas of Australia north of latitude 26° south.*

ALECs submission to the Stage 1 of the 2018 ASEL review recommended deleting the new clause 'all fodder must be placed in troughs so that animals do not eat from the ground'. The ALEC submission stated:

> *"For sheep in an outdoor assembly depot, there are good reasons for feeding hay away from the feed troughs, especially during the first two days after sheep arrive at the assembly depot, and especially for pastoral sheep, sheep that have been trucked long distances and/or if there is cold weather. Some sheep are initially reluctant to eat from a trough, but will eat hay on the ground".*
>
> *"This new requirement that all fodder must be placed in troughs is not best practice management".*

9.4 Relevant Research into Shy Feeders and Inanition

Persistent inappetence and salmonellosis account for most mortality (over 60%) during the feedlot and shipping periods of livestock export. However, they are complex and difficult areas to understand and manage and the LEP has invested more than $2.8 million over a long period of time

investigating these areas and trying to achieve findings that can contribute to substantial improvements in animal health and mortality reduction. This research program has identified key risk areas and has framed the difficulties in trying to understand and manage the line effect / property based factors relevant to these causes / contributors of illness and mortality.

There are a wide range of relevant reports including:

- A broad suite of papers from Western Australia scientists completed in the 1980s and 1990s.
- More, S (2002). Salmonellosis control and best-practice in live sheep export feedlots, LIVE.112
- Barnes, A, Beatty, D, Stockman, C & Miller, D (2008), Inanition of sheep, LIVE.243
- Makin, K, House, J, Perkins, N & Curran, G (2009). Investigating mortality in sheep and lambs exported through Adelaide and Portland, LIVE.123
- Perkins, N, House, J & Barnes, A (2010), Investigating the relationship between salmonella – inanition and property of origin, LIV.132
- More, S (2002). Salmonellosis control and best-practice in live sheep export feedlots, LIVE.112
- Barnes, A, Beatty, D, Stockman, C & Miller, D (2008), Inanition of sheep, LIVE.243
- Shiell, K, Hewitt, L & Perkins, N (2013), Review of ASEL Scoping Study – Export of sheep from southern ports to the Middle East in winter months, LIV.0284
- Barnes, A, Wickham, S, Fleming, D, Collins, T & Stockman, C (2013), Inanition tracking in pre-embarkation feedlots, Proceedings of the Australian Sheep Veterinarians Conference, Perth, 26-29 August 2013, 1-6.
- Lourdes-Angelica Aguilar Gainza (2016), The Effect of Shearing Sheep on Feeding and Behaviour in the Pre-Embarkation Feedlot, linked with LIV.159
- Barnes, A et al (2017) – LIV.159 Strategies to Reduce Inanition in Sheep

The LEP also has two core projects considering inanition and salmonella that have recently concluded or are nearing conclusion / commercialisation, as outlined below.

9.4.1 Inanition feeding trials

The LEP engaged Murdoch University to deliver against a series of objectives under the project LIV.0142 – *Strategies to reduce inanition in sheep* (Barnes et al). This project was recently completed. This project has been previously referenced in this submission under "Time in Registered Premises". Further details of the project are provided below, with a focus on inanition.

The core objectives of the project were to:

- Develop RFID technology capable of accurately identifying and tracking individual sheep at feed and water troughs at a pre-embarkation feedlot shed.
- Determine the incidence of inanition in specific lines of sheep at pre-embarkation feedlot and investigate the impact of time in the pre embarkation feedlot on the incidence of inanition and clinical salmonellosis at the feedlot.
- Investigate relevant hormonal and physiological (including immunological) measures, and determine whether sheep that are detected as inappetent at the feedlot can be treated or managed so that they regain their appetite, and whether they carry a high risk of becoming inappetent again if exposed to the same conditions in the feedlot.

- Investigate potential interventions including:
  - Practically implementable on-farm backgrounding strategies that help sheep adjust from a pasture diet to a typical livestock export pelletised diet.
  - Feedlotting strategies at the feedlot that help sheep adjust from a pasture diet to a typical export pelletised diet at the pre-embarkation feedlot.
  - The use of additives or other influences in the feedlot that increase uptake and consumption of a pelletised diet.
- Produce a set of best practice guidelines for pre-embarkation treatment of sheep that aim to minimise the incidence of inanition/salmonella on the Australian sheep export industry

The TAC is encouraged to refer to this report for further information – however, an outline of the key findings / recommendations is provided below.

The project successfully used RFID technology to detect and quantify the time sheep spent at feed and water troughs during a defined period in the pre-export quarantine yards. Correlation with body condition scores and time at feed trough provided biological evidence that the tracking system successfully detected those that were not feeding.

The project identified that the sheep spent on average over 1.5 hours total time at the feed troughs per day, and that the sheep that lived spent more than an hour longer per day at the feed troughs, corrected for day of death.

Sheep were defined as inappetent if they spent less time than the mean daily average minus 2 standard deviations, i.e. less than 28 minutes 5 seconds at the feed troughs.

Many animals that died fitted into that definition, and the mean daily average time for sheep which died was less than that used to define animals at inappetent. This confirmed that a short time feeding was associated with mortality. However, whether inappetence was the cause of death alone or the anorexic effect of fatal disease (e.g. salmonellosis) could not be distinguished.

It took until day 6 in the feedlot for more than 95% of sheep to be spending more than the minimum time at the feed trough per day (as against the definition of inappetence). This supports recommendations that require sheep to have 5 clear days at the registered premises before export (S3.8 a (i) ASEL 2011). The report noted that after 3 clear days at the registered premises (as per the current ASEL Standard 3.8) there may be over 85% of sheep spending more than the minimum time at the feed trough per day – although these animals may still be establishing normal patterns of eating pellets.

The report indicated that a further slight decline in the percentage of sheep defined as inappetent occurred for mobs monitored for longer periods (i.e. beyond 5 days), but even for those groups, there was at least 2% defined as inappetent on any day and it was not always the same sheep that fed only minimally each day.

It was also noted that there were apparent differences in period of acceptance and percentage feeding adequately between different cohorts of sheep at different times of the year, but this could not be statistically tested.

Once the project had determined the pattern of feed transition, it progressed to trial a number of feeding interventions with varying results. Some of the project's key findings are summarised below:

- Feeding patterns associated with the development of salmonellosis include intermittent or interrupted feeding after exposure to salmonella. Feeding interventions assessed in the project did not markedly hasten feed acceptance or increase the number spending an acceptable period at the feed troughs. The only strategy which had some effect was the provision of chaff on the pellets, and this is used in industry with animals considered of concern; the data continues to support the practice.
- There was no gain to housing sheep outside the sheds for a short period of a day before entering the shed.
- The study indicated that there is little economic advantage to be had in early detection and removal of those animals which are not going to the feed troughs, because the mortality was relatively low, and because not eating or eating for short periods of time on any day was not necessarily predictive of death, i.e. the feeding pattern of those that died was not consistently different from those that did not die. Removing sheep that had not attended the feed trough on any given day would mean disrupting the large group, with many misclassifications as to "at risk" sheep.
- Enteritis, mostly associated with isolation of Salmonella spp, combined with inappetence/inanition, was diagnosed as the most common cause of death. Therefore, control of salmonellosis appears key to reducing mortality. Any feeding interventions must limit exposure to Salmonella e.g. from environmental contamination. Inconsistency of feed intake appeared important in the development of salmonellosis, so maintaining consistent feed intake is important in limiting disease.
- Housing in raised sheds, where the animals have limited contact with faecal material and are dry undercover, may protect them from exposure to Salmonella (which is consistent with ASEL standards for at risk classes during the higher risk winter period).
- Other means of reducing contamination will be important in limiting Salmonella infection, for instance with all in/all out management, and not running newly received sheep through the same areas as those that leave (circular flow to limit exposure of new sheep to organisms). The continued development of a vaccine against salmonellosis is very likely to have an important impact on reducing mortality in similar situations to those tested.

9.4.2 Salmonella vaccine development

The LEP embarked on a long-term project to develop a suitable salmonella vaccine for Australian sheep many years ago. The development of this salmonella vaccine has progressed along a timing comparable with the development of other vaccines. The LEP now has a commercial partner that is engaged in the process of completing the necessary trials and registrations to bring the product to market as soon as possible.

The LEP has developed and is refining data collection mechanisms (alongside the welfare indicators project) to measure and quantify the impact on animal health and welfare when the salmonella vaccine is able to be trialled on board sheep shipments.

9.5 Economic Impact of Changes to requirements relating to Shy Feeders and Inanition

The economic impacts of changing the minimum time in Registered Premises is outlined in Chapter 8 of this submission. The economic cost of using the salmonella vaccine will be determined once trials and commercialisation have been completed.

9.6 ALEC recommendations on Shy Feeders and Inanition Management in Sheep

Based on a review of the scientific literature, ALEC recommends the following in relation to shy feeders and inanition in sheep:

- That the minimum time in Registered Premise be changed to five clear days, in line with R&D recommendations.
- That ASEL not preclude the use of chaff / hay during the Registered Premise period recognising that research has identified that its use as a supplement for 2 – 3 days can support the transition of animals that do not appear to be feeding well, or that are noted on entry as quiet or depressed.
- That rejection criteria for inappetent and ill thrift sheep remain, with a focus on the pre-loading inspections.
- That there remains a focus on minimising exposure to salmonellosis including:
  - Minimising to the extent possible the period sheep are held in registered premises.
  - Supporting LEP research to develop and implement a salmonellosis vaccine.
  - Pelletised feed must be placed in troughs to minimise exposure to salmonella contamination (ASEL 2A.2.ii)

10 Pregnancy Test Requirements and Limits

List of recommendations

- That the TAC should consider the outcomes of the MLA project developing a national pregnancy diagnosis standard before making significant changes to the pregnancy testing arrangements in ASEL, including the qualifications required.
- ALEC recommends that paragraph 1A.3.4 (c) in the Reformatted ASEL be amended as follows "*All female feeder or slaughter sheep over 40 kg and all female fat tail sheep breeds (Awassi, Damara and Van Rooy) must be determined to be not detectably pregnant and tested in accordance with the requirements of a valid pregnancy test.*"
- ALEC supports its previous submission to the review as follows:
  - That the ASEL testing criteria should be amended so that cattle certified as 'not detectably pregnant' within 45 days of export are deemed to have had a valid pregnancy test.
  - That the pregnancy testing requirements should be amended to read as follows *'A veterinarian may base this certification on assessment of the animals by a method other than manual palpation if the veterinarian determines that cattle or buffalo are too small to be manually palpated safely.'*
  - That ASEL should have a paragraph to the effect that the Standards may be varied, with approval from a DAWR authorised officer, if this will enhance animal welfare outcomes.

10.1 Current ASEL Standard

The current ASEL standards for pregnancy testing are complex and lengthy and are shown below.

Standard 1.9 - Cattle and buffalo sourced for export as slaughter and feeder animals:

a) must have been weaned at least 14 days before sourcing for export;
b) must have an individual liveweight of more than 200 kg and less than 650 kg or, if outside these weights, have written prior approval from the relevant Australian Government agency;
c) must have been determined not to be pregnant, using the following criteria:
  (i) have been pregnancy tested during the 30 day period before export and certified in writing as not detectably pregnant by the registered veterinarian or competent pregnancy tester who pregnancy tested the cattle or buffalo; or
  (ii) be accompanied by a vendor declaration that certifies that they have been spayed using the Willis dropped ovary technique not less than 30 days before export; or
  (iii) be accompanied by a vendor declaration that certifies that they have been spayed not less than 280 days before export.

For this standard, a ***competent pregnancy tester***, for a pregnancy test conducted in:

a) the Northern Territory — is a person accredited by the relevant agency of the Northern Territory to conduct pregnancy tests; and
b) Western Australia — is a person accredited by the relevant agency of Western Australia to conduct pregnancy tests.

Standard 1.10 - Cattle and buffalo must only be sourced for export for breeding if they:

a) have been weaned at least 14 days before sourcing for export;
b) have an individual liveweight of more than 200 kg and less than 650 kg or, if outside these weights, have written prior approval from the relevant Australian Government agency;

c) *have been pregnancy tested within the 30 day period before export and certified in writing as no more than a maximum of 190 days pregnant for cattle and 220 days pregnant for buffalo at the scheduled date of departure. The certification must be provided by a veterinarian who is a member of the Australian Cattle Veterinarians and an accredited tester under the National Cattle Pregnancy Diagnosis Scheme and who pregnancy tested the cattle or buffalo. For journeys of less than 10 days a declaration must be made in writing by a registered veterinarian who can attest to demonstrable current experience and who pregnancy tested the cattle or buffalo.*
If the veterinarian:
(i) is accredited under the National Cattle Pregnancy Diagnosis Scheme; and
(ii) determines that cattle or buffalo are too small to be manually palpated safely;
the veterinarian may base this certification on assessment of the animals by a method other than manual palpation.

Standard 1.11 – Sheep and goats for slaughter and feeder purposes

Ewes with a weight of 40 kg or more and all does (goats) must only be sourced for export as slaughter and feeder animals if they have been pregnancy tested by ultrasound within 30 days of export and certified not to be pregnant, by written declaration, by a person able to demonstrate a suitable level of experience and skill.

a) *all female Damara sheep breeds sourced as feeder or slaughter must be pregnancy tested within 30 days of export by ultrasound and certified not to be pregnant, by written declaration, by a person able to demonstrate a suitable level of experience and skill.*

Standard 1.13 – Sheep and goats breeding

Sheep and goats sourced for breeding must only be sourced for export if they have been pregnancy tested using ultrasound foetal measurement within 30 days of export and certified, by written declaration, by a person able to demonstrate a suitable level of experience and skill, to be not more than a maximum of 100 days pregnant at the scheduled date of departure.

Standard 1.13A – Alpacas and llamas

Alpacas and llamas sourced for breeding must only be sourced for export if they have been pregnancy tested using ultrasound within 30 days of export and certified, by written declaration, by a registered veterinarian with demonstrable current experience in camelid pregnancy diagnosis, to be not more than a maximum of 228 +/- 2 days pregnant at the scheduled date of departure.

Standard 1.14 – Deer for slaughter and feeder purposes

Deer sourced as slaughter and feeder animals must only be sourced for export if they have been pregnancy tested by ultrasound within 30 days of export and certified, by written declaration, by a person able to demonstrate a suitable level of experience and skill, not to be pregnant.

Standard 1.14A – Deer for breeding

Deer sourced for breeding must only be sourced for export if they have been pregnancy tested by ultrasound foetal measurement within 30 days of export and certified, by written declaration, by a person able to demonstrate a suitable level of experience and skill, to be not more than a maximum of 140 days pregnant at the scheduled date of departure.

[Note: there are also standards for pregnancy testing requirements and limits for air, although these are apparently not under review until stage 3.]

10.2 2013 ASEL Review

According to the Issues Paper from the 2018 Review:

> *Submissions to the 2012-13 ASEL review indicated that current pregnancy testing requirements were inadequate. There was a general view that requirements for competency of pregnancy testing must be consistent and of the highest standard. It was also suggested that individual identification of all pregnant sheep loaded onto a ship, confirming they have been pregnancy tested empty would help trace-back for any births on board to allow future risk mitigation.*

ALEC and LiveCorp also noted in the submissions to Stage 1 of the current Review concerns about the risk of poor welfare outcomes due to the application of the strict 30 day limit for pregnancy testing and requested discretion to allow variations in appropriate circumstances.

10.3 2018 ASEL Review

In relation to pregnancy test requirements and limits the TAC has posed the following questions.

- What is the risk of changing the pregnancy test requirement from all Damara sheep to only those that weigh over 40 kg?
- Should the standards be expanded to include all fat-tailed sheep and not just Damara? Fat-tail sheep being: sheep distinguished by a genetic predisposition for the accumulation of fat in the tail and hindquarters.
- Must pregnancy testing be undertaken by a veterinarian, or is a competent pregnancy tester acceptable? Should it be expanded to any livestock pregnancy tester as accredited by the state or territory?
- Should the 30 day period prior to export for pregnancy testing be extended to 45 days as a blanket change? Should there be discretionary allowances for low-risk cases, such as unjoined heifers or a shipping delay, where adverse animal welfare outcomes are likely to result from re-testing.
- Should the age that goat kids and ewe lambs are pregnancy tested be increased to more than five months? What would be an appropriate age for goat kids and ewe lambs to be tested?
- Are the methods for carrying out pregnancy tests appropriate? Are there any appropriate national pregnancy testing criteria currently in place that should be adopted/referred to in the standards?
- Should breeder cattle and buffalo only be determined as too small to be manually palpated safely by a veterinarian accredited under the National Cattle Pregnancy Diagnosis Scheme (NCPD) or should this be any veterinarian?
- What would be the cost implications for any proposed changes to these requirements?

10.4 Relevant Research into Pregnancy Test Requirements and Limits

Following considerable interest from a range of stakeholders, Meat and Livestock Australia in September 2017 tendered and commenced a project entitled "*Development of a National Pregnancy Diagnosis.*"

The purpose of the project is to investigate the nature, and quantify the extent, of reported shortcomings in existing arrangements for pregnancy diagnosis in Australia, identify causes and, depending on those findings, make recommendations on how a National Standard for Pregnancy Testing Cattle might ensure the following:

- the availability of quality pregnancy diagnostic services which meet national animal welfare and biosecurity standards;
- regulatory control that will engender confidence in the standards and integrity of available commercial services;
- equitable market access where lay and veterinary pregnancy testers operate on a level playing field;
- a viable market structure based on a fee for service and/or cost recovery model.

The scope of the project includes the domestic industry (where there is little or no legislation covering pregnancy testing) and the export industry (where ASEL provides a good foundation), and consultation with a range of stakeholders, including industry bodies and associations such as the Australian Veterinary Association and Australian Cattle Vets.

ALEC strongly supports the above project and has held the policy position since the last ASEL Review that a national pregnancy diagnosis standard is required. The MLA project will provide a rigorous basis for changes to the domestic and export pregnancy testing arrangements that should be considered for adoption into ASEL. Changes therefore to the current arrangements should not occur – particularly to limit who can conduct tests – pre-emptive of the MLA project given the likelihood that there would be structural and market changes to businesses (of veterinarians and lay testers) and governments (i.e. those overseeing the various regimes) which may then need to be later reshaped pending the research findings.

10.5 PREGNANCY TESTING FOR FEMALE FAT TAIL SHEEP

ASEL v3.0 Paragraph 1A.3.4 (c) states that …. *'all female feeder or slaughter sheep over 40 kg and all Damara female sheep must be determined to be not detectably pregnant and tested in accordance with the requirements of a valid pregnancy test'*.

ALEC recommends that the reference to Damara female sheep be extended to all female fat tail sheep breeds (Awassi, Damara and Van Rooy). The reason for this recommendation is that fat tail sheep are smaller and leaner, with similarities in this regard to goats, and are difficult to detect as pregnant. Fat tail sheep also seem to mature sexually earlier than Merinos.

10.6 ALEC DISCUSSION ON PREGNANCY TEST REQUIREMENTS AND LIMITS

ALEC raised a number of proposals relating to pregnancy test requirements and limits in its previous submission to the ASEL Review, including the following:

1. Pregnancy testing time limits – testing criteria

The pregnancy testing criteria in ASEL v3.0 require cattle to be pregnancy tested within 30 days of export. There is no flexibility to vary the 30-day time limit. It is not uncommon for pregnancy testing to be undertaken in good faith during the 30 days before the expected date of export, but with unforeseen delays to loading, pregnancy testing slips outside the 30-day window and has to be repeated. This involves putting cattle through the yards an extra time for an intervention with no obvious benefit – especially for virgin heifers previously found 'not detectably pregnant'. Animal welfare would be enhanced if the window for pregnancy testing is increased to 45 days for cattle that are certified to be not detectably pregnant.

ALEC's submission proposed that:

- The Testing criteria in ASEL v3.0 should be amended so that cattle certified as 'not detectably pregnant' within 45 days of export are deemed to have had a valid pregnancy test.

2. Pregnancy testing – small breeder cattle or buffalo

The testing criteria in ASEL v3.0 specify that breeder cattle and buffalo can only be determined as too small to be manually palpated safely by a veterinarian accredited under the National Cattle Pregnancy Diagnosis Scheme (NCPD). Pregnancy testing very small cattle and buffalo heifers is an animal welfare issue for two reasons:

- it is an unnecessary invasive procedure for pre-pubertal heifers; and
- with very small heifers there is a greater risk of rectal trauma.

The required outcome is that a decision not to pregnancy test heifers because they are too small is made by someone competent to make that assessment. Requiring that decision to be made by an NCPD accredited veterinarian is unduly restrictive. Any registered veterinarian should also be able to determine that cattle or buffalo heifers are too small to be safely palpated.

NCPD accreditation is not required for pregnancy testing breeder cattle or buffalo on sea voyages of 10 days or less. Nor is it required for pregnancy testing feeder and slaughter cattle, which may be done by a registered veterinarian or a competent pregnancy tester.

ALEC's submission proposed:

- that the pregnancy testing requirements should be amended to read as follows *'A veterinarian may base this certification on assessment of the animals by a method other than manual palpation if the veterinarian determines that cattle or buffalo are too small to be manually palpated safely'*.

3. ASEL requirements that are not best animal welfare practice

From time to time, exporters, export service providers and DAWR staff are frustrated with ASEL requirements that are inflexible, and although developed in good faith and technically sound in most circumstances, are not best animal welfare practice for a particular consignment or set of circumstances. A few examples:

- Unjoined heifers that must be put through the yards and pregnancy tested a second time because there has been a shipping delay and the previous pregnancy test is now a week outside the allowable 30-day pregnancy testing window.
- Five-month old ewe lambs or goat kids, exported as breeders, which must be pregnancy scanned and certified as not more than 100 days pregnant.

ALEC's submission recommended that:

- ASEL should have a paragraph to the effect that the Standards may be varied, with approval from a DAWR authorised officer, if this will enhance animal welfare outcomes.
- The authority to vary ASEL requirements should be delegated to senior DAWR veterinary field officers.

10.7 ALEC RECOMMENDATIONS ON PREGNANCY TEST REQUIREMENTS AND LIMITS

Based on a review of the scientific literature, ALEC recommends the following in relation to pregnancy test requirements and limits:

- That the TAC should consider the outcomes of the MLA project developing a national pregnancy diagnosis standard before making significant changes to the pregnancy testing arrangements in ASEL, including the qualifications required.

- ALEC recommends that paragraph 1A.3.4 (c) in the Reformatted ASEL be amended as follows "*All female feeder or slaughter sheep over 40 kg and all female fat tail sheep breeds (Awassi, Damara and Van Rooy) must be determined to be not detectably pregnant and tested in accordance with the requirements of a valid pregnancy test.*"
- ALEC supports its previous submission to the review as follows:
  - That the ASEL testing criteria should be amended so that cattle certified as 'not detectably pregnant' within 45 days of export are deemed to have had a valid pregnancy test.
  - That the pregnancy testing requirements should be amended to read as follows *'A veterinarian may base this certification on assessment of the animals by a method other than manual palpation if the veterinarian determines that cattle or buffalo are too small to be manually palpated safely.'*
  - That ASEL should have a paragraph to the effect that the Standards may be varied, with approval from a DAWR authorised officer, if this will enhance animal welfare outcomes.

11 On Board Stocking Densities

List of recommendations

Use of allometry

- ALEC supports the application of allometry to guide the determination of "base" stocking densities for livestock exported by sea from Australia.
- A space allowance that allows all livestock in a pen to simultaneously lie down represents strong grounds for setting densities for live exports from Australia. The agreed allometric k-value that allows livestock to lie down simultaneously is 0.027. ALEC recommends that on-board stocking densities for all voyages be determined using this k-value.
  - ALEC recognises that space allocations greater than this may result from a consideration of heat stress risk (see Chapter 4), but space allocations due to heat stress need to be independent of space allocations from allometry (the two should not be confused). Additional space allocations to avoid heat stress should be separately determined via application of an appropriately calibrated heat stress risk assessment (HSRA) model.
- If an allowance is to be made for weight gains during a voyage and for curfew adjustments, weight gains included need to be based on firm evidence.

Special and vulnerable classes of livestock

- For pregnant Bos Taurus cattle the space allocation be 10% above levels that would otherwise apply[13].
- Space allocations for Bos Taurus cattle sourced south of the 26th parallel and shipped to or through MENA during the northern summer should be further considered in the context of thermoregulatory needs (see Chapter 5 of this Submission).
- If cattle 500kg lw or over are exported they should be provided with additional space in the order of 10%.
- Animals with horns should be penned together with additional space of 10%. All horned cattle must at least be tipped.
- Where an animal belongs to two or more vulnerable and special classes the maximum additional space allowance should apply (the individual elements should not be compounded to calculate a space allowance).
- Noting that the cut off values for additional space to be provided to vulnerable and special classes of livestock have not been well researched, additional space allocations should be examined and updated as further research is finalised.

11.1 Introduction

Because of its direct relationship with productivity, changes to stocking densities have more impact on the industry than any other area of ASEL regulation. Submissions made during Stage 1 of the ASEL review contained more comments on stocking densities than any other issue.

11.2 Background

In the sections below we briefly outline the use of allometry to determine space allocations, current ASEL standards in terms of stocking densities, and recommendations from the McCarthy Review.

[13] In making this recommendation, and the subsequent recommendations, it has been assumed that ALEC recommendations on k-values have been adopted. In other words, it has been assumed that "levels that would otherwise apply" are defined by a k-value of 0.027.

11.2.1 The use of allometry to determine stocking densities

The use of allometry to determine space allocations for livestock enjoys general support amongst veterinarians and animal behaviour experts. Under allometry the amount of space allocated per animal is based on the following equation:

$A = k W^{0.66}$

where A is the area allocated per animal, W is the weight of the animal and k is a constant.

In determining the amount of space allocated per animal the value assigned to k is critical.

Petherick and Phillips, 2009 undertook a scientific literature review and concluded[14]:

- The literature on transportation of sheep and cattle indicates that space allowances per head that provide space with a k-value of less than 0.020 result in poor welfare outcomes.
- For transportation during which it is deemed unnecessary for stock to lie down, eat or drink, a k-value of 0.020 should be used to determine minimum space allowance. For transportation with these characteristics (unnecessary for stock to lie down, eat or drink) Petherick and Philips further stated that "at densities resulting in k-values of about 0.020 and greater we predict little difference between them in welfare outcomes".
- For longer term transportation and intensive housing, depending on the duration of confinement the space allowance determined from a k-value of 0.027 would appear to allow the simultaneous lying of animals, but there are insufficient data to determine whether this allowance would provide sufficient space for animals to adequately access feed and drink.
- For "long term confinement" a minimum space allowance using a k-value of 0.033 appears to reduce risks to welfare and productivity. Petherick and Phillips do not explicitly specify what is meant by "long term confinement", but the intensive housing studies Petherick and Phillips review to reach this conclusion involved confinement over a number of months.

11.2.2 Current ASEL standards

Currently stocking densities are specified in ASEL through a series of tables containing information on minimum per head pen area allocations. In these tables the minimum pen area specified per head varies by the weight of livestock, the length of voyage (for heavier cattle), the time of year shipment occurs (southern cattle, sheep) and whether livestock are horned.

The ASEL tables appear to be loosely based on allometry, but any relationship with the allometric equation is imprecise. This leads to the conclusion that the current ASEL stocking density tables may be based on a range of factors, including anecdotal experience (or previous cargo specifications), and may be lacking a clear scientific basis.

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[14] We quote carefully and directly from Petherick and Phillips, 2009, which is the published, peer reviewed, paper largely based on a 2007 internal report. There are slight, but important, differences between the summary provided in the Stage 2 Issues Paper and the wording provided here. In particular we do not accept that the following statements contained in the Stage 2 Issues Paper accurately reflect the work of Petherick and Phillips:

- "A k coefficient of 0.027 allows some animals to lie simultaneously if animals time share space" (our emphasis) – we believe that Petherick and Phillips, as well as other research, concluded that a k-value of 0.027 allows animals to lie simultaneously in a normal position without time sharing.
- "a k coefficient of 0.033 appears to be the threshold below which there are adverse effects on welfare" – this statement applies to specific circumstances only.

See J. Carol Petherick and Clive J.C. Phillips, 2009, "Space allowances for confined livestock and their determination from allometric principles", *Applied Animal Behaviour Science*, 117, pp1–12.

In addition to the provision of space based on the ASEL tables, heat stress risk assessments are required under ASEL / department policy for shipments to or through MENA (see Chapter 4 of this Submission). The application of the Heat Stress Risk Assessment (HSRA) model typically results in space allocations above those in the ASEL tables for the northern hemisphere summer months.

11.2.3 McCarthy Review

For sheep to the Middle East the McCarthy Review contained two critical recommendations that impact on stocking densities.

First, it recommended that space be allocated allometrically using a k-value of 0.033 or such further space as required by the industry HSRA model. The McCarthy Review explored the concept of 'amenity' and maps a curve showing how amenity increases with increasing k-values but asymptotes towards a maximum value. This amenity work appears to underpin the McCarthy recommendation for a k-value of 0.033. However, the science behind this is not reported.

Second, it recommended that the objective in the HSRA model used to assess heat stress risk and calibrate stocking densities be changed. The existing HSRA objective and the McCarthy recommend objective are shown below:

- Existing HSRA model objective: "Less than a 2% probability of a 5% mortality event within each line of livestock".
- McCarthy recommended HSRA model objective: "Less than a 2% probability that 5% of the sheep will become heat stressed" (with "heat stressed" determined as 75% towards the mortality threshold).

The department supported the first of these recommendations (i.e. allometric allocations of space based on a k-value of 0.033), subject to ASEL Technical Committee Review, but did not support the second recommendation until "further public and expert consultation and analysis is undertaken".

The McCarthy Review recommendation on changing the objective in the HSRA model has been addressed in Chapter 4 of this submission and in a separate submission to the Heat Stress Technical Reference Panel.

11.3 2018 ASEL Review

In relation to stocking densities the TAC has posed the following questions.

- Do you agree with the application of an allometric model for densities? What is the appropriate k-value and why? Should the k coefficient value vary depending on the species and voyage length? Please provide rationale and evidence for your position.
- Should the McCarthy Review application of a k coefficient of 0.033 be applied more broadly? Please provide rationale and evidence for your position.
- How would you standardise liveweights? Is it appropriate to apply a factor associated with curfew and anticipated weight during the voyage? How else can curfew and weight gains after leaving the registered premises be accounted for?
- What is the financial impact of changing on board stocking densities?

11.4 Context to be used in considering changes to ASEL stocking densities

Any changes to stocking density requirements in ASEL must be considered within the following context:

- Continual improvements have been made by the industry in mortality rates. Industry recognises that mortality rates are only a partial indicator of animal welfare; however, it is the only

indicator that has been consistently collected over time (and has a number of other advantages stated elsewhere in this submission). As the Stage 2 Issues Paper recognises the following mortality rates apply to livestock shipments during the most recent three-year period (2015-16 to 2017-2018)[15]:

- Sheep 0.75% of 5.4 million sheep exported
- Cattle and buffalo, voyages ≥ 10 days: 0.17% of 1.8 million head exported
- Cattle and buffalo, voyages < 10 days: 0.09% of 1.30 million head exported

Around the turn of the century mortality rates were higher than these levels – for sheep they were more than double.

- The economic impact of significantly reducing stocking densities may make some trades unviable – a direct relationship exists between stocking densities and the viability of the trade.
- If viability is affected, trades vacated by Australia will be supplied by others, leading to a deterioration in welfare outcomes for livestock globally.
- There remain significant gaps in research / knowledge on the application of allometry to stocking densities for live export shipments, including in the areas of time sharing, proximity preferences, normal lying and behavioural requirements for livestock export and for the appropriate space allowances for special characteristic livestock.

11.5 ALEC'S GENERAL APPROACH TO THE DETERMINATION OF STOCKING DENSITIES

In ALEC's view the following principles should be applied in the determination of stocking densities:

a) That the regulatory framework within ASEL for stocking densities reflect best available scientific evidence.
b) That the space requirements for animals be determined by the shape and size of animals as well behavioural aspects – that is, be guided by allometry (see the following section in this submission).
c) In addition, extra space be allocated, if required, to avoid undue suffering from heat stress, using the HSRA model (see Chapter 4 of this submission).
d) Finally, extra space be allocated, if required, for vulnerable/special classes of animals based on sound scientific evidence (see Section 11.7 of this submission).

11.6 DETERMINATION OF BASE LEVEL STOCKING DENSITIES USING ALLOMETRY

As previously noted, general support exists amongst animal scientists and veterinarians on the use of allometry to determine space allocations for animals when being transported or under intensive housing. A lower level of unanimity exists, however, over the k-value to be used in allometric equations.

A number of factors may affect the selection of a k-value, but the choice of k-value should be not be confused with the need to avoid heat stress. Rather additional space allocations to avoid heat stress should be separately and independently determined via application of an appropriately calibrated HSRA model. Additional space allocations to avoid heat stress were considered in Chapter 4 of this submission.

11.6.1 What k-value should be used to determine stocking densities?

For livestock being transported by ship the choice of k-value must allow animals to lie down and stand up and to drink and feed.

[15] ASEL Technical Advisory Committee, 2018, Stage 2: Draft Issues Paper , Review of the Australian Standards for the Export of Livestock, Department of Agriculture and Water Resources, Canberra, August.

The most commonly accepted k-values are for individual animals performing static activities (standing, lying). However, the k-values for groups of animals, or for determining the space required to perform active / behavioural functions, is less clear / accepted and needs to be determined by research and evidence particular to the situation.

Critically the selected k-value needs to take into account interactions between livestock and their ability to time share space to perform activities. This requires practical evidence, rather than simply multiplying the space required for one animal by the number of animals. The following may be noted:

> *"If an individual animal weighing 200 kg was allocated to an individual pen at semi-recumbent space, it would have 0.83 – 0.63 = 0.2 m^2 "free" space. Although the amount of "free" space per head would be the same in a group of 50 head, the total "free" space would be 41.5 – 31.5 = 10 m^2. It can be envisaged that additional space of 0.2 m^2 may be insufficient to allow an individual to carry out necessary behaviours, but that 10 m^2 may be sufficient to allow all group members to do so by using the "free" space at different times".*

Cattle, in particular, demonstrate shared vigilance, with some members of a herd staying standing while others rest by lying down[16]. Petherick and Phillips in their literature review observed "animals share space in time and all would not show lying down (or standing up) behaviours simultaneously"[17].

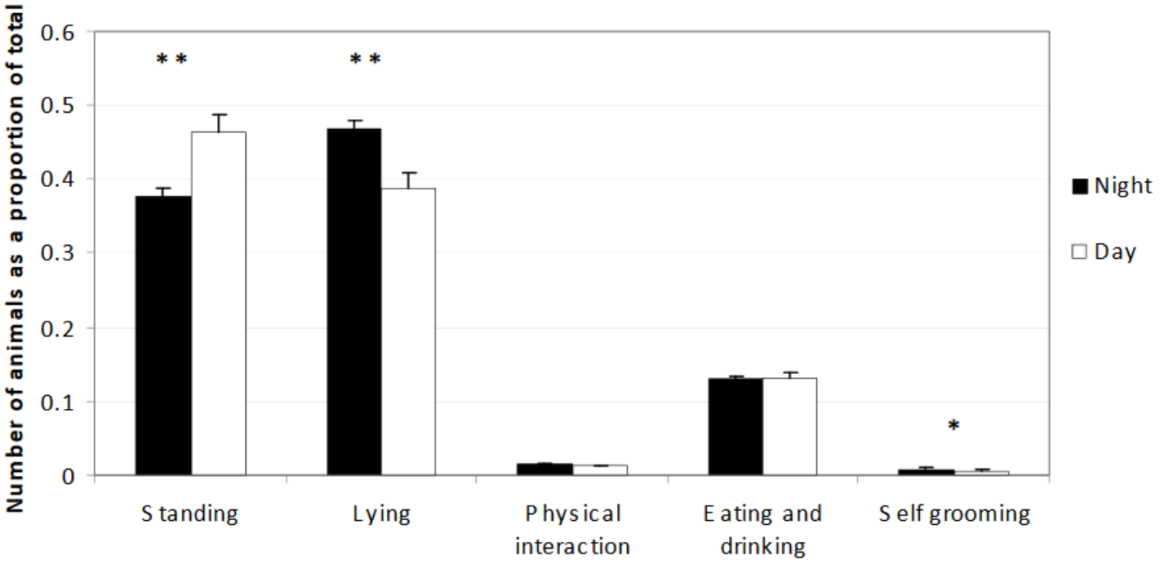
The lying positions that livestock adopt is also critically important in determining a k-value that allows simultaneous lying for all members of the group. Three basic lying positions can be observed along with corresponding k-values:

- Lying on the sternum with all legs tucked beneath the animal (termed "sternum space") - the space occupied is not dissimilar to standing space (k-value=0.020)
- Partial lying on the sternum with legs tucked against the animal's body (termed "semi-recumbent space") – minimum k-value=0.025[18].
- An animal lying laterally (on its side) with legs fully extended (termed "fully recumbent space") – this occupies the most space – k-value=0.047.

Catherine Stockman et. al., 2009, for cattle on voyages to the Middle East found that during the night cattle stood for about 38% of the time, were lying for about 46% of the time and engaged in other activities for about 16% of the time. Respective figures during the day were standing 46%, lying 38%, other activities 16% (see Figure 11.1)[19].

[16] Clive J. Phillips, 2002, *Cattle Behaviour and Welfare*. Blackwell's Scientific, Oxford, p. 264. It is not known if such sharing of vigilance is shown during transportation.
[17] J. Carol Petherick and Clive J.C. Phillips, 2009, p8.
[18] See, for example, J.C. Petherick, 2007, Spatial requirements of animals: allometry and beyond, Journal of Veterinary Behavior, Vol 2, pp 197- 204.
[19] C. Stockman, A. Barnes and D. Beatty, 2009, What is the impact of sea transport on cattle behaviour?, Poster presented at the International Ethological Conference, 2009.

Figure 11.1: Mean number of cattle as a proportion of total number of focal animals that were standing (not eating or drinking), lying (sternal and lateral recumbency), eating and drinking and self-grooming (licking and rubbing) at night (1800 to 600 hours) compared to during the day (550 to 1750 hours)



Importantly, in related work, Catherine Stockman also noted[20] that lateral recumbency was rarely observed and when it was observed cattle seldom held this position until the next sampling point (there was 10 minutes between sampling points). Cattle are unlikely to stay in a lateral recumbent position for a long period as it prevents eructation of gases from the rumen. Semi-recumbent lying is accepted as the normal lying behaviour, although sternal lying is also a common (particularly in sheep).

There is one final piece of research that has a bearing on the selection of a k-value for transport of livestock by sea. Theoretically calculating space requirements from allometric equations, and comparing space allocations in a range of very different situations (short land transport, long haul land transport, intensive housing) represents valuable research, but equally, if not more, valuable is actual observation of welfare outcomes in real livestock export voyage situations.

The CSIRO completed a stocking density project in 2013 that assessed 2 long haul sheep voyages to MENA in June and December 2010 and 1 short haul cattle voyage of 320 kg steers to Indonesia between 14 – 22 June 2012[21]. This work was partly undertaken as a result of statements by Petherick and Phillips that there is little actual data supporting the selection of k-values. The CSIRO report considered the following stocking densities – ASEL, ASEL less 10 per cent, and ASEL plus 10 per cent or space allocated allometrically using a k-value of 0.027 (whichever was greater).

The key finding of the CSIRO report was that, based on the animal welfare indicators applied, the ASEL v2.3 stocking densities are appropriate, but a 10 per cent increase should be further investigated[22]. The findings that:

[20] Catherine Stockman, 2009, Quantitative assessment of cattle behaviours on board livestock ships, Final Report Project W.LIV.0251, Meat & Livestock Australia, September, http://www.livecorp.com.au/LC/files/1c/1c35a31a-52e0-4359-9afc-6165b7bb551e.pdf.

[21] Drewe Ferguson and Jim Lea, 2013, Refining stocking densities, Final Report Project W.LIV.0253, Meat & Livestock Australia, January.

[22] It should aslo be noted that the CSIRO study found a significant farm-of-origin effect suggesting that sourcing and preparation of livestock is important.

- ASEL v2.3 stocking densities are appropriate; and
- A 10% increase in space is worthy of further investigation

contrasts markedly with the McCarthy Review recommendation that a k-value of 0.033 be used which would involve a 39% increase in space for 50kg sheep shipped in November to April and a 28% increase in space for 300kg cattle above the ASEL base table. It is to be noted that a k-value of 0.027 does allow additional space for sheep less than 80kg and for cattle less than 360kg (using Table 18 in the reformatted ASEL).

11.6.2 Determination of k-value

As shown in Table 11.1, compared to current ASEL v2.3 stocking density provisions, if stocking densities are to be based on the allometric equation, the k-value chosen will have significant implications for stocking densities[23]. For instance, a k-value of 0.033, compared to the ASEL default table would reduce the number of cattle that can be loaded by 22% (assuming an average liveweight of 300kgs) and the number of sheep by 30%.

Table 11.1: Reduction in stocking densities compared to current ASEL provisions

K-value	Change in stocking densities*	
	Sheep (lw=50kgs)	Cattle (lw=300kgs)
0.027	-14%	-5%
0.033	-30%	-22%

* No of animals per area

11.6.3 International comparisons

Tables 11.2 and 11.3 provide comparisons for cattle and sheep space allocations from the current ASEL provisions, determined allometrically using a k-value of 0.027, and space allocations that are regulated or provided as guidelines by other economically advanced countries.

Table 11.2: International comparison of space allocation for cattle transported by sea

Weight (kg)	Minimum pen area space allocation (sq. metres per head)					
	ASEL Base Table[1]	k = 0.027[2]	Ireland	EU	NZ	US
200	0.770	0.891	0.810	0.810	0.900	0.770
300	1.110	1.165	1.058	1.058	1.180	1.110
400	1.450	1.408	1.305	1.305	1.450	1.450
500	1.725	1.795	1.553	1.553	1.790	1.790
600	2.000	2.025	1.800	1.800	2.000	2.130

[1] Short haul, not southern cattle

[2] Includes an additional 10% space allocation for cattle over 500kg - see Section 11.7 of this submission

Table 11.3: International comparison of space allocation for sheep transported by sea

Weight (kg)	Minimum pen area space allocation (sq. metres per head)			
	ASEL Nov to April	k = 0.027	EU	US
40	0.290	0.308	0.290	0.226
50	0.315	0.357	0.315	0.260
60	0.360	0.403	0.340	0.294

[23] It is recognised that, particularly for sheep, provisions in EANs and application of the HSRA model may currently result in stocking densities well below those specified by ASEL.

The international comparisons show that allometrically allocating space using a k-value of 0.027 (with an additional 10% allowance for cattle of 500kgs and over – see Section 11.7) results in generous space provisions compared to those applied by other countries.

11.6.4 OIE and the k-value

An important consideration for the TAC is to ensure that the new version of ASEL is "not inconsistent" with OIE standards on animal welfare – this is part of the TAC's Terms of Reference.

The OIE provides the following recommendation for stocking densities during live export:

> *"The amount of space required, including headroom, depends on the species of animal and should allow the necessary thermoregulation. Each animal should be able to assume its natural position for transport (including during loading and unloading) without coming into contact with the roof or upper deck of the vessel. When animals lie down, there should be enough space for every animal to adopt a normal lying posture"*

Some have contended that this OIE recommendation is inconsistent with allocating space allometrically using a k-value of 0.027. This contention is incorrect. Use of a 0.027 k-value is entirely consistent with OIE recommendations – a k-value allows animals to adopt their normal lying posture involving semi recumbency or sternal lying.

11.6.5 Other issues related to the use of the HSRA model

ALEC recognised that allometric equations and the HSRA model rely on accurate data.

ALEC notes the recommendation in the McCarthy Review that:

> *Authorised officers should check and verify the weights of sufficient animals to be satisfied that the vessel is to be or has been loaded in a way that is consistent with a compliant heat stress risk assessment and ASEL. This may be conducted at any point in the supply chain.*

Under existing ASEL regulations basing load plans on accurate weights is clearly the responsibility of the exporter. No evidence exists that weights have been inaccurate. It is the recommendation of ALEC that the accuracy of weights supplied in load plans can be verified using normal risk based auditing procedures within existing structures under Approved Arrangements.

ALEC notes the recommendation in the McCarthy Review that:

> *The weight of animals for the purposes of stocking density should specify curfew and adjustments should be made to reflect a 12-hour curfew (i.e. the livestock industry standard).*

ALEC further notes that the department, in applying the allometric equation for sheep shipments to the Middle East, included an allowance for weight gains during the voyage[24].

It is ALEC's recommendation that, if an allowance is to be made for weight gains during a voyage, weight gains included need to be based on firm evidence.

[24] For non curfewed sheep the weight gains attribute during the voyage amount to 1.6% of the initial weight of the sheep. Given levels of confidence around allometric equations, we observe that adjustments of this magnitude may represent spurious accuracy. See the calculator at: http://www.agriculture.gov.au/export/controlled-goods/live-animals/advisory-notices/2018/2018-06.

11.6.6 Recommendations from ALEC

Based on a review of the scientific literature ALEC makes the following recommendations to the TAC on stocking densities.

- ALEC supports the application of allometry to guide the determination of "base" stocking densities for livestock exported by sea from Australia.
- A space allowance that allows all livestock in a pen to simultaneously lie down represents strong grounds for setting densities for live exports from Australia. The agreed allometric k-value that allows livestock to lie down simultaneously is 0.027. ALEC recommends that on-board stocking densities for all voyages be determined using this k-value.
  - ALEC recognises that space allocations greater than this may result from a consideration of heat stress risk (see Chapter 4), but space allocations due to heat stress need to be independent of space allocations from allometry (the two should not be confused). Additional space allocations to avoid heat stress should be separately determined via application of an appropriately calibrated heat stress risk assessment (HSRA) model.
- If an allowance is to be made for weight gains during a voyage and for curfew adjustments, weight gains included need to be based on firm evidence.

11.7 SPACE ALLOWANCE FOR VULNERABLE AND SPECIAL CLASSES OF LIVESTOCK

ALEC believes as a general principle space allowances for livestock exported by sea should be determined by the maximum of the allocations calculated by application of the allometric equations (using a k-value of 0.027) and the heat stress risk assessment model (if appropriate to apply to the voyage).

ALEC, however, notes that the HSRA model has not been developed for all markets (and it may not be sensible to do so). ALEC further notes that, although allometry provides useful guidance on space allocations, in some cases additional space may be warranted for vulnerable and special classes of livestock.

The recommendations provided below for vulnerable and special classes of livestock have been are based on experience and pragmatism. In general limited research exists on which to base recommendations in any of these areas. As further research becomes available the space allowances contained below should be reviewed and adjusted if necessary.

11.7.1 Space allowance for pregnant cattle

Current ASEL stocking density regulations provide at least 5% additional space for pregnant cows and, for some classes of cows, even more space is provided depending on shipment time of year.

Research recognises that pregnant livestock may have a different body shape to that envisaged within an allometric equation. However, there is no known research that confirms the actual space required for the differing shape of pregnant cattle, nor is there research that identifies how elapsed gestation time (as pregnancy becomes more advanced) may affect such an equation.

Pregnant cattle may have different behavioural needs – for example, they may have a greater need for fully recumbent lying. However, again there is no research on how behaviour may vary and its relevance to space. There is also no research as to whether any differences exist in these areas between Bos indicus, Bos taurus or dairy cattle and cows compared to heifers. Finally, there appears to be minimal R&D on the space required by pregnant camels or small ruminants.

Drs Ainsworth and McCarthy delivered the Best Practice Standards for the Preparation and Export of Cattle from Australia (LIV.102/SBMR.003) in 2000. The report was focused on ***long haul cattle shipments only***. In this report Ainsworth and McCarthy recommended:

- avoiding exporting pregnant cows where possible;
- for pregnant cows (first two trimesters), the provision of adequate bedding to last for the entire voyage is essential; and
- a minimum of 15% additional space should be provided.

The LEP Report – Best Practice Management of Dairy Cattle on Long Haul Voyages (LIVE.208) – completed by Dr Michael McCarthy in 2002 identified a range of specific factors relevant to pregnant dairy cattle. Key elements from the report relating to stocking densities were that:

- A reduction of stocking density of between 15 – 20% for the shipment of pregnant dairy heifers (and cows), over and above the existing LEAP requirements for cattle on long haul voyages. Final stocking density reduction to be determined by a risk management approach after full consideration of all factors relating to the voyage, the cargo and the vessel.

It is to be noted that applying a k-value of 0.027 already provides additional space for many cattle (including pregnant cattle) above the base space allocations being considered in the above two reports.

It was also a consensus position at the AAV Workshop convened by LiveCorp and ALEC in December 2016 that extra space above ASEL was required for pregnant cattle. The consultant's report from this workshop suggested that a possible pathway forward would be to amend ASEL to reduce pregnant cattle stocking densities by 10 per cent.

It is important to note that the recommendations made in the above reports were not based on evidence or data analysis. Before significant changes are made it is recommended that relevant research be undertaken. As an interim measure, however, ALEC recommends that for long haul voyages and for pregnant Bos Taurus cattle the space allocation be 10% above levels that would otherwise apply (using a k-value of 0.027).

11.7.2 Space allowance for other vulnerable and special classes of livestock

Drs Ainsworth and McCarthy in the report already cited (LIV.102/SBMR.003) made a number of other recommendations relevant to vulnerable and special classes of livestock:

- Where Bos taurus animals are sourced south of the 26th parallel during the northern summer, they should be provided with additional space at least to the level of 15% as described in the current AQIS orders.
- Animals over 500 kg live weight or with fat cover of 20 mm at the P8 site should not be selected for export. Cattle with CALM fat scores 4H, 5 and 6 all have fat measurements of greater than 20 mm of fat at the P8 site. If very fat animals are exported, they should be provided with additional space in the order of 10%.
- Cattle exported as slaughter or feeder animals should not have horns because horns are a major cause of bruising and other injury. Animals with horns should be penned together with additional space of at least 10%. All horned cattle must at least be tipped as per the LEAP standards.

It is important to note that the report indicated that while the general principles for the additional allowances were well supported by science, the 'cut-offs' required further clarification and validation.

11.7.3 ALEC recommendations on stocking densities for vulnerable and special classes of livestock

Based on a review of the scientific literature ALEC makes the following recommendations to the TAC on stocking densities for vulnerable and special classes of livestock.

- For pregnant Bos Taurus cattle the space allocation be 10% above levels that would otherwise apply[25].
- Space allocations for Bos Taurus cattle sourced south of the 26th parallel and shipped to or through MENA during the northern summer should be further considered in the context of thermoregulatory needs (see Chapter 5 of this Submission).
- If cattle 500kg lw or over are exported they should be provided with additional space in the order of 10%.
- Animals with horns should be penned together with additional space of 10%. All horned cattle must at least be tipped.
- Where an animal belongs to two or more vulnerable and special classes the maximum additional space allowance should apply (the individual elements should not be compounded to calculate a space allowance).
- Noting that the cut off values for additional space to be provided to vulnerable and special classes of livestock have not been well researched, additional space allocations should be examined and updated as further research is finalised.

11.8 COST IMPACT OF CHANGING STOCKING DENSITIES

The impacts are significant from any change to stocking densities, as it is the primary determinant of productivity for transport purposes.

Table 11.4 provides information on changes in freight costs for a number of typical live export voyages from Australia using current ASEL stocking densities (for November to April) and those that would apply using the allometric equation with k-values of 0.027 and 0.033. Underlying Table 11.4 is extensive information on livestock weights on each of these voyages, current shipping costs, typical vessel sizes and a range of other data. The table does not consider the influence of the HSRA model on stocking densities and hence freight costs.

It can be observed from Table 11.4 that, even using a k-value of 0.027, freight costs significantly increase – particularly for sheep voyages and longer cattle voyages (compared to the current ASEL stocking densities). For these voyages freight cost increases of 10% or more are not uncommon.

[25] In making this recommendation, and the subsequent recommendations, it has been assumed that ALEC recommendations on k-values have been adopted. In other words, it has been assumed that "levels that would otherwise apply" are defined by a k-value of 0.027.

Table 11.4: Impact of changes in stocking densities on freight costs

Voyage / change in stocking densities	Freight cost increase Per head	
	$AUD	%
Indonesia cattle (Darwin to Jakarta)		
ASEL to allometric, k=0.027	$3.67	2.8%
ASEL to allometric, k=0.033	$33.99	25.6%
Vietnam - Cattle (Townsville to Hai Phong)		
ASEL to allometric, k=0.027	-$8.09	-2.9%
ASEL to allometric, k=0.033	$52.77	18.7%
China - Slaughter Cattle (Portland to Tianjing)		
ASEL to allometric, k=0.027	-$21.60	-4.3%
ASEL to allometric, k=0.033	$85.87	17.0%
China - Breeder cattle (Portland to Tianjing)		
ASEL to allometric, k=0.027	$7.79	1.9%
ASEL to allometric, k=0.033	$99.44	24.6%
Israel - Cattle (Fremantle to Eilat)		
ASEL to allometric, k=0.027	$20.19	4.9%
ASEL to allometric, k=0.033	$115.82	28.2%
Russia - Cattle (Portland to Novorosyk)		
ASEL to allometric, k=0.027	$12.38	2.8%
ASEL to allometric, k=0.033	$114.72	25.6%
Middle East - Sheep (Fremantle to Kuwait)		
ASEL to allometric, k=0.027	$7.00	13.3%
ASEL to allometric, k=0.033	$20.22	38.5%
Turkey feeder cattle (Fremantle to Mersin)		
ASEL to allometric, k=0.027	$22.17	5.6%
ASEL to allometric, k=0.033	$114.61	29.1%
Turkey Sheep Based on double tier decks combined with a cattle shipment (Fremantle to Mersin)		
ASEL to allometric, k=0.027	$8.46	13.3%
ASEL to allometric, k=0.033	$24.44	38.5%

Using a k-value of 0.033 causes freight costs to increase by a huge amount for all voyages included in the table – with costs increasing by up to 39%.

The cost information in Table 11.4 has been combined with average shipment volumes by market for the period 2014/15 to 2017/18 and other cost information (for voyages not considered in Table 11.4) to estimate the total cost increases from changes to stocking densities. The total cost estimates also take into account seasonal shipment patterns and different stocking densities currently applying under ASEL by season.

- Using a k-value of 0.027 the additional costs imposed on the industry would be $16.8 million per annum.
- Using a k-value of 0.033 the additional costs imposed on the industry would be $99.9 million per annum.

Particularly for a k-value of 0.033, in a number of markets the increase in the landed price of Australian livestock, resulting from reduced stocking densities, is likely to render the market uneconomic or result in reduced trade. In this context it is to be noted that in Indonesia the trade in

Australian live cattle is now under severe pressure from Indian buffalo meat. Elsewhere, in the Middle East, North Africa and Tukey, fierce competition exists from EU and South American cattle suppliers and European sheep suppliers - this competition has intensified over the last decade. Any significant new impost will affect Australia's competitive position in these markets. In general competitor countries provide space allowances less than those calculated allometrically with a k-value of 0.027 (see Tables 11.2 and 11.3) – with South American countries having no regulated allowances.

In considering these cost imposts it is important to appreciate that freight rates are currently at low levels historically. Two years ago freight rates were more than 50% higher than they are now – there is evidence that freight rates will increase again in the near future. If the freight rates of two years ago are used a k-value of 0.027 would increase costs by over $30 million and a k-value of 0.033 would increase costs by close to $200 million.

11.9 Conclusion

In this review of stocking densities and associated issues, ALEC has recommended major changes to ASEL regulations. Changes recommended by ALEC are science based and recognise community concerns and needs. In terms of scientific support and animal welfare considerations the recommendations of ALEC in relation to stocking densities compare favourably with those applied anywhere internationally.

12 Stocking Densities in Registered Premises

List of recommendations

- Option 2 of the 2013 ASEL Review be rejected as a basis for regulating stocking densities in Registered Premises. Subject to minor amendments below, ALEC recommends that the current ASEL standards for stocking densities in Registered Premises be retained.
- That the TAC give consideration to the following changes as the basis for determining stocking densities in Registered Premises:
  - Currently S3.11 of ASEL specifies "*cattle with horns must be provided with additional space*". There does not appear to be a substantiation for requiring horned animals to be given additional space above the current ASEL densities (given ASEL provides 4 or 9 square metres per head).
  - Sheep stocking densities should be referrable to the size of the animal rather than a standard weight (54 kilograms). We note that this occurs with cattle where a stated multiplier is used.
  - The discretion to allow a different density should be retained, as it is relevant for addressing situations where the time in a Registered Premise may exceed the time cut-offs for unforeseen circumstances (e.g. delayed vessel) or for only small periods or numbers of animals.

12.1 Introduction

Prior to being exported by sea livestock must be assembled and held in a premise registered with the Department of Agriculture and Water Resources. Management of these premises is tightly regulated.

12.2 Current ASEL Standard

In relation to stocking densities in Registered Premises the current ASEL standards specifies the following:

> *Stocking density at registered premises must provide at least the following minimum space per head (cattle with horns must be provided with additional space), unless a variation is required and approved by the relevant Australian Government agency:*
>
> *a) for cattle, buffalo or camels held for 30 days or more, a minimum of 9 m^2, based on an individual live weight of 500 kg (this allowance can be varied by 0.09 m^2 for each 5 kg change in individual live weight)*
>
> *b) for cattle, buffalo or camels held for less than 30 days, a minimum of 4 m^2, based on an individual live weight of 500 kg (this allowance can be varied by 0.04 m^2 for each 5 kg change in individual live weight)*
>
> *c) for sheep and goats held in sheds for 10 days or more, based on an individual live weight of 54 kg:*
>
> *i. penned in groups of less than 8 animals, a minimum of 0.9 m^2*
>
> *ii. penned in groups of 9–15 animals, a minimum of 0.8 m^2*
>
> *iii. penned in groups of 16–30 animals, a minimum of 0.6 m^2*
>
> *iv. penned in groups of thirty-one (31) or more animals, a minimum of 0.5 m^2*

d) *for sheep and goats held in sheds for less than 10 days, based on an individual live weight of 54 kg:*

i. *penned in groups of less than 8 animals, a minimum of 0.6 m^2*

ii. *penned in groups of 9–15 animals, a minimum of 0.53 m^2*

iii. *penned in groups of 16–30 animals, a minimum of 0.4 m^2*

iv. *penned in groups of 31 or more animals, a minimum of 0.33 m^2*

12.3 2013 ASEL Review

No agreement was reached by the ASEL Review Steering Committee in 2013 on revised stocking densities in Registered Premises.

Rather two options were identified.

Option 1 – retain current provisions

No change – the standard to remain as above.

Option 2 – space allowances be increased

Stocking density at registered premises must provide at least the following minimum space per head (cattle with horns must be provided with additional space):

a) *for cattle, buffalo or camels held for 10 days or more, a minimum of 9 m^2, based on an individual live weight of 500 kg (this allowance can be varied by 0.09 m^2 for each 5 kg change in individual live weight)*

b) *for cattle, buffalo or camels held for less than 10 days, a minimum of 4 m^2, based on an individual live weight of 500 kg (this allowance can be varied by 0.04 m^2 for each 5 kg change in individual live weight)*

c) *for sheep and goats held in sheds, based on an individual live weight of 54 kg:*

i. *penned in groups of less than 8 animals, a minimum of 0.9 m^2*

ii. *penned in groups of 9–15 animals, a minimum of 0.8 m^2*

iii. *penned in groups of 16–30 animals, a minimum of 0.6 m^2*

iv. *penned in groups of thirty-one (31) or more animals, a minimum of 0.5 m^2*

12.4 OIE Guidelines

The OIE Terrestrial Animal Health Code 7.2.7 (1) states:

- *In some circumstances, animals may require pre-journey assembly. In these circumstances, the following points should be considered:*
  - *Pre-journey rest is necessary if the welfare of the animals has become poor during the collection period because of the physical environment or the social behaviour of the animals.*
  - *When animals are to be provided with a novel diet or unfamiliar methods of supplying feed or water, they should be preconditioned.*
- *Pre-journey assembly / holding areas should be designed to:*
  - *securely contain the animals;*
  - *maintain an environment safe from hazards, including predators and disease;*
  - *protect animals from exposure to adverse weather conditions;*
  - *allow for maintenance of social groups; and*

- *allow for rest, watering and feeding.*

12.5 2018 ASEL Review

In relation to stocking densities at Registered Premises the TAC has posed the following questions.

- Are stocking densities at registered premises an issue?
- What do you think about the options presented in the 2012-13 review? Should any of those options now be implemented? What is your rationale and evidence for this view?
- What are the cost implications of changing stocking densities in registered premises?

12.6 Relevant Research into Stocking Densities at Registered Premises

Stocking densities on-board vessels has already been extensively covered in Chapter 11 of this submission. The same allometric principles that have been enunciated in Chapter 11 for on-board application can also be considered to apply to the determination of densities in Registered Premises. In summary these principles are:

- Allometric equations are an accepted means for determining stocking densities.
- Broadly speaking the k-values used within these equations for static activities appear to be well accepted. For example: standing / sternal lying = 0.019 – 0.020; semi-recumbent lying = 0.025 – 0.027; and fully recumbent lying = 0.047.
- K-values for behavioural activities, particularly in group situations, are less accepted or validated. Very little is known about the ways in which livestock – particularly cattle and sheep – time-share space, perform behaviours in synchronicity, and the effects of spatial restrictions on behaviour and welfare – all of which affect how applicable and effective the use of allometrics and k-values is in group situations.
- For situations where confinement is of reasonably limited duration, k-values of 0.025-0.027 are generally accepted as appropriate (allowing animals to lie semi recumbent simultaneously). For confinement of longer duration (e.g. in intensive housing situations) a k-value of 0.033 is accepted as appropriate.

12.6.1 ASEL stocking densities for Registered Premises are currently aligned with domestic feedlots – this might be questioned

ASEL currently sets stocking densities in Registered Premises in alignment with domestic feedlot / intensive production standards (with some inconsistencies), but allows a higher stocking rate when animals are held for very short periods. It is to be noted that in feedlot situations in Australia livestock can be confined for many months. For instance, if Australian beef is identified with the 'GF' – grainfed - cipher the cattle from which this beef is derived must have been in a feedlot for at least 100 days – and medium and long fed cattle spend much longer periods than this in a feedlot (in some cases over 300 days).

For cattle and sheep Tables 12.1 and 12.2 compare current ASEL space provisions in Registered Premises with those of domestic feedlot standards. Also compared in Tables 12.1 and 12.2 is the ASEL space requirements with those based on allometric equations using k-values of 0.027 and 0.033.

Table 12.1: Comparison of allometric equations with cattle stocking densities

Cattle liveweight	Current ASEL requirements		Allometric space allocation		Australian cattle standards & guidelines (feedlots)
	Cattle held < 30 days	Cattle held >= 30 days	k=0.027	k=0.033	
200 kg	1.6m^2	3.6m^2	0.891m^2	1.089m^2	
300 kg	2.4m^2	5.4m^2	1.165m^2	1.424m^2	
400 kg	3.2m^2	7.2m^2	1.408m^2	1.721m^2	
500 kg	4.0m^2	9.0m^2	1.632m^2	1.995m^2	
600 kg					9.0 m^2

Table 12.2: Comparison of allometric equations with sheep stocking densities

Sheep – penned in groups of:	Current ASEL requirements		Allometric space allocation*		Australian sheep standards & guidelines (feedlots)
	Sheep held < 10 days	Sheep held >= 10 days	k=0.027	k=0.033	
< 8 animals	0.60m^2	0.90m^2	0.376m^2	0.459m^2	0.90m^2
9-15 animals	0.53m^2	0.80m^2	0.376m^2	0.459m^2	0.80m^2
16-30 animals	0.40m^2	0.60m^2	0.376m^2	0.459m^2	0.60m^2
> 30 animals	0.33m^2	0.50m^2	0.376m^2	0.459m^2	0.50m^2

* The allometric space allocations are based on a 54kg lw sheep

As shown in Table 12.1 the space allocations for cattle specified in ASEL are well in excess of those indicated by allometric equations, even using a k-value appropriate for extended confinement (k=0.033). Similar comments apply to sheep (except where animals are grouped in pens of more than 30).

The alignment of the ASEL standards with domestic feedlot standards might be questioned as significant differences exist between the two systems:

- The purposes of the two systems are quite different – the primary purpose of a feedlot is productive efficiency (especially weight gains and meat quality), whereas the purpose of a Registered Premise is transport preparation.
- The confinement periods are quite different – in feedlots often confinement extends over many months; in Registered Premises typically feeder / slaughter cattle are held for three or less days and most sheep exported are held for less than 7 days.

12.6.2 ALEC rejects Option 2 of the 2013 ASEL Review

Option 2, as identified in the 2013 ASEL Review (see Section 12.3), would require space allocations for livestock that spend a very limited time in a Registered Premise to increase (for cattle the confinement period against which a lower space allocation applies is reduced from 30 days to 10 days and for sheep maximum space allowances apply regardless of the time spent in the Registered Premises).

ALEC believes that Option 2 for stocking densities in Registered Premises in the 2013 ASEL Review should be rejected on the following grounds:

- It is not supported by allometric considerations.
- The proponents of this change fail to recognise the very significant differences between confinement of animals in domestic feedlots and those in Registered Premises (particularly in relation to length of confinement).
- No evidence exists that the current stocking densities in Registered Premises are actually contributing to, or causing, poor animal welfare outcomes either in the Registered Premise or on the subsequent voyage.

  - Strong evidence of a genuine welfare issue is particularly important given stocking density and throughput of livestock are the primary productivity drivers and determinants of profitability (and cash flow) for Registered Premise operators.
- Option 2 would also likely cause significant bottlenecks as the option to reduce stocking densities would erode the capacity of a Registered Premise to hold livestock, a loss which would take several years to regain (i.e. it takes several years to plan, get approval and build a Registered Premise).
- In terms of the stocking densities for sheep, it is important to note that the stocking density reductions proposed under Option 2 could actually lead to poorer animal welfare outcomes by limiting the number of animals prepared in sheds (these moving into paddocks) and creating a disincentive for future investments in sheds (i.e. a reduced rate of return on investment).
  - Shed preparation is recognised within R&D and ASEL as having some benefits over paddock preparation (e.g. management of salmonella risks; improved feed transition and protection from elements).

12.6.3 Retention of existing stocking densities in Registered Premises

Based on an analysis of the scientific literature, including the application of allometry, it could be argued that stocking densities in Registered Premises should increase. Despite this, ALEC recommends that the existing base standards largely be retained on the following grounds:

- The live export system has been built around existing standards. There is always a cost in change – this cost should not be underestimated.
- Although there would be economic advantages in increasing stocking densities in Registered Premises, the cost savings or imposts of changes in this area are not as great as in other areas of the supply chain.

12.7 Economic impact of changing stocking densities in Registered Premises

Adoption of Option 2 of the 2013 ASEL Review in relation to stocking densities in Registered Premises would impact on the trade due to the importance of these Premises to productivity and profitability and their potential to create bottlenecks in the supply chain.

In some circumstances, the 2013 ASEL Review Option 2 proposal would halve the productivity of Registered Premises preparing sheep or cattle (between 10 – 30 days) which would be manifestly unfair on those who have invested on the basis of the regulation in place at the time (being the current stocking densities). Depending on the changes made, some operators may face challenges in remaining profitable, competitive and getting sufficient return on investment.

Ultimately, higher costs in operating Registered Premises would be passed on - either in the form of reduced returns to producers or higher costs for customers, further decreasing Australian competitiveness.

12.8 ALEC recommendations on stocking densities in Registered Premises

Based on a review of the scientific literature ALEC makes the following recommendations to the TAC on stocking densities in Registered Premises.

- Option 2 of the 2013 ASEL Review be rejected as a basis for regulating stocking densities in Registered Premises. Subject to minor amendments below, ALEC recommends that the current ASEL standards for stocking densities in Registered Premises be retained.
- That the TAC give consideration to the following changes as the basis for determining stocking densities in Registered Premises:

- Currently S3.11 of ASEL specifies "*cattle with horns must be provided with additional space*". There does not appear to be a substantiation for requiring horned animals to be given additional space above the current ASEL densities (given ASEL provides 4 or 9 square metres per head).
- Sheep stocking densities should be referrable to the size of the animal rather than a standard weight (54 kilograms). We note that this occurs with cattle where a stated multiplier is used.
- The discretion to allow a different density should be retained, as it is relevant for addressing situations where the time in a Registered Premise may exceed the time cut-offs for unforeseen circumstances (e.g. delayed vessel) or for only small periods or numbers of animals.

13 Bedding Management and Ammonia

13.1 List of recommendations

- In the absence of clear evidence that the changes to bedding requirements will enhance welfare outcomes, ALEC recommends the ASEL requirements not be changed.
- That the current bedding research project being conducted by the LEP be allowed to run its course, and a review of ASEL bedding requirements undertaken after completion with ASEL requirements only amended, if appropriate, based on sound research evidence.
- That provided simple, practical, economical measurement systems can be devised, a new requirement be included in ASEL that ammonia levels must not exceed 25 ppm.

13.2 Introduction

The provision of bedding materials and bedding management is an important component of maintaining a high level of health and welfare during sea transport, particularly for cattle. It aids particularly in absorbing liquid waste, avoiding slipping, maintaining good foot health, contributing to animal comfort and preventing the production / build-up of ammonia gas. Bedding is not generally an issue for sheep. As Dr Michael McCarthy has noted: "*For the most part, the sheep pad makes for excellent bedding. There is no need for additional sawdust or any other bedding additive under normal circumstances"*.

13.3 Current ASEL Standards

13.3.1 Bedding provision

In relation to bedding the current ASEL standards contain the following requirements:

4.3.1 Cattle and buffalo

Cattle and buffalo on all long-haul voyages and extended long haul voyages must be provided with sawdust, rice hulls or similar material to be used exclusively for bedding at a rate of at least 7 tonnes or 25 m^3 for every 1000 m^2 of cattle pen space.

This does not apply to cattle and buffalo loaded from Brisbane or a port north of latitude 26° south and exported to Southeast Asia or Japan.

4.3.2 Deer

Bedding, such as straw, shavings or sawdust, must be provided on all voyages and must be spread at a rate of at least 7 tonnes or 25 m^3 for every 1000 m^2 of deer pen space before animals are loaded.

4.3.3 Camelids

Bedding, such as straw, shavings or sawdust, must be provided on all voyages and must be spread at a rate of at least 7 tonnes or 25 m^3 for every 1000 m^2 of camelid pen space before animals are loaded.

13.3.2 Ammonia

There is no relevant standard for ammonia in the current ASEL.

13.4 2013 ASEL Review

13.4.1 Bedding provision

No agreement was reached by the ASEL Review Steering Committee on increasing bedding and bedding management requirements.

Rather three options were identified.

Option 1 – retain current provisions

No change – the standard to remain as above.

Option 2 – apply current provisions to all voyages

The standard above to apply to all voyages¸ not just long-haul voyages. The exemption applying to cattle and buffalo loaded from Brisbane or a port north of latitude 26° south and exported to Southeast Asia or Japan would also be removed.

Option 3 - all voyages increase bedding material

Cattle and buffalo on all voyages must be provided with sawdust, rice hulls or similar material to be used exclusively for bedding at a rate of at least 4 tonnes per 1000 m^2 per application (approximately 2.4 cm depth spread consistently), including before the animals are loaded.

Deer and camelids on all voyages must be provided with straw, shavings, sawdust, or similar material to be used exclusively for bedding at a rate of at least 4 tonnes per 1000m^2 per application (approximately 2.4 cm depth spread consistently), including before animals are loaded.

Bedding must be provided to cattle, buffalo, deer or camelids at all times, except during the immediate wash down and drainage process.

13.4.2 Bedding management

The Review contained the following proposal in relation to bedding provided to cattle, buffalo, deer and camelids:

> *Management of the bedding, including deck wash downs and frequency of replacement of bedding materials, must be sufficient to ensure good welfare outcomes for the livestock. In particular, bedding management must minimise abrasions, lameness, pugging, faecal coating and ammonia production.*
>
> *Sufficient bedding material must be provided on surfaces used for loading and discharging livestock from the vessel in a manner that minimises slipping and the risk of injury to the livestock. The consistency and depth of bedding material must be continually monitored.*

Note: The proposed 4.3.2 Management of bedding clause was not offered with any alternative options. Further, equivalent bedding requirements as per the above were included for Portable Livestock Units.

13.4.3 Ammonia

The Review contained the following proposal in relation to ammonia (and other things):

> *All livestock services on the vessel must be monitored regularly to ensure that the health and welfare of the livestock are maintained while the livestock are on the vessel:*
>
> *a) Feed and water supply systems must be monitored day and night and maintained in good order.*
> *b) The pen stocking density must be checked daily throughout the voyage and adjustments made as required.*
> *c) Ventilation must be monitored daily to ensure adequate thermoregulation of the livestock.*

d) *Washing down of decks and disposal of faeces must be carried out regularly with regard to the welfare requirements of livestock.*
e) *Ammonia levels must not exceed 25ppm*

13.5 McCarthy Review

The McCarthy Review notes that:

> *"There is no need for additional sawdust or any other bedding additive under normal circumstances. There has been, however, some good work within the cattle export trade whereby the cattle pad is being extended (in terms of time) to enable voyages to China to be completed without undertaking a wash down. On these voyages, depending on the stocking density, bedding conditions can remain very dry and this is a sound management strategy (best practice) particularly when conditions at the destination are cold.*
>
> *The key to this strategy is either to put down abundant sawdust at the commencement of the voyage, or add sawdust on a strategic basis to areas that need it as the voyage progresses. This same strategy may have a place in the sheep trade where some pad areas are known to deteriorate."*

13.6 OIE Guidelines

The OIE Terrestrial Animal Health Code 7.2.5 (4) (i) states:

> *"Where appropriate, suitable bedding, such as straw or sawdust, should be added to vessel floors to assist absorption of urine and faeces, provide better footing for animals and protect animals (especially young animals) from hard or rough flooring surfaces and adverse weather conditions."*

In terms of cleaning the vessel, the OIE Code states at 7.2.9 (1) (e):

> *"Where cleaning or disinfestation is necessary during travel, it should be carried out with the minimum of stress to the animals."*

13.7 2018 ASEL Review

In relation to the management of bedding and ammonia levels the TAC has posed the following questions.

- What specific requirements (i.e. volume, usage, components) should exist for bedding material for export consignments of cattle and sheep? Should these apply to all voyages or only some? Should it apply to all species or only some? Please provide rationale and evidence for your position.
- Should the standards be amended to alter the specifications currently in place to manage provision of bedding for livestock and ammonia levels on vessels? If so, what would you suggest and what evidence can you provide to support your suggestion?
- Should there be a requirement that bedding is used to manage an appropriate faecal pad? Should a statutory reserve amount of bedding be required as a contingency amount to manage any flooded pens?
- What would be the costs of any changes to the current arrangements?

13.8 Relevant Research into Provision and Management of Bedding

Better understanding and managing the on-board environment has been, and is, a priority area for LEP R&D to ensure information is available to pursue continued improvements to the welfare and comfort of animals during export.

As McCarthy and Banhazi note in their literature review[26]:

> *"The Australian livestock export industry has completed an array of projects aimed at improving environmental conditions on livestock vessels. Most of these studies have addressed air quality (mostly NH3) but bedding management (washing frequency and the use of sawdust) has also been investigated. The industry has also undertaken pivotal studies into both ventilation and heat stress. These studies have been completed over a 15-year period and have provided the industry with a good understanding of the issues involved".*

Some of the more relevant projects are listed in Table 13.1.

Table 13.1: Selection of industry projects relevant to being provision and management:

Project	Title	Completed
LIVE.0218	Determining critical atmospheric ammonia levels for cattle, sheep and goats - a literature review	Mar 2003
LIVE.0202	Decreasing Shipboard Ammonia Levels	Jun 2003
LIVE.0223	Pilot monitoring of shipboard environmental conditions and animal performance	Oct 2004
W.LIV.0254	Management of Bedding during the Livestock Export Process	Mar 2009
W.LIV.0290	Bedding management and air quality on livestock vessels – A literature review	Oct 2016
N/A	Summary report of the 2016 AAV Consultation	Jan 2017

In addition to the above studies there has been a very significant amount of research completed into ship ventilation which has a bearing on issues relevant to bedding management. As McCarthy and Banhazi state:

> *"Ventilation is inextricably linked to both bedding management and air quality and it is not possible to discuss bedding management and air quality without reference to ventilation".*

The research summary provided here draws mostly on recent material. In particular it draws from the excellent literature review completed in late 2016 by Michael McCarthy and Thomas Banhazi. It also references elements of an AAV workshop conducted in December 2016.

13.8.1 Provision and management of bedding is multi-faceted – difficult to be prescriptive

Key objectives of providing and managing livestock bedding (and other aspects of the on-board environment) are:

- To maintain a generally healthy environment for livestock, especially good foot health, avoiding abrasions and lameness.
  - Prevent "scuffing" whereby foot abrasions from feet being in contact with rough flooring can become a source of infection.
- To keep animals dry and clean by absorbing liquid waste.

[26] M. McCarthy and T. Banhazi, 2016, Bedding management and air quality on livestock vessels – A literature review, Final Report Project W.LIV.0290, Meat & Livestock Australia, October.

- To provide comfort and ensure good traction between the flooring and the feet of animals – avoid slipping.
- To limit potentially harmful emissions (such as ammonia).

As shown in Table 13.2, in addition to bedding provision and management, a range of other factors contribute significantly to the attainment of these objectives. Table 13.2 outlines some of the variables identified as influencing the on-board environment[27]:

Table 13.2: Variables identified as influencing the on-board environment and contributing to outcomes achieved

	Issue to be addressed			
	Abrasions / lameness	Manure / pad degradation	Harmful emissions	Slipping
Factors influencing outcome achieved	*Sheep vs cattle vs type of cattle*	*Ventilation*	*Sheep vs cattle (vs type of cattle?)*	*Vessel flooring*
	Size and pregnancy	*Wet bulb temperature*	*Ventilation*	*Vessel design*
	Vessel flooring	*Sheep vs cattle vs type of cattle*	*Wet bulb temperature*	*Loading / handling*
	Maintenance of pad (as per next column)	*Length of voyage*	*Deck type (open / closed)*	
	Feed availability	*Stocking densities*	*Diet*	
	Stocking densities	*Bedding management (wash downs / sawdust)*	*Bedding management. (wash downs / sawdust)*	*Bedding*
	Aggression	*Poor drainage*	*Stocking densities*	
	Loading / handling			

The complex and multifaceted nature of bedding provision and management in meeting livestock welfare objectives was highlighted McCarthy and Banhazi. Amongst other things these authors noted:

> *"Each ship is different with its own peculiar set of features and limitations. This is one of the reasons why it is difficult to be prescriptive about bedding management".*

and

> *"… it is difficult (if not impossible) to be prescriptive about bedding management and that management strategies are modified and amended in response to the interplay of a large number of factors. It is strongly influenced by the way in which events unfold during the course of a voyage. The principles involved, however, appear to be well understood by industry personnel".*

13.8.2 Sawdust represents one of many tools, it should not be regarded as a one-dimensional remedy

It is the view of ALEC that in past reviews of ASEL too much emphasis has been placed on the provision of sawdust (or related bedding material such as rice hulls – some use fodder as an equivalent bedding material).

[27] Australian Livestock Export Corporation Ltd, 2018, Submission to Review of Australian Standards for the Export of Livestock (ASEL) – Stage 1, http://www.agriculture.gov.au/animal/welfare/export-trade/review-asel.

McCarthy and Banhazi viewed sawdust as a tool to be used in an overall bedding management plan. This suggests that sawdust should not be a factor specified in regulation in its own right. The following quotes from the review are germane to a consideration of sawdust:

> *"Sawdust is a useful management tool and has real application where it is relatively easy to source. However, getting sawdust to the more remote ports across the north of Australia is both costly and logistically difficult".*
>
> *"It is difficult to quantify the benefits of sawdust … the benefits are subjective and based mainly on observation".*
>
> *"Depending on the livestock category involved, a lack of sawdust can be compensated for by more frequent washing. In fact, under many circumstances, more frequent washing may be a better strategy to combat heat stress and provide acceptable conditions on board".*
>
> *"Some categories of livestock require the extensive use of sawdust to maintain their health and well-being. Other cattle are quite robust and handle conditions much better …. .*
>
> > *Young, agile cattle have far fewer problems and are unlikely to require any special bedding requirements. ……*
> >
> > *Bos indicus cattle are more agile than Bos taurus cattle. Bos indicus cattle have a greater heat tolerance and therefore drink and urinate less. ……*
> >
> > *Friesian cattle are more prone to foot and leg injuries and are less heat tolerant than most other cattle. The use of sawdust is essential when transporting these cattle".*

At an AAV workshop in December 2016, there was little support for an increase in the minimum quantity of sawdust required on board. In contrast, there was a strong view that it was unnecessary, with additional sawdust most likely to be wasted / dumped. Discussion by the AAVs focused on the strategic use of sawdust as a tool for cattle comfort in hospital pens and with very heavy cattle, and the use of sawdust to mop up wet spots after wash down and fluid spills, and in laneways and on ramps to reduce the risk of cattle slipping over during loading and discharge. The workshop also noted that there had been advances in flooring that minimised abrasions and that feed availability had as much influence on foot injuries / abrasions as sawdust. The proposed path forward, emerging from this workshop, as identified by the consultants, was that the current ASEL bedding requirements do not need to be changed.

In summary, changing the current ASEL requirements would have significant commercial implications with no guarantee of improved animal welfare. Complex interactions occur between a number of variables determining the on-board environment and focusing one of these variables in isolation may result in unexpected and adverse welfare outcomes – e.g. increasing sawdust can affect on-board ventilation.

Since the completion of McCarthy and Banhazi review, the LEP commenced the development of terms of reference and the establishment of a project to scientifically analyse the relationships between the different variables affecting bedding and the on-board environment (particularly ammonia) as well as identifying ways to effectively estimate and mitigate risks. This project is a significant LEP investment and is nearing commencement.

The bedding requirements in ASEL should not be changed unless there is clear evidence that the changes will enhance delivery outcomes. The research project should be allowed to run its course, with ASEL bedding requirements only amended, if appropriate, based on sound research evidence.

13.9 CONSIDERATION OF ESTABLISHING IN ASEL A STANDARD FOR AMMONIA LEVELS

On livestock vessels ammonia gas is produced as a result of the chemical / microbiological breakdown of waste material (urine and faeces). Ammonia gas is a strong mucosal tissue irritant and causes inflammation of the respiratory tract, predisposing the lungs to respiratory disease.

For both livestock and humans high concentrations of ammonia gas are known to be deleterious for welfare and health. For humans SafeWork Australia sets the following exposure limits for Australian workers:

- A time weight average (TWA) exposure limit of 25 parts per million (ppm).
- A short-term exposure limit (STEL) of 35 ppm (average over 15 minutes should not be exceeded on any work day).

On livestock vessels inadequate air movement, high temperatures / humidity, increased pH, reduced waste removal frequency, sub-optimal ventilation rates (or dead spots), high protein levels in feed and roughage with low digestibility are considered risk factors for ammonia emission.

13.9.1 Research completed by the LEP into ammonia emissions

In 2003 Professor Nick Costa et al found that atmospheric ammonia concentration was typically 15 ppm onboard vessels during transport of cattle and sheep[28]. Common readings below decks reach 20 to 30 ppm. Both the average readings and upper ranges of atmospheric ammonia were found to be comparable with cattle feedlots in eastern Australia. Costa et al recommended that:

- The critical value of atmospheric ammonia above which cattle welfare and production could be adversely affected should be set at 25 ppm (on a TWA basis).
- It is unlikely that sheep or goats are going to be qualitatively or quantitatively different to cattle in their respiratory responses to ammonia. Therefore the same critical value for atmospheric ammonia of 25 ppm should be applied to sheep and goats.

In related work in 2004 Jeisane Accioly et al[29] investigated the effect of atmospheric ammonia on the bovine lung by means of bronchio-alveolar lavage (BAL). Cattle were placed in rooms simulating live export conditions and atmospheric ammonia was monitored throughout. Bronchio-alveolar lavage was performed 4 days before the cattle were placed in rooms and immediately after they left the rooms. When a TWA level of 25ppm was exceeded the cattle developed an inflammatory response. However, the animals did not develop clinical respiratory disease. At ammonia levels lower than 22ppm no response was detected.

In 2005 Mike McCarthy attempted to use three types of meters to measure ammonia concentrations on ships. Although use of the meters proved problematic, ammonia levels were measured on five voyages. The mean level for the five voyages was approximately 10 ppm, with minimum and maximum readings on the voyage of approximately 2 and 31 ppm, respectively.

Two industry funded research projects were also completed by Phillips et al in 2007 from which a number of published articles were produced[30]. In one study ammonia measurements were made at 20 sites on two voyages of the same ship transporting sheep from Australia to the Middle East. The

[28] Nick Costa, Jeisane Accioly and Martin Cake, 2003, Determining critical atmospheric ammonia levels for cattle, sheep and goats - a literature review, Final Report Project LIVE.218, Meat & Livestock Australia, December.
[29] J.M. Accioly, E.G. Taylor, N.D. Costa, P. Clark, C.L. White, J.R. Pluske, G.D. Tudor and D.W. Pethick, 2004, Effect of Atmospheric Ammonia on Bovine Lung, Animal Production in Australia, Vol 25, 1-4.
[30] See: Clive Phillips, 2007, Development of welfare indicators for cattle & sheep transported by ship: Stage 2 - The effect of gaseous ammonia on the health and welfare of sheep & cattle, Final Report Project LIVE.222, Meat & Livestock Australia, November;

sites were not randomly selected: 10 sites were where high concentrations of ammonia were predicted and 10 where low ammonia was predicted. At four sites, the mean ammonia concentration for the voyage was above 25 ppm (in some cases, as high as 50+ ppm), while the mean ammonia concentrations at the remaining 16 sites were below 18 ppm and considered safe. High ammonia concentrations were localised and occurred particularly on closed decks, as well as at the front of the vessel and near the engine block on open decks. Substantial variations also occurred over time. Of the 20 pens that were re-sampled a second time, in five pens the section of the pen that had previously had the highest concentration of ammonia then had the lowest. In concluding this study Phillips recommended that the maximum exposure limit for steers and sheep be 30 ppm.

Further experimental data was gathered by Phillips et al by holding animals for a number of days in conditions similar to those experienced on-board vessels travelling from Australia to the Middle East during the northern hemispheric summer and applying various levels of ammonia. Findings for steers and sheep were reasonably similar and can be summarised as follows:

- For cattle the ammonia concentrations applied were < 6 mg/m^3, 11 mg/m^3, 23 mg/m^3 and 34 mg/m^3[31]. For ammonia concentrations of 23 mg/m^3, but particularly for those at 34 mg/m^3, pulmonary irritation / inflammation was evident. Ammonia had no effect on haematological variables or body weight. Twenty-eight days after exposure to ammonia, the pulmonary macrophage activity and neutrophil concentrations of the steers had returned to normal.
- For sheep the ammonia concentrations applied were 4 mg/m^3, 12 mg/m^3, 21 mg/m^3 and 34 mg/m^3[32]. Some short-term pulmonary inflammation was indicated at the higher ammonia levels however, ammonia concentrations had no effect on haematological variables. Feed intake decreased in proportion to ammonia concentration, and body weight gain decreased at the 2 greatest concentrations. Twenty-eight days after exposure to NH_3, the pulmonary macrophage activity and BW of the sheep returned to that of sheep exposed to only 4 mg/m^3. It was concluded that NH_3 induced a temporary inflammatory response of the respiratory system and reduced BW gain, which together indicated a transitory adverse effect on the welfare of sheep.
- Phillips et al also tested ammonia avoidance using trained sheep, which found that there appeared to be a moderate aversion to 45-ppm concentrations and no evidence that previous exposure to ammonia concentrations influenced aversion.

13.9.2 Summary conclusions by ALEC on ammonia emissions

In summary a number of studies (e.g. Costa et al. 2003) suggest that ammonia levels above 25ppm as a time weighted measure, are harmful to animals and should be avoided. The use of 25ppm is consistent with SafeWork Australia recommendations for exposure in humans as a time weighted average (see http://www.safeworkaustralia. gov.au/). The stated short-term exposure limit by SafeWork Australia is 35ppm.

The 2013 ASEL Review included a new requirement that ammonia levels must not exceed 25 ppm. The 2013 ASEL Review amendment appears to be reasonable based on the research conducted into livestock and in relation to the workplace safety systems. It is to be noted that if a time weighted requirement is imposed that ammonia levels not exceed 25ppm, in order to comply with this requirement levels will necessarily less than the maximum.

However, there are some issues with the proposed ASEL standard:

[31] Concentrations of ammonia at 6 mg/m^3, 11 mg/m^3, 23 mg/m^3 and 34 mg/m^3 are equivalent to 9ppm, 16ppm, 33ppm and 49ppm assuming a temperature of 25^{o}C and pressure of 1 atmosphere.

[32] Concentrations of ammonia at 4 mg/m^3, 12 mg/m^3, 21 mg/m^3 and 34 mg/m^3 are equivalent to 6ppm, 17ppm, 30ppm and 49ppm assuming a temperature of 25^{o}C and pressure of 1 atmosphere.

- There is no technology currently implemented or potentially implementable to provide the ongoing, automated ammonia readings required to demonstrate compliance, particularly with a time-weighted average.
- There is a lack of evidence and data as to the nature of ammonia emissions on vessels – including differences in risk factors based on journey (length / time of year), vessel (ventilation / dead spots / configuration) and animals (sheep / cattle).
- There is a need for further consideration of the mitigation strategies and approaches that can be applied to higher risk scenarios.

As previously noted, the LEP has established a project to scientifically analyse the relationships between the different variables affecting bedding and the on-board environment (particularly ammonia), as well as identifying ways to effectively estimate and mitigate risks. This project is a significant LEP investment and is nearing commencement.

13.10 Economic impact of changes to bedding requirements

Bedding material (sawdust, rice hulls or similar material) is costly, hard to source in certain areas of Australia and takes up space on vessels. Requiring greater use of bedding material would add significantly to costs with a marginal or non-existent welfare benefit.

No welfare benefit from increased provision of bedding material is proven on short haul voyages. Similarly, increasing the requirement to carry more bedding material on long haul voyages cannot be justified as there is no link between performance and the volume of bedding in the standards. As has been pointed out in this submission, a range of factors contribute to achieving key objectives such as maintaining a generally healthy environment for livestock, keeping animals dry and clean, providing comfort and ensuring good traction and limiting potentially harmful emissions – bedding material is just one tool to meet those objectives. Simply requiring more bedding material to be carried on board would unfairly penalise those who are invested in other mechanisms to achieve these outcomes (e.g. that have invested in ventilation improvements and flooring) and who are preforming well in terms of animal welfare outcomes because of this.

The proposed doubling of the bedding material would have an enormous economic impact. In some case a substantial re-design of ships would be required to accommodate a doubling of bedding material – this would represent a very significant cost.

Even where a substantial re-design of ships is not needed, implementation of Options 2 or 3 in the 2013 ASEL Review would still add very significantly to costs.

ALEC has based cost estimates on the following:

- Allometric allocation of space using a k-value of 0.027.
- An estimate of average cattle weights by destination.
- Last 5 years average exports via destination.
- Information on vessel sizes used via destination
- A cost estimate for bedding of $700 / tonne in southern ports and $1,000 per tonne in northern ports.

Based on the above ALEC estimates that implementation of Options 2 and 3 of the 2013 ASEL Review, even without the need to re-configure vessels, would cost the industry between $6.5 million and $8.1 million each year.

13.11 ALEC RECOMMENDATIONS ON BEDDING MATERIALS AND AMMONIA

Based on a review of the scientific literature and outcomes from the AAV Workshop, ALEC makes the following recommendations to the TAC on bedding materials and ammonia.

- In the absence of clear evidence that the changes to bedding requirements will enhance welfare outcomes, ALEC recommends the ASEL requirements not be changed.
- That the current bedding research project being conducted by the LEP be allowed to run its course, and a review of ASEL bedding requirements undertaken after completion with ASEL requirements only amended, if appropriate, based on sound research evidence.
- That provided a simple, practical measurement systems can be devised, a new requirement be included in ASEL that ammonia levels must not exceed 25 ppm.

14 Water, Fodder and Chaff Requirements on Vessels

List of recommendations

- Fodder for cattle and sheep on all long-haul shipments from Australia must include at least 1 per cent of the required feed as chaff and / or hay.
- Fodder for cattle and sheep on all extended long-haul shipments from Australia must include at least 2 per cent of the required feed as chaff and / or hay.

14.1 Current ASEL Standard

Current ASEL standards in relation to fodder, water and chaff are quite lengthy and are contained in Appendix A14.

14.2 2013 ASEL Review

The following comments were included in the Stage 2 Issues Paper on consideration of fodder and additional chaff during the 2013 ASEL Review:

> *"Submissions received from a number of AAVs in 2012-13 noted that the pellets on board are designed for ship delivery systems and not sheep nutrition or digestibility. It was further suggested that the grain starches within the pellets are irregular and often lactic acidosis occurs, predisposing animals to salmonellosis or colibacillosis. Previous successful use of hay and cubes from bails and bags was mentioned, however the practical difficulties of such a feed on board was noted. It was also noted that there is no pellet specification for cattle and buffalo, and the camel specification and the sheep and goat pellet specifications are identical."*

14.3 2018 ASEL Review

In relation to water, fodder and chaff requirements on vessels the TAC has posed the following questions.

- Should paragraph 3A.3.2 (c) be amended as follows:
  - 'For all long-haul and extended long-haul cattle voyages, at least 1 per cent of the fodder required for cattle must be chaff and/or hay.'
- There are a range of issues relating to shipboard fodder requirements being reviewed within Industry. In the interim, are there any other changes to water, fodder and chaff requirements that need to be addressed?
- Should automated water systems be mandatory on all voyages? What would be the cost associated with this change and who should pay?
- Should there be extra fodder provisions for voyages longer than 10 days?

In addition:

- The McCarthy Review recommended that sheep voyages to the Middle East carry 1 per cent chaff. This is now being implemented by the department.
- The McCarthy Review recommended that all sheep vessels have automated livestock watering systems. This has been implemented by the department through the Australian Meat and Livestock (Export of Sheep to Middle East) Order 2018.
- The draft ASEL standard produced in stage one of the current review includes requirements for 7 days reserve fodder to be carried for extended long haul voyages.

The TAC Stage 2 Issues Paper also reiterated the views expressed by AAVs during the LiveCorp / ALEC workshop in late 2016. These are outlined in the following section.

14.4 Relevant Research into Water, Fodder and Chaff Requirements on Vessels

An LEP project entitled '*Review of fodder quality and quantity in the livestock export trade*' was completed in November 2011 by Greg Willis.

Some of the key recommendations from the 2011 project were:

- Changes to the pellet specifications that were standardised across sheep and cattle. These included:
  - Increasing minimum metabolise energy from 8.0 to 9.0 MJ/kg;
  - Changing crude protein from 9 – 12 %, to 10.5 – 12 %;
  - Changing the acid detergent fibre from 18 – 35 %, to minimum 25 %;
  - Decreasing the maximum mineral ash to 11%;
  - Setting a maximum starch of 20 % rather than a maximum wheat, barley, corn component of not greater than 30 %;
  - Decreasing maximum urea from 1.2 % to 0.5 %;
  - A range of other new additions including in relation to other components.
- Increases in the quantity of fodder, in particular increasing the daily intake for adult sheep to 2.75 % of live weight from 2 %, and all cattle classes to 2.5 % of live weight;
- No changes to the contingency / reserve volumes;
- That 1 per cent chaff be loaded for all long-haul cattle voyages, and that 2 per cent chaff be loaded for all cattle voyages over 30 days.

In late 2016, LiveCorp and ALEC coordinated a workshop with AAVs at which a list of technical issues and proposed ways forward were identified. The TAC received a copy of the workshop outcomes in the first stage of the ASEL consultation. The AAV workshop outcomes identified the following.

Table 14.1: AAV workshop in 2016 and "proposed ways forwards" in relation to feed & chaff / hay

Technical Issue	Proposed way forward from AAV Workshop
Pellet specifications	The pellet specifications in ASEL are updated to reflect current industry knowledge. Further research is needed into pellet manufacture and handling systems, to minimize pellets breaking into 'fines'. Feeding oats and cubes instead of pellets is worthy of further research.
Chaff / hay	ASEL is amended so that chaff and/or hay is required for all long-haul cattle voyages rather than just for consignments loaded at a port south of latitude 26°S. The statutory minimum quantity of chaff and/or hay for long haul cattle voyages remains unchanged at 1% of the required feed. Exporters are encouraged to load additional chaff and/or hay with consignments of Jersey and Holstein-Jersey cross heifers (that are prone to premature lactation).

Technical Issue	Proposed way forward from AAV Workshop
Calculating feed requirements for the voyage	Feed available for a voyage is calculated using feed on board at the time of departure, after deducting fodder consumed in port. Feed requirements for a voyage include provision for fodder consumed on board until the last animal is discharged, with three day's additional fodder as contingency for delays and breakdowns. For vessels on their maiden voyage and for extra long-haul voyages, additional fodder is loaded as contingency for delays and breakdowns.
Daily feed requirements for cattle and buffalo	This is a key issue. Feeding has a significant impact on animal welfare outcomes and on commercial outcomes. More work is needed to determine the appropriate minimum statutory feed requirements.

Following the strong focus on fodder at the AAV Workshop, the LEP prepared terms of reference and tendered for a review of the fodder quantity and quality arrangements to update the work completed by Willis. Michael McCarthy was successfully engaged to complete the project.

The current project is specifically addressing fodder quantity, pellet specifications (including particularly the issue of 'fines'), contingency / reserve volumes, chaff volumes, and how fodder requirements should be calculated. The project has included an updated literature review, and comprehensive consultation with AAVs, pellet manufacturers and others in the industry. It has also taken a slightly different approach to assessing fodder needs from Willis by looking at young animals, growing animals and adult animals as separate groupings with different energy and nutritional needs.

Once the project is fully completed, including normal review processes, it will be forwarded to the TAC.

In relation to water, there is little research available specifically related to the livestock export industry. However, it is noted that while sheep and cattle vessels transiting the Middle East largely have automated livestock watering systems, this is not the case for the shorter Asian cattle trade.

It is the view of ALEC that both manual and automated watering systems, if managed properly, can be used to effectively provide water in required quantities to livestock on board vessels. Equally, both systems can experience problems if managed improperly. Rather than specify the technology to be employed, the TAC should specify an outcomes based standard with respect to water.

14.5 Economic Impact of Changes to the Water, Fodder and Chaff Requirements on Vessels

Water

All vessels carrying sheep to the Middle East now have automated livestock watering systems.

A number of cattle vessels, however, operating trades to Asia, still use manual watering systems. There would be a very significant cost in retrofitting these vessels with automated systems.

Fodder

Feeding animals on-board vessels represents a significant cost item for the industry. Basic pellet costs currently range from about $300 / tonne to $600 / tonne depending on location, manufacturer and composition. Based on these costs and average shipments over the last five years, total fodder costs to the industry are about $90 million per annum. A 1% change in the amount of fodder to be carried would impose additional costs on the industry of almost $1 million.

Chaff / hay

Currently ASEL does not require chaff / hay to be included as part of the fodder mix for vessels loaded in northern Australia.

If regulations were changed so that all long-haul voyages had to carry 1% chaff / hay as part of the required feed, and 2% for extended long haul voyages, a cost impact would occur for cattle shipments from northern Australia. For Darwin and other remote ports in Western Australia and Queensland considerable costs are incurred in transporting chaff from elsewhere in Australia due to the lack of local production. The cost of chaff / hay is northern Australia (Darwin) is about $800 / tonne, compared to about $360 / tonne in parts of southern Australia.

It is also to be noted that vessels often have limited capacity to carry additional supplies. Chaff in many ways is similar to bedding – it is bulky, has to be lifted on board vessels using cranes and is stored on deck. Many ships, particularly smaller ships, have limited available (free) deck space and this means that storage can be a problem.

14.6 ALEC RECOMMENDATIONS ON WATER, FODDER AND CHAFF REQUIREMENTS ON VESSELS

Based on a review of the scientific literature, ALEC recommends the following in relation to water, fodder and chaff on vessels:

- Fodder for cattle and sheep on all long-haul shipments from Australia must include at least 1 per cent of the required feed as chaff and / or hay.
- Fodder for cattle and sheep on all extended long-haul shipments from Australia must include at least 2 per cent of the required feed as chaff and / or hay.

APPENDIX 14A – CURRENT ASEL STANDARDS

APPENDIX 4.2 SHIPBOARD RATION SPECIFICATIONS AND PROVISIONING

4.2.1 GENERAL

1) The shipboard ration must not contain more than 30% by weight of wheat, barley or corn, unless the livestock have been adapted to the ration over a period of at least 2 weeks before export.
2) All pelleted feed must be accompanied by a manufacturer's declaration that states it is manufactured in accordance with national pellet standards.
3) All feed from a previous voyage that is suitable for livestock consumption may remain in a feed storage tank provided that:
   a) each tank is completely emptied at least once in every 90 days;
   b) all feed that is no longer suitable for livestock consumption is emptied in its entirety before further feed is loaded; and
   c) records are maintained of the emptying of feed storage tanks and are made available for inspection.

4.2.2 SHEEP AND GOATS

1) Pellets used as the shipboard ration must conform to the nutritional specifications outlined in Table A4.2.1.
2) At the time of departure, there must be sufficient feed and water on the ship to meet the anticipated needs of the sheep and goats during the voyage, plus an additional 25% or 3 days feed and water, whichever is less.
3) Feed and water allowances must be as follows:
   a) for young sheep and goats (up to and including 4 permanent incisor teeth), at least 3 per cent of liveweight of feed per head per day;
   b) for sheep and goats with more than 4 permanent incisor teeth, at least 2% of liveweight of feed per head per day; and
   c) for sheep and goats, at least 4 L of water per head per day, except for days when the ambient temperature is expected to exceed 35°C, when allowance must be made for at least 6 L of water per head per day.
4) Allowance may be made for fresh water produced on the ship while at sea.

TABLE A4.2.1 PELLET SPECIFICATIONS FOR SHEEP AND GOATS

Pellet composition	**Specification**
Moisture content	< 12%
Ash (as a percentage of dry matter)	< 13%
Crude protein (as a percentage of dry matter)	< 12% but > 9%
Urea (as a percentage of dry matter)	< 1.2%
Acid detergent fibre (as a percentage of dry matter)	18-35%
Metabolizable energy	> 8.0 MJ/kg dry matter

4.2.3 CATTLE AND BUFFALO

1) There must be sufficient water on the ship to meet the anticipated needs of the cattle and buffalo during the voyage, plus an additional 3 days water.
2) There must be sufficient feed on the ship to meet the anticipated needs of the cattle and buffalo during the voyage, plus an additional 20% or 3 days feed, whichever is less.
3) When calculating feed and water requirements, allowance must be made:
   a) for at least the quantity of feed shown in Table A4.2.2;
   b) for at least 12% of liveweight of water per head per day:
4) This water allowance may be reduced to at least 10% of liveweight per head per day if water consumption on the ship for each of the previous 3 voyages averaged less than 10% of liveweight per head per day.
5) Allowance may be made for fresh water produced on the ship while at sea.
6) Fodder for cattle exported from an Australian port south of latitude 26° south must include at least 1% of the required feed as chaff and/or hay.

TABLE A4.2.2 FEED SPECIFICATIONS FOR CATTLE AND BUFFALO

Class of cattle and buffalo	**Minimum feed allowance per head per day (%age of live weight)**
Cattle and buffalo weighing less than 250kg	2.5
Breeding heifers with six or fewer permanent incisor teeth (regardless of pregnancy status)	2.5
Pregnant cows	2.5
Other classes of cattle and buffalo	2.0

4.4.9 Feed and water requirements

1) Feed and water must be managed in accordance with standard S4.14 and the Marine Orders Part 43:
   a) with adequate storage space; and
   b) with sufficient protection from weather.
2) The vessel must have adequate capacity to desalinate water or sufficient water storage on board.

STANDARD 5. – Onboard management of livestock

S5.4 All livestock for export must be offered feed and water as soon as possible after being loaded on the vessel, but no later than 12 hours after loading.

S5.5 All livestock on the vessel must have access to adequate water of a quality to maintain good health and suitable feed to satisfy their energy requirements, taking into consideration any particular needs of the livestock species, class and age. In addition:

a) There must be a contingency plan to provide satisfactory tending, feeding and watering of the livestock in the event of a malfunction of the automatic feeding or watering systems, but without compromising the safe navigation of the vessel.
b) Adequate feed and water must be supplied to livestock waiting to be discharged, and during the discharge period.

15 ON-BOARD PERSONNEL, ANIMAL MANAGEMENT AND CARE

LIST OF RECOMMENDATIONS

- It is critical that exporters ensure that there are sufficient, competent personnel on-board, particularly accredited stock people, to ensure that livestock receive the necessary care and oversight.
  - Requirements relating to the number of accredited stockpeople required on a vessel / consignment should be expressed as an outcomes based standard (perhaps with guidance), rather than a prescriptive regulatory limit.
- The requirement for an AAV to accompany a voyage should reflect the extent of veterinary care and supervision needed, proportionate to the risk of the journey and the likely animal health issues that may be faced.
  - The current arrangements relating to AAVs should be retained to provide the department with the discretion to place AAVs on voyages as it sees appropriate, according to risks. The wording / scenarios encompassed in Export Advisory Notice 2016 – 14 is supported as an appropriate reflection of when AAVs are required.
- With respect to the Independent Observer Program the following recommendations are made:
  - Much greater clarity is required on the roles and responsibilities of Independent Observers and the objectives of that program.
  - Normal risk based principles of good regulation should be applied to the use of Independent Observers rather than a blanket prescription across all voyages. ALEC understands that the current blanket approach may be useful in obtaining an overall picture of compliance risk – but given this picture has now been obtained the future allocation of Independent Observers to voyages should be limited and based on risk.
  - Efforts should be made to avoid duplication with the role of AAVs given they are a regulated entity – for example, consideration should be given to whether AAVs can deliver all or part of the functions of Independent Observers on vessels (for example, reporting or collection of data).
  - Best practice regulatory approaches should be adopted in which required outcomes sought from the Independent Observer Program are identified in regulation, but the means of achieving these outcomes is left for the market to determine. Scope should be provided for achieving the purposes of the Program through other mechanisms e.g. the employment of monitoring technology. Automated (tamper proof) monitoring may offer several advantages over human monitoring such as providing an historical record of events free of interpretation of a human observer.

15.1 CURRENT ASEL STANDARD

In relation to on-board personnel the current ASEL standard specifies the following:

- *Standard 4.5 – An accredited stockperson who is employed or contracted by the exporter and who is not ordinarily a member of the ship's crew must be appointed to accompany each consignment of livestock for export to its destination. In addition, if required by the relevant Australian Government agency, an accredited veterinarian must be appointed to accompany the consignment.*

  (Accredited stockperson means a stockperson who is accredited by LiveCorp for the shipboard husbandry of livestock)

- *Standard 4.6 – Sufficient personnel must be available both at loading and during the voyage to ensure that livestock husbandry and animal welfare needs are addressed.*

In addition, in mid-2018 the Minister for Agriculture and Water Resources introduced a requirement that an Independent Observer travel on all shipments from Australia. The department is yet to specify the objective, roles, responsibilities and reporting from this program

15.2 2013 ASEL REVIEW

The ASEL Review Steering Committee sought to expand on the requirement that sufficient personnel must be available both at loading and during the voyage to ensure that livestock husbandry and welfare needs are addressed by adding the following requirement:

(a) At least one accredited / approved stockperson is to be allocated per 2,500 to 3,000 head of cattle or 40,000 to 60,000 head of sheep.

The review identified the following options in relation to AAVs:

- Option 1 – status quo

  (b) If required by the department, an accredited veterinarian must be appointed to accompany a consignment.

- Option 2

  (b) An accredited veterinarian must be appointed to accompany all long haul voyages, extended long haul voyages and voyages with pregnant livestock. If required by the department, an accredited veterinarian must be appointed to accompany a short haul voyage.

- Option 3

  (b) An accredited veterinarian must be appointed to accompany all consignments.

15.3 AUSTRALIAN LEGISLATION

The *Export Control (Animals) Order 2004* states:

> 2.48 (1) the Secretary may require, as a condition of the approval of an export program, that livestock the subject of an export program are to be accompanied on their export voyage by an accredited veterinarian.
>
> Note. Failure to comply with such a requirement is an offence – see the Act, section 9J.
>
> 2.48 (2) For the purpose of deciding whether or not to impose a requirement under subsection (1), the Secretary may take into account any relevant matter including:
>
> (a) the relevant importing country requirements; and
> (b) the exporter's record as an exporter of livestock; and
> (c) the condition of the vessel on which the livestock are to travel; and
> (d) the weather and time of year; and
> (e) the kind of livestock being exported; and
> (f) market considerations.

EAN 2016 – 14 specifies the situations that the department will require an AAV, being

(a) If the vessel is travelling to or through the Middle East;
(b) If the vessel is new (or recently renovated);

(c) If the consignment is the first consignment for a particular exporter;
(d) On a case-by-case basis as determined by the department.

15.4 2018 ASEL Review

In relation to on-board personnel, animal management and care, the TAC has posed the following questions:

- In addition to the ship's crew, which on-board personnel should accompany livestock export consignments? Should this apply to all consignments? Please provide detail.
- Should the current requirements in the standards be amended and, if so, what elements should be changed?
- What is your view of the three options for AAVs accompanying voyages proposed during the 2012-13 review, and why?
- Does the requirement for Independent Observers now in place modify or change the need for AAVs to accompany some or all voyages?
- What do you believe the roles and responsibilities of the following personnel should be, and why?
  - AAVs
  - Stockpersons
- If AAVs are to be placed on more or all voyages, what is the additional cost and who should pay?
- Is it a practical requirement for stock handlers on-board to be able to observe all animals at all times during a voyage? If not, what requirement should exist to ensure animal health and welfare is appropriately monitored during a voyage?

15.5 Relevant information relating to on-board personnel, animal management and care

The LEP has completed a range of RD&E related to on-board personnel, including:

- Stockpeople – there have been several reviews of the LiveCorp stockperson training program and recently the development of an Advanced Stockperson Professional Development Program.
- AAVs – An AAV workshop was held in Melbourne in 2016, followed by an AAV RD&E Forum in 2017. LiveCorp also produces a biannual e-newsletter for AAVs on developments in the industry and the LEP commonly requires researchers engage with AAVs in preparing reports.
- Crew – DVDs on stock handling were produced for on-board crew for sheep and cattle vessels. These DVDs are available in multiple languages commonly spoken by the crews of livestock vessels.

A project to review the on-board veterinary kit within ASEL is underway. This project will also assess the likely health issues for common journeys and determine the necessary competencies to identify and treat these.

On-board accredited stockpersons and AAVs play a critical role in the management of the health and welfare of livestock throughout the export journey. For the successful outcome of voyages, it is essential that these roles are not jeopardised, compromised or over complicated. The roles and responsibilities outlined in the existing ASEL remain largely relevant and effective, however there is room for refinement and clearer definition – particularly in light of the introduction of Independent Observers.

The AAV, accredited stockpersons and the officers and crew of the vessel all contribute to the health and welfare of the livestock. However, the contribution and skills of the officers and crew of the vessel are commonly overlooked.

15.5.1 Accredited stockpersons

LiveCorp runs the accreditation program for on-board stockpersons which undergoes continual review and improvement. Most recently, in 2017 the stockpersons training course was reviewed and updated and an Advanced Stockperson professional development program was developed. Both courses place strong emphasis on balancing technical knowledge, practical skills and crew culture to foster effective working outcomes.

From a regulatory perspective, it seems unnecessarily prescriptive to set absolute limits of the type proposed in the 2013 ASEL Review draft standards (relating to the ratio of stockpersons required to the number of livestock). Such prescription does not take into account different levels of skills, experience and work ethic. Further, such prescription appears likely (even in the current wording) to lead to unnecessary costs and complexity from perverse outcomes and unexpected situations. ALEC notes that based on the input of members the allocation of "*at least one accredited / approved stockperson is to be allocated per 2,500 to 3,000 head of cattle or 40,000 to 60,000 head of sheep*" seems high. On a G-class vessel, for instance, of 4,500 square metres one stockman is sufficient even if issues are encountered.

It is critical that exporters ensure that appropriately skilled / competent personnel are on-board to provide care for the livestock; however, if the ASEL standards complied with best practice regulations, these requirements should be expressed in an outcomes based standard.

15.5.2 Australian Accredited Veterinarians (AAVs)

Australian Accredited Veterinarians (AAVs) are accredited by Animal Health Australia and regulated by the department. There would be value in providing further training for AAVs before they commence on-board work to ensure they are comprehensively prepared for their role.

The *Export Control (Animals) Order 2004* provides the department with a defined discretion – with specific factors to consider – for when an AAV is required. The department – as part of its transition to Approved Arrangements – issued an EAN (2016-14) detailing its position of when AAVs are required, including when it will decide whether they are required on a case-by-case basis. The situations where an AAV would be required as per the EAN (2016-14) are risk based and appear to provide a sensible balance between discretion and regulatory certainty.

It is noted that there would be significant logistical challenges associated with options 2 and 3 from the 2013 ASEL Review as the pool of on-board AAVs (a position where it can be difficult to attract veterinarians) may not be sufficient to meet demand.

Furthermore, for short haul voyages, because of accommodation restrictions for personnel it would likely be necessary for the AAV to also act as the accredited stockperson. Such an approach would effectively shift employment from stockpersons to AAVs – having a subsequent impact on costs and reduced rural / regional employment opportunities.

It is also noted that there have been suggestions proposing greater independence in the allocation of AAVs and their relationship with exporters.

LiveCorp indicated in its submission to the Moss Review that:

Clarity is needed in such discussions on whether any proposed changes are to address a failing in the existing structures (and if so, what) or primarily to overcome perceptions of conflict. This is important to avoid such discussions implying that AAVs have not acted appropriately in discharging their duties under the export legislation and professional codes.

The concept of introducing independence for AAVs is a more complicated discussion than may be first realised, with potential implications for exporters, AAVs and animal welfare. AAVs are crucial members of the on-board management and decision making processes and play a critical role towards the success of a voyage and providing for the welfare of livestock. These roles extend off the ship into the land based supply chains and the preparation and inspection of livestock. AAVs that attended a consultative workshop in 2016 held by LiveCorp identified that where possible, a shipboard AAV should be part of the exporter's management team. There was a view from that workshop that AAVs can more positively influence the outcomes of a shipment when they have built consignment preparation knowledge / relationships and are part of the exporter's team rather than being employed as an independent contractor that is tasked with managing a component of the exporters supply chain.

There are different levels of experience, skills and work ethic approaches in every profession – including for AAVs. Allowing exporters to select the AAV that is best suited to the voyage and reward performance is an important consideration in any structure that would change the current role or engagement of the AAV. There is value in balancing independence with the ability for professional relationships to create improved performance.

15.5.3 Independent Observers

Following the recent poor footage on-board a live sheep vessel, the placement of Independent Observers on livestock voyages by the Minister may play a role in rebuilding community trust in the industry and demonstrating what 'normal' shipments are like.

However, greater regulatory clarity is required as to the purpose, roles and responsibilities of the Independent Observer Program.

As McCarthy noted in his review, there is a critical need for more clearly defined roles and responsibilities for on-board personnel – including the function of Independent Observers, the skills required, and how they interrelate / integrate with the existing on-board personnel.

There are also significant logistical and technical challenges associated with the implementation of the program with the lack of clarity causing confusion / dissonance in the overlapping roles and expertise on-board between the Independent Observers and the AAVs. Further logistical challenges exist in the task of rolling the program out across all shipments as the department has limited numbers of staff with the capability to act as an Independent Observer, and the smaller vessels primarily have no spare accommodation and therefore a crew member would have to leave the vessel for the Independent Observer to join which could jeopardise animal welfare.

Apart from clarifying the purpose, roles and responsibilities for the Independent Observer Program, scope should be provided for achieving the purposes of the Program through other mechanism e.g. the employment of monitoring technology. Again this suggests merit in adopting a best practice regulatory approach in which required outcomes are identified in the regulation, but the means of achieving these outcomes left for the market to determine.

Within the current framework, Independent Observers are best suited to performing an auditing / verification function with their core function being confirming / verifying and building confidence in

the systems / structures through which the department receives reports from AAVs and / or stockpersons, and obtaining first hand observations to support standard setting / confirmation of reporting. If the observers were used for primarily an auditing / inspector role, best practice auditing principles could be applied – for example, rather than a continued presence on vessels their use could be determined to reflect a strategic risk based schedule, including random placements. A risk based approach would be consistent with best practice regulation and enable both logistical efficiency and effectiveness in the use of limited resources.

Consideration should also be given to whether AAVs can deliver all or part of the functions of Independent Observers on vessels (for example, reporting or collection of data).

15.6 Cost impact of changing on-board personnel, animal management and care

The cost impact from implementing Independent Observers on all voyages from Australia is significant. ALEC estimates that the annual costs of having Independent Observers on every vessel is $6.4 million. This estimate is based on the following live export voyage information, drawn from average data for live exports over the last 5 years, and information on the costs of Independent Observers:

- Average annual voyage days: 3,650 days.
- Average annual number of voyages: 302
- Daily rate for an Independent Observer: $1290 per day
- Allowance for business class airfare: $3,000 per voyage
- Allowance for report writing: 2 days.

Voyage days and consignment numbers have been derived from the DAWR reports to Parliament. Salary data for the Independent Observers is taken from a departmental estimate for a 7.5 hour day.

The above estimate does not include over time work for the Independent Observers.

In relation to AAVs, the impact of Options 2 and 3 from the 2013 ASEL Review would be significant and the evidence / assurance of improved animal welfare / health outcomes to support the cost burden does not appear to exist.

The annual cost of applying option 3 from the 2013 ASEL Review is estimated as follows:

- Average annual voyage days once voyages to the Middle East / North Africa, China, Russia and Pakistan are removed: 1,320
- Average annual number of voyages once the Middle East / North Africa, China, Russia and Pakistan have been removed: 242.
- An AAV rate of $900 / day has been assumed.
- An estimate of $800 has been included for economy class airfares.

Based on the assumptions above implementing Option 3 in 2017 would increase annual costs by $2.3 million.

15.7 ALEC recommendations on on-board personnel, animal management and care

- It is critical that exporters ensure that there are sufficient, competent personnel on-board, particularly accredited stock people, to ensure that livestock receive the necessary care and oversight.
  - Requirements relating to the number of accredited stockpeople required on a vessel / consignment should be expressed as an outcomes based standard (perhaps with guidance), rather than a prescriptive regulatory limit.

- The requirement for an AAV to accompany a voyage should reflect the extent of veterinary care and supervision needed, proportionate to the risk of the journey and the likely animal health issues that may be faced.
  - The current arrangements relating to AAVs should be retained to provide the department with the discretion to place AAVs on voyages as it sees appropriate, according to risks. The wording / scenarios encompassed in Export Advisory Notice 2016 – 14 is supported as an appropriate reflection of when AAVs are required.
- With respect to the Independent Observer Program the following recommendations are made:
  - Much greater clarity is required on the roles and responsibilities of Independent Observers and the objectives of that program.
  - If the role of Independent Observers is related to auditing / inspection, then normal risk based principles of good regulation should be applied rather than a blanket prescription across all voyages.
  - Efforts should be made to avoid duplication with the role of AAVs given they are a regulated entity – for example, consideration should be given to whether AAVs can deliver all or part of the functions of Independent Observers on vessels (for example, reporting or collection of data).
  - Best practice regulatory approaches should be adopted in which required outcomes sought from the Independent Observer Program are identified in regulation, but the means of achieving these outcomes is left for the market to determine. Scope should be provided for achieving the purposes of the Program through other mechanisms e.g. the employment of monitoring technology. Automated (tamper proof) monitoring may offer several advantages over human monitoring such as providing an historical record of events free of interpretation of a human observer.

16 REQUIREMENTS FOR VULNERABLE/SPECIAL CLASSES OF ANIMALS

ALEC recommendations for vulnerable and special classes of animal are contained throughout this submission. A series of recommendations were included in Chapter 11 which are repeated below:

- For pregnant Bos Taurus cattle the space allocation be 10% above levels that would otherwise apply.
- Space allocations for Bos Taurus cattle sourced south of the 26th parallel and shipped to or through MENA during the northern summer should be further considered in the context of thermoregulatory needs.
- If cattle 500kg lw or over are exported they should be provided with additional space in the order of 10%.
- Animals with horns should be penned together with additional space of 10%. All horned cattle must at least be tipped.
- Where an animal belongs to two or more vulnerable and special classes the maximum additional space allowance should apply (the individual elements should not be compounded to calculate a space allowance).
- Noting that the cut off values for additional space to be provided to vulnerable and special classes of livestock have not been well researched, additional space allocations should be examined and updated as further research is finalised.