

# Stage 2: Draft report

Review of the Australian Standards for the Export of Livestock

Technical Advisory Committee



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## Introduction

### Australian Standards for the Export of Livestock

The first Australian Livestock Export Standards were developed in 1996–97 by industry. These were in place from 1998 until 2005, when the first version of the Australian Standards for the Export of Livestock (ASEL) were released, following a recommendation made by Dr John Keniry in his 2003 review of the live export trade. Since that time, the ASEL has set the animal welfare standards for the export of livestock from Australia by sea and by air.

The ASEL is given effect under the *Australian Meat and Live–stock Industry (Standards) Order* 2005, and is referenced in instruments including the *Export Control (Animals) Order 2004*. Exporters must comply with the ASEL to be permitted to export livestock by the Department of Agriculture and Water Resources (the department).

Four versions of the ASEL have followed since 2005, with the current version, ASEL v2.3, in place since 2011. It covers the major steps along the livestock export supply chain, including:

* Sourcing and on–farm preparation of livestock.
* Land transport of livestock for export.
* Management of livestock at registered premises.
* Vessel preparation and loading.
* On–board management of livestock.
* Air transport of livestock.

The standard currently applies to exports of cattle, sheep, goats, buffalo, deer and camelids.

### This review

The last significant review of the ASEL was undertaken in 2012–13, following the *Independent Review of Australia’s Live Export Trade* conducted by Mr Bill Farmer AO (the Farmer Review). The review was undertaken by a steering committee made up of representatives from state and territory governments and animal welfare, veterinary, livestock producer and industry representative organisations. The steering committee provided its final report in May 2013, recommending improvements to both the content and format of the standards and providing an incomplete draft version of the standard. There were 13 unresolved issues and the draft standard was not implemented.

In 2017, the government announced the current review process to ensure the standards remained fit for purpose and continue to be supported by the latest scientific research. A Technical Advisory Committee (the committee) was appointed to undertake the review process. The committee’s full handbook (describing its role and operation) is available on the department’s website, but in summary, the committee is to:

* make recommendations to the department aimed at ensuring all livestock that enter the supply chain are fit for export and maintain their health and welfare status throughout the export voyage
* carry out the review to facilitate the continuous improvement of the standards, considering new animal welfare research and innovations in industry practices in a timely manner
* facilitate contemporary outcomes based regulation which will allow flexibility in achieving the required animal health and welfare outcomes, encourage innovation in industry practices and adoption of relevant technological improvements
* ensure the recommendations align with the guiding principles of the committee.

To achieve these objectives, the committee is to:

* conduct public submissions processes to ensure all interested stakeholders have the opportunity to provide input to the standards
* ensure all technical issues, new research and scientific knowledge submitted by stakeholders relating to ASEL are properly considered and independent expert advice sought as necessary
* examine a range of viable, genuine, policy options
* clearly analyse the benefits and costs of the proposed options for affected stakeholders in a balanced and objective manner, with particular regard to the practicalities of livestock management and implications for animal welfare in Australia
* review the format of the standards and ensure they are written in line with best practice regulatory principles and other relevant standards and provide recommendations to the department where improvements may be adopted.

#### Conduct of the review

Stage 1 of the review process commenced in 2017 (Table 1). On 6 February 2018, the committee released an issues paper and a proposed reformatted version of the standard for consultation. The committee received 19 submissions, and based on those views, identified a set of key issues that needed to be resolved in later parts of the review. It also endorsed the reformatted version of the standards for further use in the review process. The committee’s Stage 1 report is available on the department’s website.

In April 2018, the government commissioned a short and sharp review into the standards for sheep exported during the northern hemisphere summer. Dr Michael McCarthy was engaged to advise on conditions (as specified in approved arrangements), any changes to the administration of ASEL and/or any actions that would be required to assure health and welfare outcomes for sheep being transported to the Middle East during the northern hemisphere summer. The final report was provided on 11 May 2018; the government supported the 23 recommendations made in the report. The department has implemented a number of measures to give effect to the recommendations. The committee has considered the recommendations where relevant to the standards in its review.

Around the same time, the Minister for Agriculture and Water Resources, the Hon. David Littleproud MP, announced that the timeline for the ASEL review would be accelerated, to conclude at the end of 2018. In response to this, the scope of the review was adjusted to exclude matters relating to export by air. These issues will be addressed in a later process.

Stage 2 of the ASEL review formally commenced in August 2018, with the release of a further issues paper seeking comment on the key areas of contention raised in Stage 1 of the process. The consultation period closed in September 2018.

***Table 1: Review process***

|  |  |
| --- | --- |
| **Date** | **Activity** |
| July 2017 | Commitment to undertake review, call for committee members. |
| February 2018 | Stage 1 issues paper released, including draft reformatted standard. |
| March 2018 | Submissions closed. |
| April/May 2018 | Stage 1 finalised. |
| 17 May 2018 | McCarthy Review report released. |
| 24 May 2018 | Minister for Agriculture and Water Resources, the Hon. David Littleproud MP, announced that the timeline for ASEL review would be accelerated. |
| 23 August 2018 | Stage 2 issues paper released for consultation.  Stage 1 report released. |
| 19 September 2018 | Submissions closed. |

#### Out of scope

As noted above, the current stage of the review is focussed on the export of livestock by sea. Matters relating to export by air will be considered at a later stage. The committee’s terms of reference also exclude the following matters:

* expanding the scope of the standards within the supply chain
* assessing other livestock export licencing and regulatory arrangements such as approved arrangements and the Exporter Supply Chain Assurance System (ESCAS)
* examining legislation enabling livestock exports, with the view to amending it
* reviewing the Australian Position Statement on the Export of Livestock which is located at the front of the ASEL v2.3
* assessing the implementation and compliance by individual exporters
* commenting on the suitability of domestic animal welfare standards for livestock
* seeking endorsement of recommendations after providing them to the department, or drafting final orders
* considering the role of independent observers
* considering the framework by which Australian Government Accredited Veterinarians (AAVs) or accredited stockpersons are engaged
* considering the Heat Stress Risk Assessment Model, which is subject to a separate review process.

#### Stage 2 submissions

A report on submissions from Stage 1 of the review is available on the department’s website.

The committee’s Stage 2 issues paper sought feedback on the significant issues identified in Stage 1 of the review, as well as the unresolved matters from the 2012–13 ASEL review process, and recommendations from the McCarthy review into live sheep exports to the Middle East. Submissions were sought over a four week period from 23 August to 19 September 2018.

The submission process was advertised on the department’s website and via a departmental media release. A number of alerts and reminders were issued via social media platforms such as Twitter. The committee also made contact with members of the Stakeholder Reference Group, state and territory governments (via the Animal Welfare Task Group under the Agricultural Senior Officials’ Committee) and with the AAVs.

The committee received 41 submissions. Of those, 12 were from businesses involved in the livestock export industry, five were from animal welfare organisations and 12 were from representative bodies, peak industry bodies and service providers in agriculture. The remainder were from individuals and other businesses. Some submissions focussed on particular issues, but most addressed the full range of issues raised in the committee’s issues paper.

Where agreed by the individuals concerned, submissions have been made available on the department’s website at: agriculture.gov.au/animal/welfare/export–trade/review–asel.

### This report

The committee has adopted the principle that national minimum standards should ensure consistent welfare outcomes and provide industry participants with clear criteria for meeting their duty of care to the animals they manage along the export supply chain. The standards must, to the maximum extent possible, be evidence-based and, where available, supported by contemporary science relevant to Australian systems and the conditions faced during voyages from Australia. They also need to be enforceable. As required by the Terms of Reference, in developing its views, the committee has sought to balance implications for livestock welfare with the practicalities of livestock management, compliance costs and industry sustainability.

This draft report addresses each of the outstanding issues raised in the Stage 2 issues paper. For each issue, the draft report notes the approach taken in the reformatted standard released with the issues paper, summarises the debate in submissions and outlines the committee’s deliberations. A draft recommendation is provided for each issue.

#### Working draft standards

The committee’s Terms of Reference require it to review the format of the standards. In earlier stages of the review process the committee proposed a reformatted version of the standards. A further version of that document—referred to as the working draft reformatted standard—has been prepared to accompany this draft report. It incorporates the committee’s draft recommendations and is provided to assist with the next stage of consultation. The working draft standard can be found on the *Have your Say* website.

In the reduced time available for the review, it has not been possible to explore alternative regulatory models in detail. The committee’s view is that options for moving towards a more outcomes-based regulatory approach should remain a goal for future stages. The committee is also mindful of other reviews and work underway, such as the review of the heat stress risk assessment model and the Moss Review. These processes may well result in further changes.

There is merit in amending the standard once; or at least as few times as possible. Those subject to complying with the regulations should not have to learn a new regulation every couple of months. Pending the finalisation of those other reviews, and the review of the standards for air transport, the department could incorporate the committee’s recommendations into the current format of the standard. This may be less onerous on both the regulator in legislative drafting, and those subject to the standard in learning a new format as well as the new requirements.

#### Matters for monitoring

The committee has made its recommendations based on the available evidence. However, in a number of areas the report suggests that the approach be further reviewed in light of research that is currently in progress, or data obtained following implementation of the new requirements. For example:

* A review of pregnancy testing requirements for cattle once national standards for pregnancy testing cattle are in place.
* Application of new stocking densities; review in light of performance and current research.
* Application of an allometric model using a k-value of 0.033 when determining stocking densities for the export of sheep to the Middle East between May and October; review after several northern hemisphere summers.
* Testing criteria for a heat stress risk assessment; revise based on outcomes from the review of the heat stress risk assessment model.
* Mortality rates; review in approximately 12 to 18 months in light of voyage data and the use of average daily mortality rates.
* The use of panting scores in daily reports; review in approximately 12 to 18 months and adjust based on the outcomes of the heat stress risk assessment review process, and any resultant ‘heat stress indicators’.
* Bedding for sea exports; review in 12 to 18 months in light of research being commissioned by the Livestock Export Program.
* Fodder required for sea exports; review without delay once current studies into fodder quality, quantity and pellet specifications are completed.

The committee recommends that the department establish a regular process for accommodating these and other changes. As noted in the section on voyage reporting, the committee also recommends an epidemiological approach to analysing data obtained through daily and end-of-voyage reports to identify changes that should be accommodated in the standards more generally.

#### This consultation, and next steps

The committee is now keen to test its draft recommendations with stakeholders and welcomes submissions from stakeholders.

It is particularly interested to receive advice on factual misunderstandings in the report or new information that may influence final views. The committee is also keen to hear about implementation concerns and cost issues.

Submissions are due by **close of business, 27 November 2018**. For information on the submission process, visit the department’s *Have your Say* website.

The committee will consider submissions in finalising its report, which is due to be provided to the department by the end of the year.

## Sourcing and preparation

The way in which livestock are sourced and prepared for export has a significant impact on health and welfare outcomes during the export voyage. Several sourcing and preparation issues were identified in Stage 1 of the review for further consideration in Stage 2. These are discussed below.

### Sourcing *Bos Taurus* cattle

#### Current requirement

Suitability for export varies between different types of animals. For cattle, the reformatted standard released with the issues paper imposed a number of restrictions on sourcing *Bos taurus* for export to the Middle East at times when they are likely to experience more extreme heat. These restrictions are summarised below.

***Table 2: Sourcing Bos taurus cattle***

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| **Summary of requirement in reformatted standard (issues paper)** |
| *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 the reformatted standard. |
| *Bos taurus* cattle with a body condition score of five (5) or more must not be sourced for export from or through any area north of latitude 26° south from 1 October to 31 December (inclusive). |

#### Discussion

A number of submissions discussed the risks of sourcing *Bos taurus* cattle from areas south of latitude 26° south. There were different views on acclimation and the need for a heat stress risk assessment, as well as timing (May to October) and relevant voyages for which a heat stress risk assessment should be required.

Some submissions argued that there should be prohibition on sourcing this class of cattle for export to areas north of the equator between May to October. Others referred to the work by Perkins et al (2015), *Identifying the causes of mortality in cattle exported to the Middle East*, which found that heat stress was not the major cause of mortality for cattle exported to the Middle East, but that it was still a risk that needed to be effectively managed. Some submissions agreed that the provision should continue to apply for voyages to the Middle East. Others suggested the requirement should be broadened to include voyages through waters in the Arabian Sea north of latitude 11° north, during May to October. This geographical definition would take into account destinations in the Middle East, North Africa, Pakistan and Turkey.

In relation to sourcing fatter cattle for export into areas where they may experience more extreme heat, submissions tended towards a body condition score of 4.5 or 5 as an appropriate upper limit.

The independent literature confirmed the importance of sourcing livestock breeds that are suited to travel conditions, including selecting animals that have been acclimatised to warm weather conditions if they are to be transported through climatic zones of high temperature and humidity (Adams and Thornber 2008). The review also confirmed there are pronounced differences in capacity to withstand heat load between cattle breeds, with the most dramatic being between *Bos taurus* and *Bos indicus* cattle. It referred to data from Moore et al (2003) which showed that mortality rates due to heat load in *Bos taurus* and *Bos indicus* animals under identical conditions were 38.4 per cent and 0 per cent respectively.

#### Committee view

*Bos taurus* cattle sourced from southern Australia are at greater risk of heat stress than *Bos indicus* cattle. The standards recognise this by requiring an agreed heat stress risk assessment for higher risk voyages at certain times of the year. While some submissions suggested that *Bos taurus* cattle should not be sourced from south of latitude 26° south for export during May to October, others claimed that the existing heat stress risk assessment requirement had resulted in considerable improvement since being introduced in 2004. On balance, the committee considered that the export could continue, subject to appropriate risk management measures.

While the current provisions refer specifically to voyages to the Middle East, the committee’s broader view regarding heat stress risk assessment is that it should apply to any voyage crossing the equator. This decision is discussed further in Section 4 of this draft report and should also be reflected in the provisions relating to sourcing of *Bos taurus* cattle from southern parts of Australia.

The committee also considered there should be a prohibition on the export of pregnant *Bos taurus* cattle during northern hemisphere summer period if they are sourced from an area of Australia south of 26° south. Those cattle must be certified as not detectably pregnant.

Regarding the sourcing of heavy *Bos taurus* cattle for export from or through any area of Australia north of latitude 26° south, from 1 October to 31 December (inclusive), the committee accepted that the requirement remain. The body score in that provision should, however, be adjusted to ‘four or more’ given the new body scoring system that has been recommended as part of the minor amendments.

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| **Draft recommendations:**   1. That the standards prevent *Bos taurus* cattle from an area of Australia south of latitude 26° south being sourced for export on voyages that will cross the equator between 1 May to 31 October (inclusive), unless an agreed livestock heat stress risk assessment indicates the risk is manageable.   [*Note: if Recommendation 23 is accepted, this specific provision would not be required, as the heat stress risk assessment requirement would apply for these and all other voyages.*]   1. That the standards prevent pregnant *Bos taurus* cattle being sourced for export on voyages that cross the equator from 1 May to 31 October (inclusive). 2. That the standard prevent *Bos taurus* cattle with a body condition score of four (4) or more being sourced for export from, or exported through, any area of Australia north of latitude 26° south from 1 October to 31 December (inclusive).\*   \* Note, new body condition scoring system for beef cattle goes from 0-5. |

### Shearing sheep and hair sheep

#### Current requirement

Wool length has previously been identified as a factor which influences an animal’s ability to tolerate heat on an export voyage. The reformatted standard released with the issues paper included requirements which aim to ensure that sheep have a short fleece. It also set timeframes around how close to export a sheep could be shorn, with shorter timeframes permitted for sheep that are held in sheds at the registered premises.

***Table 3: Shearing sheep for export by sea***

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| **Summary of requirement in reformatted standard (issues paper)** |
| Wool cannot be more than 25mm in length. |
| Sheep must either be 10 days or more off shears when sourced, or shorn during the 10 day period before export and accommodated in sheds on the registered premises. |

#### McCarthy review

The wool length of sheep is one of many factors used in calculating space and heat stress probability on voyages (to the Middle East in the northern hemisphere summer). Sheep that are ‘off shears’, that is sheep that have been recently shorn, are more tolerant to heat. Dr McCarthy strongly recommended wool length categories are looked at in regards to the HSRA model and that sourcing of sheep that are ‘off shears’ be investigated as a condition of an approved arrangement.

#### Discussion

Acceptable wool length and time off shears were discussed in a number of submissions. Most submissions agreed that shorter fleece increased the capacity to withstand heat, with 25mm generally accepted as an appropriate limit to include in the standard. The relationship between time of shearing and export was also discussed, with time off shears promoted as a strategy for managing risks associated with shearing (injuries and stress) and for allowing animals to rest and access feed and water before commencing the loading process. The benefits of allowing the protective lanolin coat to re–establish was also mentioned. But there was not a consistent view on what constituted adequate time off shears, with views ranging from one clear day through to 10 days or more.

Most submissions agreed that hair sheep breeds are more heat tolerant than wool sheep breeds, and most agreed that those sheep did not need to be shorn. However others stated that exporting any sheep with wool or hair over 25mm was an unacceptable risk.

The independent literature review referred to studies and anecdotal evidence which confirm the relationship between shearing and improved heat tolerance. For example, Beatty *et al.* (2008a) found that fleeced sheep maintained higher core and rumen temperatures and respiratory rates than shorn sheep under all environmental conditions. In relation to stresses associated with shearing, the literature review discussed a study performed by Murdoch University which examined feeding and watering behaviours of sheep after shearing. That study found minimal behavioural change in terms of time spent at the feed or water trough post–shearing (Collins et al, 2018, pp65–66). The literature review, and several submissions, referred to studies on the stress of shearing. One demonstrated that the use of cognitive bias may indicate shearing was an acute stressor (Sanger 2011) . Another concluded there was no difference in observed feed and water behaviour of sheep shorn over a six day period in a registered premises (Aguilar Gainza 2015).

#### Committee view

The committee considered a number of options for shearing, including different requirements that should apply depending on whether sheep are held in a paddock or shed at the registered premises.

The committee agreed to retain the requirement that sheep have no more than 25mm of wool at the time of export. Submissions did not provide significant evidence to suggest that approach was inappropriate for wool sheep. But there were a range of views on whether the requirement should apply to hair sheep. There appears to be a genetic correlation between hair sheep, lower body fat, a concentration of fat around the tail area and a higher level of heat tolerance. This is evident in sheep that are common to the Middle East. No evidence was presented in submissions to support hair removal as a measure to increase heat tolerance in those sheep, which are not generally shorn. The committee therefore agreed to retain the existing approach, with the 25mm limit applying only to wool sheep. However, if cross–bred sheep become a component of the trade, evidence will need to be provided in support of heat tolerance capability.

The committee did not accept that there should be discretion for the department to allow the export of sheep with more than 25 mm of wool.

For sheep held in paddocks, the committee agreed to retain the requirement that they be ten or more days off–shears when sourced. This is an important safeguard against cold stress/hypothermia should extreme cold, wet and windy weather be encountered during preparation.

Sheep held in sheds at a registered premises can currently be shorn within the 10 days prior to export. Exporting immediately after shearing does carry some risks in relation to time available for minor shearing cuts or injuries to be adequately healed. It is not realistic to expect that these will all be picked–up at pre–export inspection, and there may be a risk of subsequent infection on board the vessel. An appropriate period of time should be provided between shearing and export to assist in managing this risk. The committee also noted the potential to reduce minor cuts/leg injuries and infections by not shearing the distal legs. It recommends that industry consider this option in terms of best practice for further monitoring. The committee also noted the potential for more vigilance in terms of shearing cuts/injuries to legs as a rejection criteria.

Contrary to some concerns presented to the committee, sheep have been shown to recover quickly from shearing–related stresses.

Under existing requirements, there is no minimum time between shearing and loading for export. The committee considered a number of options taking into account the pre–shearing curfew period and pre–loading curfew period and the need for time for the rumen to ‘kick start’ following this. To manage the risk, the committee determined to require at least one clear day between shearing and loading for export, during which the animals are held in a pen with full access to feed and water. The day of shearing and the day of loading must not be part of the clear day (refer definition of ‘clear day’ at Recommendation 9).

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| **Draft recommendations:**   1. That the standards require that sheep to be exported by sea have no more than 25mm of wool, with hair sheep excluded from that requirement given their natural tolerance for heat and lack of information on the stresses associated with shearing those animals. 2. That for sheep held in a paddock at the registered premises, the standard continue to require that they be 10 or more days off–shears when sourced. 3. That for sheep held in sheds at the registered premises, the standard require they be given at least one ‘clear day’ between shearing and loading for export. (*Note: refer definition of ‘clear day’ at Recommendation 9*). 4. That industry investigate potential to reduce leg cuts/injuries and infections by not shearing the distal legs, and accommodate in best practice arrangements for further monitoring. |

### Threshold weights of cattle and buffalo

#### Current requirement

It is generally agreed that heavier animals are at greater risk of injury and lameness during sea voyages due to the increased stresses associated with their weight. The reformatted standard released with the issues paper addressed this risk for cattle and buffalo by specifying threshold weights, outside which special approvals are required for export. For cattle and buffalo, the weight range is 200kg to 650kg inclusive.

Export Advisory Notice 2016–12 provides the detail on arrangements that apply for cattle and buffalo exports above 650kg, requiring a heavy cattle management plan to be agreed with the department.

#### Discussion

While there was agreement on the risks associated with exporting heavier cattle or buffalo, there were differing views in submissions on the appropriate point at which to impose additional requirements or restrictions in order to appropriately manage risk. Views on that point ranged from 450kg to 650kg, with some advocating for departmental discretion beyond their suggested limit, and others arguing for a non-negotiable cut–off. Some AAV submissions indicated that whilst heavy cattle can have more problems, including foot and leg trauma, they can travel successfully if managed appropriately.

A number of industry submissions argued to maintain the current standard, on the basis there are few scientific studies or data sets available to suggest alternative threshold weights. One submission noted the industry project that is currently underway to produce an enhanced industry data collection system. That system should enable collection of relevant statistics to inform and assess the correlation of weight and morbidity more effectively. The project, *Animal welfare indicators pilot for the live export industry*, is expected to conclude in May 2021.

The literature review did not identify any animal–based studies that reported on the health and welfare outcomes for exported fat or heavy cattle or buffalo. However, mortality data suggests adult bulls may experience a higher mortality rate then other classes of cattle during export (Norman 2016; Norman 2017) as well as possible heightened mortality risks due to their weight and behavioural traits (Shiell et al. 2014).

#### Committee view

The committee agreed that cattle between 500 and 650kg are at increased risk, require special attention and need to be monitored. However, insufficient evidence was put forward to suggest that the risks could not be managed via the additional space and bedding requirements that are already factored in under standards. As a result, the current thresholds should remain, but with special attention paid to the cohort above 500kg going forward.

While the committee acknowledges the increased risks associated with exporting ultra–heavy cattle, it did not have access to data which demonstrated there should be a strict upper limit applied in the standard. Rather, the existing approach should continue, with those exports assessed on a case–by–case basis (via an approved heavy cattle management plan). However, the committee strongly recommends that export of cattle and buffalo above 500kg be a priority for monitoring over the next 12 to 18 months, with appropriateness of the 650kg upper threshold, and the possible need for an absolute upper weight limit on exports, considered at that point.

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| **Draft recommendation:**   1. That existing weight thresholds for cattle and buffalo be retained, but with outcomes for animals over 500kg monitored over the coming 12 months to assess whether the upper threshold weight should be reduced from 650kg, and whether an absolute upper weight limit is necessary. |

### Minimum time at a registered premises

#### Current requirement

The *Export Control Act 1982* requires that livestock which are to be exported by sea be assembled at ​registered premises for preparation. The reformatted standard released with the issues paper specified periods of time that different types of stock must spend at the registered premises with a view to ensuring the animals are adequately prepared for the export voyage. The requirements in the reformatted standard adopted those used in ASEL v2.3 and are summarised below.

***Table 4: Time in registered premises, for exports by sea***

|  |  |
| --- | --- |
| **Applies to** | **Summary of requirement in reformatted standard (issues paper)** |
| Cattle and buffalo | Required to be in the registered premises for:   * 24 hours (short haul voyage, one port of loading or discharge). * One clear day (short haul voyage, multiple ports of loading or discharge). * Two clear days (long haul voyage). |
| Sheep and goats | Required to be in the registered premises\* for:   * Five clear days if the stock are in paddocks during any or all of the months of May to October. * Three clear days if the stock are in paddocks during any or all of the months of November to April. * Three clear days if the stock are in sheds during any or all months of the year. |

\* Note: Provision applies to premises south of 260 south. All registered premises for export of sheep and goats by sea fall within this geographical definition.

#### Discussion

It was generally acknowledged that for sheep, time spent in the registered premises may assist with mitigating the risk of inanition and salmonellosis. This stage of the export process allows for adaptation to pelleted feed, and, to the extent possible, allows shy feeders, ill and diseased sheep to be identified and removed from consignments. Some submissions concluded that, based on research, the sheep should be kept in a registered premise (paddock or shed) for a minimum of 5–7 clear days, year round. Others, with alternative supporting research, suggested that additional time was unlikely to provide significant benefits in terms of animal welfare. Several industry submissions noted work underway to develop a salmonella vaccine, anticipated to be available in 2021. Industry is optimistic this will provide an effective method for managing the risks associated with salmonellosis in the future.

There appears to have been relatively little work done on the welfare benefits of providing cattle with more time in the registered premises. Some submissions suggested, that in the absence of such research, the minimum time should remain unchanged. Others were in favour of increasing the minimum time period to three clear days for all cattle voyages to allow animals to adapt to feed and recover from any travel stresses prior to export.

The independent literature review identified a number of studies relevant to the period of time that stock should spend in a registered premises prior to export. For example:

* Access to reasonable food quality diets at a registered premises for 5–7 days can assist with recovering from feed and water deprivation associated with mustering, pre–transport curfew and transport of up to 48 hours and 32 hours in cattle and sheep respectively (Pethick 2006).
* Sheep which do not eat at a pre–embarkation feedlot are more likely to die during a voyage than those that do eat (Norris et al. 1989b, 1990; Higgs et al. 1993).
* Animals which have suffered stress (regular handling, travel or boggy yards) during the period immediately prior to export may not cope as well on board (Alliance Consulting and Management 2001).
* Tracking feed and water patterns at a registered premises showed that, of the sheep that departed the registered premises, 19 per cent attended the feed trough for less than 15 minutes per day on day one; this decreased to only 2 per cent by day six (Barnes *et al.* 2018)
* High animal densities typical of feedlots may impact animal health and welfare through preventing animals from moving freely or from accessing feed or water (Rice et al. 2016).
* Exposure to pellets before feedlotting for three weeks resulted in a greater number of sheep feeding at the feedlot than those that were not given prior supplementation with pellets (McDonald et al. 1988a)
* Extending the length of the feedlot period has been shown to be ineffective at stimulating feed intake in persistently inappetent sheep (Norris et al. 1992).

#### Committee consideration

The period of time for which livestock are held in registered premises prior to export is one of a number of critically important aspects to ensuring they are well prepared for the export voyage.

Livestock need to adequately rest after sometimes lengthy journeys by road from their properties of origin. They also need sufficient time to adjust to the shipboard fodder ration. Depending on the species and overseas destination, a range of activities need to be conducted during the holding period, including treatments, vaccination and shearing. For some animals, time is also needed to adapt to human interaction. Livestock must be equally well rested and prepared irrespective of the length of intended voyage.

**Sheep**

The committee received submissions proposing a wide range of holding periods for sheep in export feedlots; from the status quo up to a period of 10 days. While considering all submissions, the committee took particular note of a recently completed research project, *Strategies to reduce inanition in sheep* (Barnes et al., 2018). While focussed on inanition, the research examined the time required for sheep to transition to pellets in pre–export facilities and whether adding oats or chaff, or being housed in sheds versus paddocks, had any positive effect on the speed of transition to the pelletised ration. The project determined that on average, it took five days in a feedlot for the majority of the sheep to transition.

The committee reached the position that a minimum holding period of five clear days was required between arrival at, and load out from, registered premises for all classes of sheep. This time period should apply irrespective of premises location and design, and/or the length of export voyage.

The definition of a ‘clear day’ should be unambiguous. The committee has defined it as a day (midnight to midnight) when livestock are held in their holding areas with normal access to feed and water (i.e. not subject to any feed or water curfew) and not handled (including shearing) or moved. Wherever the term ‘clear day’ is used in the report, this is the definition that applies.

In the absence of evidence to the contrary, holding periods for goats should mirror those of sheep. However the committee notes that the export of goats by sea does not currently occur. It requires the express agreement of the department and a tailored management plan (refer Export Advisory Notice 2007/19).

Issues relating to inanition and salmonellosis in sheep at registered premises are dealt with in Section 2.5 of this report.

**Cattle**

Stage 2 submissions proposed a range of changes to the holding periods for cattle in registered premises. The committee’s considerations were unfortunately not assisted by recent or relevant research directed at this component of the cattle export process. The committee made particular provisions to inform itself, including through field visits and discussions in Western Australia and the Northern Territory. Voyage investigation reports for cattle and buffalo shipments with reportable mortalities were also examined. Several of the investigation reports cited insufficient time at registered premises as a factor contributing to the poor voyage performance.

The committee’s strong view was that, as for sheep, cattle in registered premises must be adequately rested and adjusted to the shipboard ration prior to loading for all voyages, and that this was far more influenced by the journey already undertaken from the property of origin than the one they were to yet to undertake. The committee noted that most or all short haul voyages depart from northern Australia where travel times to registered premises are longest and, arguably, transport conditions are harshest.

Accordingly, the committee reached the position that minimum holding times for cattle in registered premises must apply irrespective of whether the voyage will be long or short haul, or the number of loading/discharge ports. The committee also agreed that minimum holding times were too short, particularly for short haul voyages, and that a period of two clear days is required in the registered premises for cattle, with three clear days for extended long haul voyages. As highlighted in regard to the proposed minimum holding requirements for sheep, the definition of a ‘clear’ day applies strictly; being a day (midnight to midnight) in which animals are not moved from their pen, handled or withheld from feed/water.

**Buffalo**

Buffalo exports are small in volume compared to cattle, but are not insignificant (approximately 10,000 head in 2017), and the industry is planning for growth. Exports are almost entirely from northern Australia via the port of Darwin. There were few submissions that dealt with buffalo exports, and industry research is sparse. As a result, the committee used the opportunity of a field visit to Darwin to engage with the buffalo industry and the Northern Territory Department of Primary Industries and Resources Chief Veterinary Officer, to inform itself about the nature of, and industry practices associated with, the procurement and preparation of buffalo for the export market. In essence, there is only a small population of ‘domesticated’ buffalo ‘behind wire’ in the Northern Territory. Most export buffalo are sourced from wild or feral populations in Arnhem Land, held for relatively short periods after capture for dehorning and consolidation, before being transported by road to registered premises near Darwin. Road transport is long distance, with much of it on unsealed road. It is clear to the committee that, given the circumstances leading up to their arrival, the holding period for buffalo in registered premises must provide adequate time for rest. It must also provide adequate opportunity to acclimate to shipboard feed.

The committee also examined voyage investigation reports for a number of buffalo shipments with notifiable mortality levels (reportable mortalities). Several cited preparation issues, including the period in registered premises, as contributing factors.

The committee reached the position that, at a minimum, the holding time for buffalo in registered premises must be five clear days. Again, this period must not include the day of arrival or the day of loading, with a clear day being a day (midnight to midnight) in which animals are not moved from their pen, handled or withheld from feed/water.

The committee noted the importance of shade for buffalo at registered premises, mindful of the evidence in the independent literature review on the lower heat tolerance of buffalo. It noted the existing requirement in the standard for livestock to be protected from climatic extremes, including via shade, and strongly supported its application at registered premises which hold buffalo. In addition, the committee recommends that research is initiated to better understand the requirements for buffalo preparation, transport and humane euthanasia, and, in particular, that the reporting, investigation and causes of mortalities that occur within the supply chain be prioritised. Issues in relation to the knowledge base on buffalo are further discussed in Section 3.2 of this report.

**Related considerations**

The committee accepts that the proposed increase in minimum holding periods may have implications with respect to last minute, unplanned ‘top–up’ of livestock numbers to make up orders, particularly for cattle given the current short minimum holding periods. The committee considers however that consignment procurement processes must allow for any such ‘top–up’ livestock to be fully prepared for the export journey. ‘Topping up’ should not mean those livestock are less well prepared for export.

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| **Draft recommendations:**   1. That the term ‘clear day’ be defined in the standard as a full day (midnight to midnight) during which livestock are not subject to any feed or water curfew, and are not handled, treated (including shearing) or moved from their holding pens or paddocks. 2. That the standards require sheep and goats to be held at the registered premises for five clear days, irrespective of the location and design of the registered premises, the time of year, or the length of the export voyage. 3. That the standards require all classes of cattle travelling on short and long haul voyages to be held at the registered premises for a minimum of two clear days, irrespective of the location of the premises and the number of loading/discharge ports on the voyage. Three clear days should be required for all classes of cattle travelling on extended long haul voyages. 4. That the standards require buffalo to be held at the registered premises for a minimum of five clear days, irrespective of location of the premises, length of intended voyage or number of loading/discharge ports. |

### Management of shy feeders and inanition in sheep

#### Current requirement

Inappetence and inanition (the interaction between inappetence and salmonellosis) are major causes of mortality on sheep export voyages. Recognition of susceptible sheep pre–export can have a significant impact on the rate of mortality in the export journey. The reformatted standard released with the issues paper recognised this risk, in particular through the requirement that animals suffering ill–thrift or anorexia (inappetence) be rejected from the proposed export consignment.

#### McCarthy review

Dr McCarthy made a number of observations about the practicalities of managing ‘shy feeders’ and inanition in sheep. He noted the increased risk of salmonellosis in select lines of sheep including older, heavier and generally fatter merino wethers. His view was that the increased risk was in part due to acclimatization to feed during preparation. McCarthy also considered that the sourcing of sheep from sale yards, or pastoral sheep during certain months of the year (winter), were large contributors to mortality levels.

#### Discussion

The independent literature review confirmed that the main cause of death in registered premises is persistent inappetence – or ‘shy feeders’ – and the interaction of inappetence with salmonellosis. It noted there are a number of factors likely to contribute to inappetence, including the origin or source of the sheep, housing at the feedlot and diet. The literature review noted that consistent feed intake is considered the key to preventing mortalities from inanition and salmonellosis (p24). It also noted that most shy feeders will start eating within two weeks of feedlotting, but some do not appear to adjust, regardless of time (p23).

Issues associated with inappetence / shy feeders / inanition were discussed in most submissions. The joint submission from several AAVs suggested that identification and rejection of shy feeders could be improved at registered premises, including use of individual paddock based assessments. The use of RFID technology was suggested by other submissions, along with improved infrastructure at wharfs to assist in individually assessing sheep. The time spent in the registered premises was recognised as an important part of managing risks associated with shy feeders. The work by Barnes et al. (2018) was referenced in several submissions. That study suggested that five days in the feedlot was required to transition onto a new ration. The inclusion of chaff in the ration was advocated as a management strategy in several submissions.

Ready access to feed, including ensuring adequate trough space per head, were mentioned as strategies for managing inanition on–board the vessel. Several submissions argued that the primary method of identifying and handling shy feeders remains the use of experienced stockpersons (Barnes et al. 2018). Some submissions argued that the exclusion of saleyard sheep would reduce the incidence of inanition, though without direct supporting evidence. The development of a salmonella vaccine was also identified as a possible mitigation strategy.

#### Committee consideration

Inappetence is a major risk factor in registered premises and on–board sheep export vessels, and it is important that research continue to focus on minimising or eliminating this risk.

There are different views on the best method for transitioning sheep onto the pelleted shipboard ration in the lead up to export. Time in the registered premises is important, and it has also been demonstrated that allowing sheep a few days of hay or chaff, in addition to pellets, is helpful. The committee’s view is that of the five clear days in the registered premises (refer Section 2.4, Recommendation 10) the sheep should be fed *ad libitum* on pelleted feed equivalent to the shipboard ration for the final three clear days.

The committee also recognised that, when livestock are held in open yards or paddocks, access to pelletised feed must not be hindered by inclement weather or other climatic factors. Accordingly, pelleted feed must be placed in troughs (as required by 2A.2(a)(ii) of the reformatted standard) and feeders/troughs to be of a design that prevents spoilage of feed during inclement weather (2A.2(a)(i) refers). Ideally, troughs would be fully sheltered. But if not, the manager of the registered premises must ensure that spoilage does not occur. For sheep and goats held in registered premises in southern parts of Australia, the committee’s view is that they should be fed from fully sheltered troughs all year–round, rather than only between May and October as is currently required by the standards.

As noted in Section 2.4, some submissions raised concerns about the practice of “topping up” consignments of sheep with sheep purchased at saleyards. The committee considered this risk in relation to inappetence, but found insufficient evidence to conclude that these sheep are necessarily at greater risk. The committee, however, recommends this be further considered by industry in terms of research and best practice guidelines.

The committee also acknowledges the current industry research focusing on the development of a vaccine for salmonellosis and management strategies to minimise the risk of inappetence in sheep.

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| **Draft recommendations:**   1. That the standards require that, of the five clear days for which sheep and goats are held at the registered premises (refer Recommendation 10), they are fed *ad libitum* on pelletised feed equivalent to the shipboard ration for at least the final three clear days. (*Note: refer definition of ‘clear day’ at Recommendation 9*). 2. That the standards continue to require pelletised feed to be fed in troughs at the registered premises, and that feeders/troughs be of a design that prevents spoilage of feed, particularly during inclement weather. For sheep and goats held at registered premises in southern parts of Australia the standards should require they be fed from fully sheltered troughs, regardless of the time of year. |

### Pregnancy testing

#### Current requirement

The reformatted standard released with the issues paper carried forward requirements from ASEL v2.3 regarding the pregnancy status of animals destined for export by sea. The aim of those provisions (summarised below) is to manage the risks associated with pregnant animals on export voyages. Part 4G of the reformatted standard is also relevant. It listed criteria for a valid pregnancy test and addressed matters such as: the timeframe before export in which the test must be carried out; and the qualifications of persons who can conduct pregnancy tests.

***Table 5: Pregnancy testing for export by sea***

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| **Applies to** | **Summary of requirement in reformatted standard (issues paper)** |
| Feeder or slaughter cattle | Determined not to be detectably pregnant by a valid pregnancy test\* or accompanied by a valid spay declaration. |
| Breeder cattle | Not more than 190 days pregnant at scheduled date of departure, tested in accordance with valid breeder pregnancy test\*. |
| Feeder or slaughter buffalo | Determined not to be detectably pregnant by a valid pregnancy test\* or accompanied by a valid spay declaration. |
| Breeder buffalo | No more than 220 days pregnant at scheduled date of departure, tested in accordance with valid pregnancy test\*. |
| Feeder or slaughter sheep | For female sheep over 40 kg and Damara female sheep, determined not to be detectably pregnant, tested in accordance with valid pregnancy test\*. |
| Breeder sheep | Must not be more than 100 days pregnant at the scheduled date of departure and tested in accordance with valid pregnancy test\*. |
| Feeder or slaughter goats | Must be determined not to be detectably pregnant, tested in accordance with the requirements of a valid pregnancy test\*. |
| Breeder goats | Be determined to be no more than 100 days pregnant at the scheduled date of departure, tested in accordance with valid pregnancy test\*. |
| Feeder or slaughter camelids | Determined not to be detectably pregnant, tested in accordance with valid pregnancy test\*. |
| Breeder alpaca and llamas | Must not be more than 228 +/– 2 days pregnant at the scheduled date of departure, tested in accordance with valid pregnancy test\*. |
| Deer | Tested in accordance with valid pregnancy test\* and determined to be not detectably pregnant, or in the case of breeders, must not be more than 140 days pregnant at the scheduled date of departure. |

\* Testing criteria for pregnancy tests are listed at Part 4G of the reformatted standard.

#### Discussion

Pregnancy testing was widely discussed in submissions; with strong views expressed on the competency of personnel involved and the testing requirements for different types of livestock.

On competency, some submissions argued that pregnancy testing should only be undertaken by registered veterinarians (particularly for cattle), while others argued that testing could be undertaken by other skilled personnel. Several submissions noted the project that is underway through Meat and Livestock Australia to develop a national standard for pregnancy testing cattle, with the view that it apply domestically and for live exports. State government arrangements were also mentioned, including the fact that the Queensland government is progressing legislative amendments to allow lay testers to operate in that state. The views in relation to sheep exports were more uniform, with most submitters accepting testing by lay persons. There was no specific information provided in relation to buffalo.

In relation to testing criteria, the committee had asked questions about:

* Changing the requirements so that only Damara sheep over 40kg need to be tested.
* Extending testing requirement to include all fat–tailed sheep, not just Damara.
* Increasing the age for testing goat kids and ewe lambs to more than five months.
* Appropriateness of pregnancy testing methods.

Submissions generally agreed that all fat–tailed sheep should be tested, not just the Damara breed. While some submitters agreed that testing could be limited to Damara sheep over 40kg, others indicated that it is possible for pregnancy to occur at lower weights. There were mixed views on increasing the age for testing goat kids and ewe lambs, but several submissions noted that it is possible for these animals to conceive from 150 days. Most submissions argued that ultrasound should continue to be an option for testing in certain circumstances, but with differing views on the competencies required to make that judgement.

The committee also asked for submissions about the requirement for pregnancy tests to be carried out within the 30 day period prior to export. Several submissions argued that this should be extended to 45 days, largely as a buffer against unforeseen loading delays. Others argued that while animals should not be subjected to unnecessary re–testing, this should not necessarily be addressed via change to the 30–day pregnancy testing window.

#### Committee consideration

The committee discussed the range of different views on the skills/competencies required to pregnancy test livestock. The committee felt that the standard should be able to rely primarily on competency arrangements deemed appropriate in each jurisdiction. However, in practice, national discussions on competency are still underway and the required national standards/regulatory arrangements are not yet developed. As a result, the committee agreed the standards should continue to specify requirements in relation to competency of testers.

The most diverse views on competency related to testing of cattle, with some arguing for veterinary–only testing, and others arguing that the criteria should allow for lay testers. The committee considered these views, as well as the different requirements that might apply in relation to breeder cattle, where the stage of pregnancy needs to be assessed, versus feeder and slaughter cattle, where the tester is confirming that the animal is not pregnant.

The committee’s view is that pregnancy testing breeder cattle should remain the domain of registered veterinarians, with additional accreditation under the National Cattle Pregnancy Diagnosis Scheme required to test cattle destined for longer voyages. The committee agreed to retain existing flexibility for testing slaughter cattle, with those animals to be tested by either a registered veterinarian or a competent pregnancy tester. As suggested by some submitters, the committee agreed that the definition of a competent pregnancy tester should be amended to provide for persons permitted by law to conduct pregnancy tests in any jurisdiction, not just the Northern Territory or Western Australia.

Manual palpation should remain the preferred method of pregnancy testing cattle. However, the committee agreed that ultrasound testing should be available where it is safer for the animal. That judgement should be restricted to veterinarians accredited under the National Cattle Pregnancy Diagnosis Scheme, to ensure that it is only used where required, rather than because it provides a potentially faster and less manually intensive approach to testing. This is a matter that should be reviewed once national standards for pregnancy testing cattle are in place. In the absence of specific evidence to the contrary, the committee agreed that the same pregnancy testing requirements should continue to apply for buffalo as for cattle.

The committee discussed the current approach to ‘maximum days pregnant’ for breeder cattle and buffalo, as well as other livestock. The standards currently set the maximum limits for different species of livestock, calculated at the scheduled date of departure. It noted this approach would allow livestock to be exported (i.e. travel on ships) in the third trimester. The committee’s view is that, even with additional space (refer Section 3.2 of this report), this is an unreasonable risk and should be prevented. As a result, it recommends the testing criteria are amended so that the maximum gestation applies at the intended date of discharge from the vessel. In effect, this would ensure that animals are not in the third trimester of pregnancy at any stage of the export process.

For sheep and goats, the committee agreed the standard should continue to allow testing by lay testers. Evidence was not provided to suggest that an alternative approach was needed. The committee did note strong arguments for sheep and goats to be identified individually. It supported those arguments, and agreed individual identification should be incorporated into export arrangements as soon as such a system is in place domestically.

The committee agreed to extend the requirement for testing to all female fat tail sheep breeds, not just the Damara breed as is required by the current standard. It also agreed to retain the existing age threshold for testing sheep and kid goats.

In relation to the pregnancy testing window prior to export, the committee agreed to retain the existing 30 day requirement. However, there appears to be an issue with regulatory inflexibility, and unnecessary re–testing must be avoided from a welfare perspective. It was the committee’s considered view that the department should be able to extend the validity period of an existing test beyond 30 days where necessitated by circumstances outside the control of the exporter and where the exporter can demonstrate that the extension will not impact on animal welfare outcomes. This decision on whether to approve an extension should be taken at the regional level, rather than requiring a formal dispensation from the Canberra office.

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| **Draft recommendations:**   1. That the existing pregnancy–related rejection criteria and pregnancy testing criteria be retained in the standards, other than:    1. the testing criteria relating to ‘maximum days pregnant’ for all livestock exported by sea, which should be amended to apply at the scheduled date of discharge, rather than the scheduled date of departure, to ensure that livestock cannot be exported in the third trimester; and    2. the provision relating to Damara female sheep, which should be extended to apply to all female fat tailed sheep. 2. That the definition of a *competent pregnancy tester* be amended to cover persons permitted to undertake pregnancy testing by law in any state or territory jurisdiction, rather than just persons in the Northern Territory and Western Australia. For clarity, the circumstances in which *competent pregnancy testers* are permitted remains unchanged. 3. That the standards allow the department to extend the validity of a pregnancy test beyond 30 days only where necessitated by circumstances outside the exporters control and where the exporter can demonstrate that the extension will not impact on animal welfare outcomes. That decision should be delegated to regional veterinarians, rather than requiring a formal dispensation from the Canberra office. |

## Stocking densities

The reformatted standard sets out the minimum amount of space that must be provided to different types of animals at the registered premises and on board the vessel.

### Registered premises stocking densities

#### Current requirement

The reformatted standard released with the issues paper required that livestock in registered premises be provided with an appropriate amount of space, in accordance with stocking density requirements that are set out in the standard. The space requirements were the same as those used in ASEL v2.3, and are summarised below. Unlike ASEL v2.3, the reformatted standard did not include capacity for the department to approve a variation to those stocking densities.

***Table 6: Stocking density, cattle and buffalo at a registered premises***

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| **Applies to** | **Held for** | **Summarised requirement in reformatted standard (issues paper)** |
| Cattle or buffalo, 500kg | 29 days or less | 4m2 per animal, variable by 0.04 m2 for each 5kgchange in liveweight. |
| 30 days or more | 9m2 per animal, variable by 0.09 m2 for each 5kgchange in liveweight. |

***Table 7: Stocking density, sheep and goats at a registered premises***

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| --- | --- | --- | --- |
| **Applies to** | **Held for** | **Penned in** | **Requirement** |
| Sheep or goats, 54kg | Less than 10 days | Sheds in groups of less than 8 animals | 0.6m2 |
|  | Sheds in groups of 9 to 15 animals | 0.53m2 |
|  | Sheds in groups of 16 – 30 animals | 0.4m2 |
|  | Sheds in groups of more than 31 animals | 0.33m2 |
| 10 days or more | Sheds in groups of less than 8 animals | 0.9m2 |
|  | Sheds in groups of 9 to 15 animals | 0.8m2 |
|  | Sheds in groups of 16 – 30 animals | 0.6m2 |
|  |  | Sheds in groups of more than 31 animals | 0.5m2 |

#### Discussion

A range of views were presented regarding stocking densities at registered premises. Several submissions argued that the standards should align with domestic intensive housing standards, whilst others argued that the purpose of a registered premises was different (preparation for export, as compared with productive efficiency) and different space requirements should apply. No significant data was provided to indicate a significant mortality problem exists at registered premises, however, mortality may not be an appropriate indicator of whether settings are right for this stage of the export process.

The Australian Livestock Exporters’ Council provided a table which compared current ASEL requirements with an allometric approach using a k value of 0.027 and 0.033. Those figures showed that the current standards are generally above space required using a k value of 0.033 in all circumstances, other than for sheep held for less than 10 days in groups of 16–30 and more than 30 animals. The densities set for smaller groups of sheep were generally regarded as redundant as sheep would very rarely be prepared in mobs of 8, 15 or even 30 animals. The need for departmental discretion in relation to stocking density was highlighted, to assist with circumstances such as export delays.

Along with space in the pen, minimum trough space was identified in some submissions as an issue that warranted consideration at the registered premises.

The literature review found limited studies on stocking densities in feedlots. Rice et al. (2016) concluded that high stocking densities may impact animal health and welfare by preventing animals from moving freely or from accessing feed or water. Close proximity to other animals, human infrastructure and human handling may induce stress responses in livestock, particularly in animals that have been transported directly from free–ranging conditions (Petherick et al. 2002).

#### Committee consideration

Adequate space allocation for livestock held at registered premises is important to ensure stock are rested, and have unfettered access to feed and water during a period when adaption to shipboard fodder is of critical importance to minimising welfare risks during voyages.

As discussed in more depth in section 3.2 of this report (on–board stocking density), the committee supports the application of an allometric approach to minimum space allocation for livestock housed or held during the export process. For livestock at a registered premises, the committee’s view is that an allometric space allocation using a k value of 0.033 is appropriate. This is the value proposed by *Petherick et al (2009*) as providing the minimum space allowance for long–term confinement of animals with reduced risks to welfare and productivity.

Beyond adopting an allometric approach, little evidence was provided to the committee to support significant changes to current ASEL space allowances at the registered premises. The committee noted the current provisions are reasonably complex. Space allocation varies with the length of time held, the group size, and the weight of stock. In the case of sheep, a single space allocation is proposed irrespective of the weight of the animal. These complexities are discussed and addressed in the species–specific considerations which follow.

The committee did not see a need to reintroduce departmental discretion on stocking densities into the standards. It understands that the existing discretion has not been requested in practice.

**Sheep and goats**

As detailed above, the current standard sets out different space allowances for sheep depending on the number of animals held in the pen, and the length of time for which they are held. Many submissions pointed out that sheep are almost invariably held in groups well in excess of 30 head and that the current complex approach was unnecessary. The committee accepted this view. The committee also reached the position that an adequate space allowance should apply irrespective of whether sheep were being held for a period greater than or less than 10 days (a period which in any case has little relationship to prescribed holding periods in registered premises). It is the committee’s view that this space allocation be 0.5m2 for a 54kg sheep (the highest of the current ASEL provisions), being more space than would apply using a k value of 0.033. This should be a base allocation. The standards should also make provision for additional space for sheep of higher weights.

Taking all these matters into account, the committee has reached the following position with respect to space allowance for sheep at registered premises: sheep held at registered premises for any period of time and in any group size require a minimum space allocation of 0.5m2 per head, with an additional 0.006m2 for each 1kg increase in body weight above 54kg.

In the absence of evidence to the contrary, the committee determined that the same requirement should apply for goats.

**Cattle and buffalo**

As indicated previously, the committee found little scientific evidence to indicate a need to change stocking densities for cattle or buffalo at registered premises. The committee observed first hand cattle held at registered premises in Western Australia and Northern Territory; although it recognises that there are many registered premises in a range of locations and climates around Australia with varied layouts.

The committee noted that space allocations based on the allometric model using a k value of 0.033 would be well below those currently required by ASEL. For example, for a 500kg beast, a k value of 0.033 would provide for 1.992m2 per animal. The current ASEL requirement is from 4.0 to 9.0 m2, which is more consistent with stocking density standards set for Australian cattle feedlots. Accordingly, the committee proposes no change to the current ASEL standards with respect to stocking density for cattle and buffalo at registered premises.

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| **Draft recommendations:**   1. That the standards require that sheep and goats held at a registered premises for any period of time and in any group size be given a minimum space allocation of 0.5m2 per head, with an additional 0.006m2 for each 1kg increase in bodyweight above 54kg (as the threshold already specified in the standard). 2. That the standards for stocking density in registered premises remain unchanged for cattle and buffalo. |

### Onboard stocking densities

#### Current requirement

Stocking density on board vessels was dealt with in various parts of the reformatted standard released with the issues paper.

Paragraph 3A.4 required that a load plan be prepared for the vessel before the animals were loaded. That plan should be prepared in accordance with specified stocking densities which are set out in the appendices. Part 3B.1 then required that livestock be appropriately segregated, loaded and penned on the vessel in accordance with the load plan. It also required that the consignment be checked prior to departure to ensure that the livestock had been loaded in accordance with the loan plan, and that the pen stocking density be regularly checked throughout the voyage and adjusted as required.

The base stocking densities varied by species and liveweight, with additional space required for higher risk voyages and consignments, including:

* Larger cattle on longer voyages.
* Exports associated with a higher risk of heat stress (predominantly export of sheep and *Bos taurus* cattle between May to October to the Middle East).
* Animals with certain characteristics such as pregnancy, horned rams, goats with specific horns and sheep with more than 25mm of wool.

Current space allowances in the standards (ASEL v2.3) appear to be based on 1978 Marine Standards specifications, which were then incorporated into Marine Orders in 1981, and then into the ASEL. The origin of, and basis for, the 1978 standards is unknown.

#### McCarthy review

Dr McCarthy identified stocking densities as a key issue that should be addressed by regulatory reforms. His review made a number of observations and recommendations regarding stocking densities, including the adoption of an allometric model for determining space on board with a k value of 0.033 for sheep exported to the Middle East during the northern summer. The department accepted this recommendation and since 6 July 2018 has required the use of the 0.033 k value on all consignments of sheep exported to the Middle East between the months of May and October. Dr McCarthy also suggested the ASEL Technical Advisory Committee consider the longer term application of the allometric model beyond the end of the 2018 northern summer. (Note, the *allometric model* is described in some detail in Section 3.2.4 below).

Dr McCarthy also raised concerns about how the weight of livestock is taken into account when calculating stocking densities. The reformatted ASEL does not consider whether weights should be empty body weight, a curfew weight (12 hours) or a full weight. Dr McCarthy noted in passing that there can be up to 12 per cent difference between these weights. He suggested the ASEL Technical Advisory Committee address this anomaly in its review.

The committee notes that as part of its *Australian Meat and Live–stock Industry (Export of Sheep by Sea to Middle East) Order 2018* of 6 July 2018 (referenced above), the department introduced the requirement for a curfew factor of 12 per cent in stocking density calculations as well as a daily weight gain factor of 0.04 kilograms.

#### Discussion

One of the most contested issues amongst stakeholders is what constitutes a reasonable stocking density on board vessels. Most submissions discussed the issue, with almost all advocating an allometric approach to determining minimum requirements. This approach reflects the fact that the space requirements of animals are more accurately determined in three dimensions, rather than the two dimensional approach (m2) used in the current standards. The work of Petherick *et al* (2009) was heavily referenced, with submissions variously supporting a k value of 0.027, 0.033 or 0.047. Submitters agreed that it was important for animals to be able to lie down simultaneously, however there were different views on the k value that would allow this to occur. The preferred lying posture, from sternal recumbancy, to semi–recumbancy and full recumbancy, may go some way to explaining the different views, along with different views on the importance of ‘time sharing’ or ‘synchronous lying’ in determining space allocations. In general, industry submissions tended towards a k value of 0.027, with welfare organisations supporting a k value of 0.047.

Submissions generally separated the discussion on base stocking densities from decisions on space required to avoid heat stress (to be determined via a heat stress risk assessment). Pregnant animals and heavy animals were identified as cohorts requiring space beyond base levels.

The independent literature review also referred to the work of Petherick *et al* (2009) in relation to stocking densities. Petherick concluded stocking density, or space allowance, is an important factor impacting on heat load. Of significant concern for livestock welfare, the amount of space provided governs important elements of animal behaviour that are important for their health and welfare. Another review questioned the adequacy of current space allowances with regard to concerns over heat stress and poor welfare (Caulfield et al. 2014). While another review (Shiell et al. 2013) signalled the need for ASEL to continually evolve to address any persistent issues (e.g. sheep mortality on voyages to the Middle East in the northern hemisphere summer). Overall, the literature review was unable to find a scientific study/ies that gave a definitive calculation for minimum space allowance on board a vessel.

#### Committee consideration

*Note to readers, the recommendations in this part of the report need to be considered alongside the committee’s recommendation that the (new) heat stress risk assessment (HSRA) model be applied to all voyages of livestock crossing the equator (refer Section 4).*

It is universally accepted that the amount of space provided to animals during periods of confinement is critically important for their health and welfare. Stocking density governs important elements of behaviour, including social interaction. It also affects access to feed and water, influences susceptibility to disease and has a strong influence on heat load experienced by confined animals.

The amount of space required by animals is influenced by multiple factors including the duration of confinement (voyage length), the environment (heat and cold), and class of stock. The current approach to stocking density on vessels has been to set a ‘base’ or ‘default’ space allowance, primarily to meet behavioural needs, allow space for animals to rest and lie down in a natural position, and to allow ready access to feed and water troughs invariably placed at the side/s of pens. Default space allowances also make some provision for a normal range of climatic conditions, but not for instance, exposure to periods of high heat and humidity. The latter welfare risk factor is managed through the application of an HSRA in the case of voyages likely to experience hot conditions. The output of the HSRA may be a revised (increased) space allowance over and above the base or default level.

Other special circumstances also require extra space, such as the presence of horns, pregnancy status, location of loading port in Australia and time of year. Requirements regarding the application of a HSRA are dealt with in Section 4 of this report.

There is widespread agreement—from the literature and in submissions received by the Committee—that the appropriate science–based approach to determining space allowances for confined livestock is through the application of allometry. Allometry is the study of the relationship between body size to shape and behaviour, and applied here involves understanding how use of space by animals may differ with body shape and weight. A significant body of research has determined that the allometric equation—Area = k Weight0.66—can be used to calculate the space an animal occupies as a consequence of its mass. A value for the ‘k’ coefficient in the equation can be chosen given the particular circumstances, such as the:

* type of animal
* natural posture of the animal when lying/resting (or whether the animal group remains standing such as during road transport)
* need for, and accessibility to feed and water and
* length of the confinement.

While there was almost universal support across submissions for the use of allometry in setting base space allowances in standards, there was a wide variation with respect to the preferred value of the coefficient ‘k’ to be used in the allometric equation.

Determining an appropriate amount of space for penned livestock on a sea voyage is challenging. More is required than for typical long–distance road transport (where stock largely remain standing), yet less than required for long term confinement such as a typical feedlot or indoor housing system. While there is scientific evidence for the effects of different space allowances within indoor housing systems, in which animals are typically confined for long periods of their life, the committee found a paucity of evidence regarding appropriate stocking densities for the unique environmental conditions that impact livestock on–board vessels.

After extensive consideration based on research findings and Stage 2 submissions, the committee came to the position that the appropriate value of the ‘k’ coefficient for calculating base space allowances on typical voyages from Australia was between 0.027 (which allows for all animals to lie down simultaneously but may not provide adequate room for access to feed and water troughs) and 0.033 (which is described in the literature as providing an acceptable space allowance for animals in long–term—typically lifetime—confinement). The committee also examined the current ASEL v2.3 space allowance tables in some depth. While the exact basis for, and origin of, these tables is not critical, the committee noted that many tables did not provide a constant linear increase in space with increasing liveweight. Instead, they provided disproportionately extra space for animals at higher weights, presumably based on experience and risk mitigation over time. The committee was concerned to ensure this continued to be reflected in the base space allowances required within the standards, as allometric calculations only provide for a constant linear increase of space allowance with increased in liveweight.

It is the committee’s considered position that the appropriate ‘base’ or ‘default’ ship–board space allowances for livestock be determined using a k value of 0.030, or the current ASEL space allocation for a given liveweight, whichever is the highest. For clarity, the current ASEL base or default space allowance for sheep is that required for shipments from November to April. For cattle, it is that set out in the default table for voyages of less than 10 days. The effect of this approach can be seen in the comparison tables and graphs in Appendix D.

Use of a k value of 0.030 will provide for an increased minimum space allowance for livestock to be exported (noting this is the base allowance) as indicated by the following examples.

***Table 8: Increased space allocation***

|  |  |  |  |
| --- | --- | --- | --- |
| **Stock** | **ASEL v2.3** | **Recommended (k=0.03)** | **Percentage increase** |
| 54kg sheep | 0.333 m2 | 0.417m2 | 25% |
| 400 kg cattle | 1.45 m2 | 1.56 m2 | 7.9% |

With respect to shipments currently required by ASEL to be provided with extra space above the base or default, the committee noted Dr McCarthy’s recommendation for a k value of 0.033 to be used to calculate space allowances for sheep to the Middle East during the period May to October. This recommendation was accepted by the department and is being applied until 31 October 2018. The committee has had little opportunity to assess the performance of consignments loaded to the McCarthy specifications given the timing of the review and the small number of shipments. The committee’s position is that the 0.033 k value should remain in place for the May to October period and be reviewed in the light of voyage reports and industry performance after several northern summer periods.

The committee accepted evidence that, as a principle, all pregnant cattle and buffalo should be given 15 per cent additional space above that which would otherwise apply.

The committee did not receive enough evidence to indicate that livestock, particularly sheep, are fed for weight gain during voyages. The standards operate on a maintenance ration and the stocking density requirement should reflect this. Inclusion of a weight gain factor in determining stocking densities is not recommended. The committee also considered the application of a curfew factor in determining on board stocking densities. Where a curfew has been applied to livestock for more than 12 hours off feed and water, a curfew factor of 5 per cent is to be applied in calculating stocking densities.

The committee supports the verification of livestock weights in determining stocking densities. Department officers should ensure a check of animal weights is undertaken through a sample inspection and review process at registered premises prior to loading. This is to assess the accuracy of the exporter’s proposed load plan and heat stress risk assessment.

**Buffalo**

As discussed under the section of this report regarding registered premises, most buffalo for export are sourced from rangeland or feral populations in Arnhem Land, held for relatively short periods after capture for dehorning and consolidation, then transported by road to registered premises near Darwin. Road transport of buffalo to registered premises covers long distances and over considerable lengths of unsealed road, and under relatively harsh hot conditions. Buffalo are known to be less heat tolerant than cattle and require frequent cooling / watering rest stops during long distance transport.

The committee has examined voyage mortalities and reports for buffalo. Buffalo exports regularly exceed reportable mortality rates. Although export numbers are smaller, average buffalo mortalities for voyages over the three year period 2015 to 2018 were approximately three times that of cattle for voyages more than 10 days, and four times that of cattle for short voyages. Many voyage investigation reports cite the feral origin and hence unhabituated nature of exported buffalo as a likely factor. Accordingly, the committee’s position is that buffalo need additional space on ships to cattle, and the Committee recommends that standards be revised to provide buffalo with 10 per cent more space than cattle for any given equivalent voyage.

The committee noted the lack of data on the causes of morbidity and mortality of buffalo during export voyages, which would help guide deliberations on the optimum standards that should apply to buffalo to ensure acceptable welfare outcomes. The literature review uncovered no relevant scientific studies involving buffalo. Post–mortem investigations of buffalo mortalities are uncommon and detailed clinico–pathological investigations have not occurred on ships. It seems clear to the committee that this situation will remain unless action is taken to better investigate and identify the causes of buffalo mortality and morbidity during export, and associated risk factors.

While acknowledging it is beyond the scope of this review, the committee strongly recommends that the department engage with the industry and the Northern Territory Department of Primary Industries and Resources (via the Chief Veterinary Officer) to discuss actions which can be taken to improve the understanding of the nature and causes of morbidity and mortality of buffalo during the export process. These may include NLIS identification, post mortem examination and sharing of reports between government authorities.

The committee learned during its field visit that the Northern Territory provides a free investigation service for livestock in country and there is no reason this cannot apply to live export preparation and ship–board mortalities (with the obvious limitation of fresh samples not being permitted entry). There are also a number of in–country initiatives that the department is funding through the North Australian Biosecurity Strategy / Framework including the North Australian Veterinary Surveillance Network, Veterinarian training and supply of post–mortem kits to stations that could be directed in part towards buffalo export preparation, including the shipping phase.

**Review**

The Committee strongly recommends that the revised space allowances recommended in this report be reviewed in 12–18 months’ time in the light of industry performance and voyage reports during that time.

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| **Draft recommendations:**   1. That the standard adopt an allometric approach for calculating on–board stocking densities for sheep, with a k–value of 0.030 to be applied to the voyages during November to April, and a k–value of 0.033 for voyages during May to October. 2. That the standard adopt an allometric approach for calculating on–board stocking densities for cattle, with a k–value of 0.03. Where this approach determines a space allowance that is lower than the current ASEL requirement for a given liveweight and voyage, the higher space allowance will apply. 3. That in relation to special categories of livestock, the following approach should apply to on–board stocking densities:    1. Buffalo: 10 per cent more space than required for cattle.    2. Cattle and buffalo with horns: 30 per cent more space than otherwise required for cattle and buffalo without horns.    3. Cattle and buffalo from 650kg and above: additional space allowance as determined by an approved heavy cattle/buffalo management plan.    4. All pregnant cattle and buffalo: a minimum of 15 per cent more space than otherwise required for cattle and buffalo for a given liveweight and voyage.    5. Rams and goats with horns: 10 per cent more space than otherwise required for sheep and goats. |

## Heat Stress Risk Assessment

### Requirement for a heat stress risk assessment

#### Current requirements

Voyages of certain livestock into the Middle East region in the northern hemisphere summer face a greater risk of a welfare event due to heat. As discussed in the previous section, this risk is reflected in additional space requirements for sheep and *Bos taurus* cattle on voyages during May to October.

But in addition to that, the reformatted standard released with the issues paper required that for exports to the Middle East, an agreed heat stress risk assessment (HSRA) be completed and indicate the risk is manageable as per the testing criteria in the standard. The testing criteria were set out in Part 4G.3 of the reformatted standard indicating the risk was manageable if:

* The HSRA output is less than a two per cent chance of a five per cent mortality.
* The HSRA cross wind output for any open decks is less than seven knots.
* The HSRA output for stocking density meets at least the relevant stocking density specified in the standard (ie the base stocking density rate).

The committee notes that while the reformatted standard referred to the Middle East, the department has extended this requirement to voyages travelling through waters in the Arabian Sea north of latitude 11°N (refer *Australian Meat and Live–stock Industry (Export of Sheep to Middle East) Order 2018*).

#### McCarthy review

In his review, Dr McCarthy looked at the application of the HSRA to consignments of sheep traveling to the Middle East. He used the months of May to October, as prescribed in the current standards, to define the northern hemisphere summer. He did not consider the implications of heat stress on vessels travelling to destinations outside of the Middle East. According to Dr McCarthy’s report, one submission to his review included analysis of seasonal patterns of mortality rates for sheep exported to the Middle East. The submission noted that mortalities were more likely to occur when voyages commenced in May to October, corresponding to the hotter months in that region.

Dr McCarthy made a number of recommendations in relation to the HSRA model itself, including moving away from an assessment based on mortality to one based on risk of heat stress. These recommendations are being considered in a separate review process. He did not make any specific recommendations to revise the time period during which a HSRA should be required, or for what region.

#### Discussion

There was a great deal of discussion on HSRA in submissions. Commentary was focussed on the circumstances in which a HSRA should be required, given that the model itself is subject to a separate review process, and is not prescribed in the standards.

Some submitters argued that the standards should require a HSRA for shipments travelling through waters in the Arabian Sea north of latitude 11° North (i.e. the requirement currently applied by the department). Others suggested a ‘wider net’ to capture any voyage where there is a risk of heat stress, with voyages from southern Australia to China (at certain times of the year) cited as an example. As for how the ‘high risk period’ is defined in other parts of the standards, some argued for June to September. Others argued for the current approach of May to October.

The independent literature review touched on the heat stress risk assessment model. It did not provide information in relation to markets for which an assessment should be required, or what should reasonably be considered the higher risk period.

#### Committee consideration

Noting that the standards only set out the circumstances under which a HSRA is required to be undertaken (not the nature of the assessment itself), the committee considered the two relevant aspects; namely: the voyages or destinations, and the period/s of the year when an HSRA should be required.

The committee assessed the historical mortality data for shipments over a considerable period of time, and accepted that livestock mortality on voyages has reduced significantly over time. While a range of factors have contributed to this trend, there seems little doubt that the introduction of the HSRA requirement has been a contributing factor.

In considering the voyages or destinations for which an HSRA will improve welfare outcomes, the committee was of the view that livestock will be at risk of heat stress on any voyage that crosses the equator headed for northern hemisphere ports. Noting that the HSRA model is being revised and will be based on (heat stress–related) welfare risk rather than simply mortality risk, the committee was of the strong view that the assessment should be applied to all voyages where livestock may be at risk of heat stress. Accordingly, the committee’s position is that a HSRA be required for all livestock voyages that cross the equator to any destination. In reaching this position, it is acknowledged that the HSRA model will need to be adapted for application to voyages to destinations outside the Middle East.

With respect to the period/s of the year when an HSRA should be required, the committee, in the light of the above recommendation (to require an HSRA for all voyages crossing the equator), found no evidence to support introducing a time period to this requirement. Putting these together, the committee’s position is that an HSRA be required for all voyages crossing the equator at all times of the year, from all Australian ports.

The current standard requires that, when undertaken, an agreed heat stress risk assessment must indicate the risk is manageable as per the testing criteria in the standard. The testing criteria are set out in Part 4G.3 (of the reformatted standard). As these include mortality–based criteria, this section of ASEL will require revision in line with the new HSRA model once finalised, given that the new model is to be based on welfare outcomes not (simply) mortality outcomes.

The committee does note that the current review of the HSRA model only relates to sheep, flowing as it does from recommendations made in the McCarthy report (which was restricted to sheep). The committee stresses the need for the model to be revised for cattle also, acknowledging that this may require further research to obtain the necessary scientific data.

**Related considerations**

Other sections of the standards (for example on–board stocking density for sheep and *Bos taurus* cattle exported from southern ports) set particular or altered requirements to apply during the ‘northern summer’. It was the committee’s view that this approach should remain. The standards currently define this period as 1 May to 31 October.

A range of submissions were received concerning the period of the year that best defines the ‘northern summer’ when climatic conditions during the latter part of a voyage and at destination ports were most hot and humid, with most submissions providing evidence to support the current ASEL standard. This is also the period when livestock for export from southern ports in Australia are sourced and prepared in cool to cold conditions and thus less acclimatised to heat and humidity. After considering all the submissions and evidence, the committee found no basis to change the current period defined in the standards, being from 1 May to 31 October.

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| **Draft recommendation:**   1. That the standards be revised to require the application of an agreed heat stress risk assessment for all livestock voyages that cross the equator, at all times of the year, from all Australian ports. 2. That once the (separate) review of the heat stress risk assessment model is completed, the testing criteria in the standards should be revised to support the new model. 3. That the period 1 May to 31 October continue to be applied as defining the ‘northern summer’ in the relevant sections of the revised standard. |

## Voyage reporting

### Reportable mortality

#### Current requirements

The reformatted standard released with the issues paper set a whole–of–consignment mortality rate for livestock export voyages which, if exceeded, must be reported to the department. The ‘reportable mortality rates’ (RMR) in the reformatted standard are summarised below.

The reformatted standard released with the issues paper also identified a number of events which, should they occur, would qualify as a ‘notifiable incident’ that has the potential to cause serious harm to the health and welfare of animals. Notifiable incidents must be reported to the department as soon as possible, and within 12 hours. That report triggers an investigation by the department, including subsequent publication of investigation information on the department’s website (note: the investigation and publication process sits outside of the ASEL). One of the events which qualifies as a notifiable incident includes a shipboard mortality rate equal to, or greater than, a reportable level.

***Table 9: Reportable level of mortality in reformatted standard***

|  |  |  |
| --- | --- | --- |
| **Animal** | **Voyage length** | **Reportable mortality rate (RMR)** |
| Sheep and goats | – | 2 per cent, or three animals, whichever is greater. |
| Cattle and buffalo | Greater than, or equal to, 10 days. | One per cent, or three animals, whichever is greater. |
|  | Less than 10 days. | 0.5 per cent, or three animals, whichever is greater. |
| Camelids | – | 2 per cent, or three animals, whichever is greater. |
| Deer | – | 2 per cent, or three animals, whichever is greater. |

#### McCarthy review

In his review, Dr McCarthy acknowledged that on–board management of mortality is important to both the health and welfare of livestock and the crew. Dr McCarthy considered reportable mortality levels in his review, specifically in relation to public expectations. He recommended that the reportable mortality rate for sheep exported by sea be reduced to 1 per cent. The department implemented this recommendation via the *Australian Meat and Live‑stock Industry (Standards) Amendment (Reportable Sheep Mortality Level) Order 2018*, which reduced the RMR for sheep exported by sea to 1 per cent. While Dr McCarthy recommended this change, he noted that reportable mortality events were unlikely to increase as historically, the majority of voyages are below this level.

#### Discussion

Most submissions recognised the need for mortality reporting to support continuous improvement and transparency in the industry. While the current reportable mortality approach was regarded as a relatively blunt tool by many submitters, there was no suggestion that it should be removed entirely. Rather, the debate was around retaining the current thresholds, reducing them to reflect actual average mortality rates, or adopting a more dynamic approach, such as a threshold that moves with average industry performance, or mortality reporting by species and class. There was also agreement that a set of animal welfare indicators should be developed in addition to the current mortality indicator, however industry work in this area is still some time away from completion.

The independent literature review noted that livestock mortalities have generally been decreasing since data started being reported in 1995. It also noted that while overall mortalities have declined, the rates are not uniform across voyages. Higher mortality rates were noted for sheep transported from Australia in winter to the Middle East in summer (when mortality rates approximately double); and for cattle voyages (mainly *Bos taurus*) to the Middle East where mortality rates are approximately four times higher than for much shorter voyages to South–East Asia (mainly *Bos indicus*).

#### Committee consideration

The objective for requiring reporting of a mortality event above a threshold is to provide greater transparency to the public, to allow for independent investigation, and to provide industry with means of demonstrating implementing continual improvement. Factors that may impact a high mortality event are varied, and allowing investigations to better understand the specific circumstances that contribute to a reportable mortality event is important. Factors to consider in understanding any incident and future risk mitigation may include animal factors (class, type of, or farm of origin /registered premises, ship factors and management decisions), feed type and amount, space allowance and environment/climate factors including unpredictable weather.

Ideally, voyage reporting on the welfare of livestock would be based on a broad set of health and welfare measures (morbidity data) in addition to a mortality rate. However, measures of welfare are complex, requiring multiple measurements over time, and vary with many factors including livestock class and preparation and environmental context. These measures have not yet been clearly identified and described for on–farm assessment, nor adequately validated to determine thresholds to act as triggers for action and thus the need to continue with mortality rates per consignments in some way remains. However, it is recommended that daily voyage reports be considerably expanded to include additional morbidity and welfare data which means an extension of the daily data to be collected and recorded, using digital methodologies to standardise and facilitate recording and reporting (see Section 5.2, Other Voyage Reporting).

The committee received many submissions advocating a lower RMR. It was noted by the committee that the current rates in ASEL were set at a time when voyage mortality rates were considerably higher than the present. The committee noted that, for sheep, the average mortality rate for all voyages over the past three years was approximately 0.75 per cent, while the current RMR is 2 per cent, close to three times the three–year average. Similarly, for cattle the current RMR for short voyages (0.5 per cent) is some six times the three–year average of 0.08 per cent, and the RMR for long haul voyages (1 per cent) is also about 6 times the three–year average for such voyages (0.16 per cent). The committee believes there is a clear case for reducing the reportable mortality rates for sheep, cattle and buffalo, and on this basis recommends that the RMR for sheep be revised to 1 per cent (noting that this accords with the McCarthy report), and to 0.5 per cent for cattle and buffalo for all voyages, regardless of length.

There was considerable support for setting an RMR that was based on an agreed relationship with the average mortality rate, for example on a 3–year rolling average basis. The committee’s considered position is that the RMR should be regularly reviewed over time against voyage and industry performance, rather than fixing a set relationship in ASEL.

**Other mortality measures**

The current approach using an RMR is relatively crude but represents a marker of voyage and industry performance that can be tracked over time. However, the committee was concerned that the current approach does not account for voyage length, reducing its usefulness (and indeed equity) in comparing voyages of varying length and transparency in identifying shipboard conditions and mortality. For example, currently, a 10 day voyage can have the same total mortalities as a much longer—say 20 day—equivalent size voyage but have and report the same end-of-voyage mortality rate. The committee was drawn to alternative or additional approaches based on daily incidence or average daily mortality rate (ADMR), or an animal–time unit, such as the number of mortalities per 1000 animal days, as a more rational approach. With the imminent introduction of digital data reporting, the ability to calculate these incidence rates should become more straightforward. The recommendation for a reportable ADMR is 0.05 per cent for sheep, and 0.025 per cent for cattle. This has been calculated as a percentage slightly higher than that obtained by dividing the recommended new RMR by the published average voyage length for sheep and cattle over recent years.

Accordingly, the committee recommends the following for sheep and goats:

* The RMR should continue to be required, but set at 1 per cent for sheep as recommended by Dr McCarthy and accepted by the department, for all shipments by sea.
* An ADMR of greater than 0.05 per cent, calculated at the end of the voyage, be added to events that would qualify as a ‘notifiable incident’ under the standard.

The committee recommends the following for cattle and buffalo:

* The RMR should continue to be required, but set at 0.5 per cent for all voyages.
* An ADMR of greater than 0.025 per cent, calculated at the end of a voyage, be added to events that would qualify as a ‘notifiable incident’ under the standard.

For the avoidance of doubt, the ADMR is calculated by dividing the final voyage mortality rate by the length of the voyage (in days).

These recommendations introduce a new, more meaningful reporting parameter for mortality, which allows a fairer comparison of voyage performance for all shipments regardless of voyage length.

The committee recommends that these two mortality rates be monitored against voyage data, and that the level and utility of these rates be reviewed in approximately two years. This time period will provide regulatory certainty for the industry, as well as a reasonable period over which to collect actual data for comparison. The committee notes that whilst compliance arrangements are out of scope for its review, it expects this information would be useful in monitoring overall performance of the sector as well as the performance of individual exporters and shipments.

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| **Draft recommendations:**   1. That the reportable mortality level for sheep and goats should be reduced to 1 per cent, or three animals, whichever is the greater; and that an average daily mortality rate of greater than 0.05 per cent be added to the list of events that would qualify as a ‘notifiable incident’. 2. That the reportable mortality level for cattle and buffalo should be set at 0.5 per cent, or three animals, whichever is the greater; and that an average daily mortality rate of greater than 0.025 per cent be added to the list of events that would qualify as a ‘notifiable incident’. |

### Other voyage reporting requirements

#### Current requirements

There are a number of reports that need to be prepared for sea export voyages. Section 4F of the reformatted standard released with the issues paper set out the reporting requirements and specified personnel that must prepare them. A summary is provided below.

***Table 10: Reporting for voyages by sea***

|  |  |  |
| --- | --- | --- |
| **Report** | **Prepared by** | **Requirements in reformatted standard (issues paper)** |
| Daily Reports | Accredited stock person, unless an AAV is on board. | Required for voyages equal to, or greater than, 10 days.  Must commence on day one of the voyage.  Must include information outlined in appendices. |
| End of voyage | Accredited stock person, unless an AAV is on board. | Must be provided within five days of completion of discharge at final port, regardless of journey duration.  Must include information outlined in appendices. |

#### McCarthy review

Dr McCarthy considered the existing voyage reporting requirements, and how they may change with independent observers and new technology becoming available. He advocated for continuous automated environmental monitoring and further research into such monitoring opportunities by industry. He recommended that all vessels travelling to the Middle East during the 2019 northern hemisphere summer have automated continuous environmental monitoring equipment installed.

Dr McCarthy also suggested that a panting score and a heat stress score should be mandatory in reporting processes. His view was that a panting score, combined with a heat stress score and temperature and humidity data would provide a complete view of livestock conditions. This requirement has been given effect for relevant voyages up to mid–September via directions.

#### Discussion

Many submissions commented on voyage reporting with varying opinions on what should be included. Many of the submissions suggested additional elements for inclusion in daily and end of voyage reports, including; welfare indicators and environmental monitoring such as carbon dioxide, ammonia and other gas levels. However, others noted that considerable reporting already occurs and that more data is not necessarily better. New reporting requirements should only be implemented if supported by science and used to improve regulation or performance. Several submissions cautioned against more reporting given the risk that it reduces time for veterinarians and stockpersons to actually manage the livestock.

Several submissions suggested daily reporting should be required on all voyages, rather than those of ten or more days. A number of submissions also proposed that templates be standardised, and that industry adopt electronic reporting through app based technology.

Most people agreed that more needed to be done with the data that is already collected. One suggestion was that industry should proactively analyse existing and future data to improve practices, and that an epidemiological study could be conducted to drive improvements in the industry. Although outside the scope of the standards, a number of submissions indicated support for the publication of data on a routine basis.

The independent literature review noted mortalities have been generally decreasing since the available data began (1995). However, there was a suggestion that reported data may be unreliable due to the veterinarians and stockpersons being employed by exporters. It has been argued by authors of several reviews that animal welfare monitoring should not be solely restricted to addressing mortalities. Rather, it has been proposed that animal welfare management should be based on ensuring the physical and mental welfare needs of exported animals are addressed throughout the entire journey (Foster and Overall 2014; Wickham et al. 2017; Australian Veterinary Association 2018). This was echoed by the McCarthy Review, which recommended a move away from mortality towards morbidity reporting.

#### Committee consideration

The objective for collecting data other than mortality rates is to provide more detail about the monitoring of welfare of animals on each consignment, to promote increased transparency, to identify contributing factors to livestock outcomes and to enable improved risk mitigation for future consignments. Importantly, reporting should allow the early detection of subtle changes in animal or environmental conditions on–board and allow proactive decision–making and corrective action to reduce risk of poor welfare outcomes. Reporting may initiate communications with exporter or the department, provide support to shipboard personnel, and facilitate detailed analysis of any adverse event. Ideally reports should include daily measures on animal welfare and morbidity and mortality data, including animal identification. This data, combined with an end of voyage report, should be analysed post–voyage with an epidemiological approach. The analysis should involve discussion with the AAV, an exporter representative and the department.

Factors that may impact a high mortality event are also likely to result in high morbidity rates, and prevention and treatment of these animals is pertinent. Factors contributing to poor welfare outcomes are varied, complex and differ with consignment type. Having a good understanding of morbidity data is essential to better understand the specific circumstances that contribute to an adverse event and to allow continuous improvement. The inclusion of animal identification (or at least pen ID) would allow any problems to be traced back to the animal source/farm of origin.

The committee understands there are several phases for effective widespread data collection, storage and analysis subsequent to routine animal monitoring.

* Data Collection: Data should be collected daily at the pen and recorded simply but in a standardised way. Standardised classification at the point of data capture is vital and use of digital technology such as a smart phone app is recommended. Identification of animals requiring observation, or treatment, classification of illness/ injury and types of medications or treatments administered should also be collected and reported on.
* Data Storage: Once recorded, data should be appended to a secure central database to facilitate ease of reading of current daily trends and for future long–term analysis. The recording of data should be real–time (at the time of monitoring) and uploaded as soon as is practical (at least daily, or when there is internet connection). Such data and daily trends should be available to key personnel for on–board management of animals.
* Animal Data: Data type should include animal ID (RFID for cattle; ear tag for sheep) pen ID, and a number of standard daily pen assessments of a range of animal welfare indicators, including identification of panting scores, signs of ill–health (injury or disease), treatments or animal movement to hospital pens, mortalities or euthanasia and post mortem findings. These data may be complemented with photos of animal condition, deck condition or post mortem images.
* Environmental data: Data detailing environmental conditions, wet bulb globe temperature (WBGT) (dry bulb temperature and relative humidity), ammonia levels and other pertinent on–board conditions such as sea swell, or other relevant management issue (e.g. depth and moisture of manure pad (sheep), pen wash down days (cattle) or incidents such as broken water pipes leading to pen flooding). In addition, data reporting on water and fodder consumption and feeding regime (amount fed per head, feed type), and bedding type if provided. With the move towards standardised collection of data, collection of these environmental and management measures will not be overly time consuming to record.

There is research currently underway, funded by the industry to:

* develop a methodology for standardised data collection using a smart phone app
* determine practical animal welfare indicators which reflect behaviour and physiology and could be included in pen–side assessments and reporting, and
* develop ways that environmental measures can be automated by installing multiple devices per deck that report directly to a central database.

These more detailed welfare indicators require validation on ships for sheep, cattle and buffalo. As a result, the committee does not suggest they be included in mandatory reporting at this stage. Data is needed across the various consignments, stock lines and destinations to understand the typical range of measures, and how they contribute a better understanding of livestock welfare. In the interim, while research is being performed and industry develops standardised collection of data using a phone app, the committee suggests daily reports are modified to capture more detailed measures around pant scores and livestock demeanour for each livestock line and deck conditions. It is suggested that the veterinary toolbox should include one hand held environmental device capable of measuring WBGT and humidity, and that the AAV or accredited stockperson be trained in its use. This is particularly important given the microclimates that may occur on decks. It would enable the AAV/stockperson to make critical measures pen–side, particularly when animals exhibit elevated panting scores.

It was noted that current daily reports require information on health and welfare issues which can be provided as a single assessment for all animals on the voyage. This is unlikely to be useful in understanding factors affecting morbidity and welfare of a particular species or line of livestock, especially given the various microclimates within decks. The committee noted there may be resourcing implications for additional welfare reporting as data collection would currently be the responsibility of the AAV or accredited stockperson. This role could be factored into discussions about independent observers. In the meantime, the committee suggests that welfare assessments be made daily on a representative sample of pens (e.g. a number of pens per species, class, and possibly line and deck). The exporter and the AAV or accredited stockperson can select which pens to monitor for welfare assessments at the time of loading, based on the stowage plan and nature type and complexity of livestock for each consignment. As some consignments may have multiple lines of a similar class of stock, a discussion can determine the appropriate number of pens to be selected for assessment.

Thus, daily reports should include health and welfare monitoring for at least each species and class (and possibly several lines), based on an assessment of at least 1–2 pens of sheep and 1–2 pens of cattle per deck. The pens selected should be representative of the class or line, the report should include a detailed panting score, description of animal demeanour, feed and water intake (including feeding activity), a report on faecal type and manure pad scores, and a WBGT and humidity reading. As noted, this is similar to the existing general daily report, but relating to pens representative of the consignment. In addition, as the voyage progresses, ‘at high risk’ pens (such as those with poor ventilation, those adjacent to engine, or exposed to direct sunlight) or pens ‘of concern’ (e.g. pens identified with water leaks, unusually wet manure pads or less trough space per pen) on each deck may be identified. Animals within those pens should also be subjected to more detailed welfare reporting as outlined above.

The panting scores for sheep could be based on the scoring system put forward by Dr McCarthy and since accepted by the department (Table 11). For cattle, the panting score (0–4.5) described in the Live Export Veterinary Handbook, could be used (Table 12). A panting score for buffalo does not currently exist and should be developed with high priority by industry.

***Table 11: Panting scores for sheep***

|  |  |  |  |
| --- | --- | --- | --- |
| **Panting score** | **Respiratory Rate (RR)** | **Respiratory character** | **Appearance or demeanour** |
| 0 – Normal | 25–80 | Normal | Normal |
| 1 – Normal (elevated RR) | 60–100 | Increased RR | Normal |
| 2 – Mild panting | 100–160 | Rapid RR | Discomfort |
| 3 – Open mouth panting | 160–220 | Laboured | Extreme discomfort |
| 4 – Open mouth panting with tongue out | Usually second stage | Extremely laboured | Distressed |

Source: McCarthy 2018

***Table 12: Panting scores for cattle***

|  |  |  |
| --- | --- | --- |
| **Breathing pattern** | **Panting score (PS)** | **Respiratory rate**  **(per minute)** |
| Normal – no panting, difficult to see chest movement | 0 | <40 |
| Slight panting, mouth closed, no drool or foam. Easy to see chest movement | 1 | 40-70 |
| Fast panting, drool or foam present. No open mouth panting | 2 | 70-120 |
| As for 2 but without occasional open mouth. Tongue not protruding | 2.5 | 70-120 |
| Open mouth and some drooling. Neck extended and head usually up. | 3 | 120-160 |
| As for 3 but with tongue out slightly and occasionally fully extended for short periods, Excessive drooling. | 3.5 | 120-160 |
| Open mouth with tongue fully extended for prolonged periods + excessive drooling. Neck extended and head up. | 4 | >160 |
| As for 4 but with head held down. Cattle ‘breath’ from flank, drooling may cease. | 4.5 | Variable – RR may decrease. |

Source: MLA/ALEC Veterinary Handbook for Cattle, Sheep and Goats

The daily reports should also require that where a panting score of 3 or 4 is observed, an estimate must be provided of the total number (count) or the percentage of pens with animals showing a score of 3 or more. An estimate should also be provided of animals within those pens showing panting score (3–4). The committee notes that the requirement for this recording may depend on the outcomes of the separate review on the HSRA model for sheep, and any ‘heat stress indicators’ produced by that process. As a result, the requirement for this data should be reviewed in 12–18 months.

These, and other more minor amendments, are shown in the requirements for daily and end of voyage reports at Appendix A and B (with key new requirements highlighted).

The committee foresees that with these changes, more detailed and valuable information will be submitted during and after each voyage. There is an urgent need for a considered review of this data after each shipment to identify any areas of concern and to pinpoint areas for improvement. An epidemiological discussion of any factor based on species and class will be far more valuable than considering data based on averages for species or deck alone. Hence, more resources will be needed in the department to analyse the information.

The committee notes that, in response to the issues paper, a number of submissions suggested that voyage reports should be publicly released. While the standard sets out requirements in relation to information to be collected, the decision on whether to release reports publicly is a matter for the department and should not be included in the standard.

|  |
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| **Draft recommendation:**   1. That the requirements for daily reports and end of journey reports be updated as per Appendix A and Appendix B in this report including: 2. Inclusion of more detailed welfare monitoring in daily reports based on an assessment of at least 1–2 pens of sheep, cattle, buffalo and goats representative of each class or line, per deck, as well as a welfare assessment for any ‘at high risk pens’ or ‘pens of concern’. |

## Onboard resources and management

### Management of bedding and ammonia levels

#### Current requirements

Provision of bedding, and management of that bedding, is an important part of managing the risk of injury or other adverse welfare outcomes during export. The reformatted standard released with the issues paper set out bedding requirements in part 3A.3.3 and 3B.4. It also included requirements associated with ventilation, which is relevant to discussions around the impact of ammonia levels of animal health and welfare.

***Table 13: Bedding and management for sea exports***

|  |  |
| --- | --- |
| **Animal** | **Summary of requirements in reformatted standards (issues paper)** |
| Cattle and buffalo | On voyages of 10 or more days, must be provided with sawdust, rice hulls or similar material.  Bedding must be at a rate of at least seven tonnes or 25m3 for every 1000m2 of cattle pen space.  Does not apply to cattle and buffalo loaded from Brisbane or a port north of latitude 260 south and exported to Southeast Asia or Japan. |
| Deer and camelids | On all voyages, must be provided with straw, shavings or sawdust.  Bedding must be at a rate of at least seven tonnes or 25m3 for every 1000m2 of deer pen space before animals are loaded. |
| All | Where used, bedding must be maintained to ensure the health and welfare of the livestock and meet requirements set out in paragraph 3A.3.3. |

***Table 14: Ventilation for export by sea***

|  |
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| **Summary of requirements in reformatted standards (issues paper)** |
| When animals are loaded on vessels with enclosed decks, the ventilation system must be run continuously from commencement of loading. |
| Ventilation must be monitored daily to ensure adequate thermoregulation of the livestock. |

#### McCarthy review

Dr McCarthy discussed bedding management for sheep export voyages. His view was that on routine sheep voyages, there was no need for bedding beyond the sheep manure pad. He did, however, note the strategic use of bedding for cattle to extend the life of the cattle pad on long haul voyages, and recommended that exporter’s heat stress management plans for sheep should include strategic use of sawdust before and/or during the voyage, if required, for targeted areas on the vessel. The department implemented that recommendation through the *Australian Meat and Live‑stock Industry (Export of Sheep to the Middle East) Order 2018*, which requires an exporter to ensure there is at least one tonne of bedding on board per 10,000 sheep.

#### Discussion

Submissions discussed the usefulness of bedding in managing spills, preventing slipping on loading and discharge ramps as well as in specific pen use.

There was general agreement that the sheep manure pad constitutes adequate bedding in most circumstances, provided adequate sawdust or wood shavings is available to manage wet or boggy pens. There were however, mixed, and strong, views on bedding requirements for cattle, particularly on long haul voyages. Submissions from welfare groups tended to argue for more bedding. Submissions from industry varied, with some suggesting additional bedding in certain circumstances and others arguing that existing bedding requirements should be retained. Views from AAVs varied. There was little evidence provided to support either increasing or decreasing existing requirements. Many submissions noted the project industry is commissioning to scientifically analyse the relationship between the different variables affecting bedding and the on board environment (particularly ammonia levels), as well as identifying ways to effectively estimate and mitigate risks.

There was general agreement that 25ppm was an appropriate maximum level for ammonia, although measurement presents a challenge.

The independent literature review confirmed the appropriateness of different approaches for sheep and cattle. The manure pad from sheep is generally quite dry, and if it remains firm, dry and intact, it is considered the preferred choice of bedding material for sheep during live export (Banney et al. 2009). On the other hand, manure from cattle is more liquid and generally requires more cleaning during long haul voyages. It noted that very little specific research has been conducted on bedding on ships, and there are issues associated with most of the materials. Provision of bedding is linked to ventilation and air quality (McCarthy and Banhazi 2016), whereby ventilation will affect the moisture content of the bedding, and the removal of noxious gases produced in the bedding. An early study recommended the monitoring of ammonia levels on–board, and that ammonia levels below 20 ppm (parts per million) should be the target during live cattle export (Tudor et al. 2003).

#### Committee consideration

**Bedding**

There was universal agreement in submissions to the committee that some bedding material should be provided on all voyages for either specific bedding use in pens and for use in managing water spills, to prevent slipping on loading and discharge ramps and for bedding within hospital pens (particularly those with lame cattle). Bedding may also be used to potentially limit harmful emissions such as ammonia. Bedding should be dry and consist of an appropriate material that is comfortable for livestock to lie on. Vacuumed wood shavings and rice hulls are preferred over sawdust, as there was some concern expressed about the relationship between the application of sawdust and the incidence of pinkeye. However, the committee noted it was challenging to be prescriptive in the amounts to be provided.

Bedding requirements may depend on voyage length and stocking type, but when provided, it should be in amounts sufficient to ensure animals can rest comfortably. For example, pregnant breeding cattle and heavier slaughter weight cattle, which have potential for more leg injuries, will require additional bedding. Sheep generally require much less bedding. All cattle voyages that require washing also require sufficient amounts of bedding, and long –haul voyages in particular require additional amounts. Bedding material is also useful for managing faecal pad moisture at times when it becomes too moist such as in high humidity or where there is high urine output.

Additional research has been commissioned under the Livestock Export Program to determine bedding requirements for both sheep and cattle and its effect on welfare outcomes. Further research on vessels is also required. The standards should be reviewed when the results of that research become available. To assist with future decisions on bedding requirements, the committee agreed that bedding type and use, as well as conditions of the manure pad, should be monitored and reported as part of voyage reporting.

**Ammonia levels**

There was universal agreement that high concentrations of ammonia gas are known to be deleterious for welfare and health. Ammonia is a strong mucosal irritant and at harmful levels predisposes to respiratory disease due to inflammation of the respiratory tract, and adversely affects feed intake. On ships, ammonia is produced and accumulates in livestock accommodation spaces as a result of the chemical and microbiological degradation of urine and faeces, although the exact risk factors and their interaction are not fully understood. Inadequate ventilation/air movement, high temperatures and humidity, reduced waste removal, management of bedding and high protein levels in feed are believed to be risk factors for ammonia emission. Studies on board vessels have demonstrated that high ammonia levels can be localised in parts of the holding areas of the vessel, and are not necessarily consistent over time.

Based on research studies, and submissions to the committee, there is a strong consensus that ammonia levels above 25ppm—as a time weighted average—are harmful to animals (and humans) and should be avoided. The committee recommends that the standards include a new requirement that ammonia levels must not exceed 25ppm, and that ammonia reduction measures (to the extent that these are understood) must be implemented if levels exceed or appear likely to exceed this level. Recording of ammonia levels should be incorporated into the daily and end–of–voyage reports.

The committee notes, however, that practical measurement of ammonia gas levels as a routine, regular measure is currently problematic. There is no technology currently available to provide the on–going automated ammonia measurements that would be necessary to demonstrate compliance with such a standard, particularly to calculate a time–weighted average. The committee also notes that a project has been established to scientifically analyse the relationships between the different variables affecting bedding and the on–board environment (including ammonia), and to identify ways to estimate and mitigate risks. While this project is only at the commencement stage, there is a good prospect that once completed, risk factors and mitigation measures will be better understood and ammonia–related requirements in the standards can be inserted or revised accordingly.

The committee strongly recommends that its requirements for bedding be reviewed in 12 to 18 months’ time in light of research on bedding being commissioned by the Livestock Export Program.

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| **Draft recommendations:**   1. That the standard require bedding management, including deck wash downs and replacement of bedding materials, to be sufficient to ensure good welfare outcomes for livestock, in particular, minimising slipping and abrasions, lameness, pugging and faecal coating. 2. That the standard require the consistency and depth of bedding material to be routinely monitored. 3. That the sheep manure pad continue to be used as the preferred bedding approach for sheep, but that the standards require a sufficient amount of sawdust, rice hulls or similar material be carried to manage moisture in the sheep manure pad, avoid slippage during loading and unloading, and manage incidents such as pen flooding. The necessity and adequacy of the amounts carried should be tested over the next 12 months, with adjustments to this requirement made on the basis of evidence obtained through daily and end of voyage reporting. 4. That the standards require that cattle and buffalo on all voyages are provided with sufficient sawdust, rice hulls or similar material to be used for bedding at a minimum rate of 4 tonnes per 1000m2 per application, with a minimum of 4 tonnes per 1000m2 provided after each washdown. 5. That bedding requirements for extended long haul voyages be agreed in the long haul management plan. 6. That once the variables affecting ammonia levels are better, and practical measurement devices are available (noting the current Livestock Export Program project underway), a requirement be inserted into the standards that: (i) ammonia levels in livestock spaces must not exceed 25ppm, and (ii) that ammonia reduction measures must be implemented if levels exceed 25ppm in any given area of a vessel. |

### Water, fodder and chaff requirements

#### Current requirements

Part 3A.2 of the reformatted standard released with the issues paper set out requirements in relation to the types and volumes of water and feed for export voyages. Part 3B.2(a) then went on to require that animals have ready access to feed and water on the export voyage. A summary is below.

***Table 15: Water and feed requirements***

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| **What** | **Summary of requirements in reformatted standard (issues paper)** |
| Water | At time of departure, vessels must hold or be able to produce quantity of water to meet anticipated needs of animals, plus statutory reserve amounts (Appendix G).  Must take into account species, class, age and expected weather conditions. |
| Feed | At time of departure, vessel must hold at least quantity of feed to meet anticipated needs of animals. Must also hold statutory reserve amounts (Appendix G).  Must not contain more than 30 per cent by weight of wheat, barley or corn, unless livestock have adapted to that ration over at least 2 weeks before export.  Fodder for cattle exported from a port south of 260 south must include at least one per cent of required feed as chaff and/or hay.  Pelleted feed must be accompanied by manufacturer’s declaration that manufactured in accordance with national pellet standards.  Pelleted feed for sheep, goats and camelids must also meet requirements in Appendix G.  Feed from previous voyage can remain in storage tank subject to certain requirements.  For deer, where concentrates are fed, they should be included at a ratio of 1:4 with roughage.  For all voyages through the Suez Canal, the statutory reserve of additional fodder must be increased to at least seven days. |

***Table 16: Access to feed and water, export by sea***

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| **Summary of requirements in reformatted standard (issues paper)** |
| Must have access to adequate water of a quantity and quality and frequency to maintain good health.  Must have access to suitable feed to maintain good health.  Take into consideration any particular needs of livestock species, class and age. |
| Must be offered feed and water as soon as possible after being loaded, and within 12 hours. |
| Feed and water supply systems must be monitored day and night and maintained in good order. |
| Adequate feed and water must be supplied to livestock awaiting and during discharge period. |

#### McCarthy review

Dr McCarthy noted that having an automatic watering systems on vessels transporting sheep to the Middle East removes a level of risk. He recommended automatic watering systems should be mandatory for vessels during the northern summer. The department implemented this recommendation for voyages of sheep to the Middle East through the *Australian Meat and Live–stock Industry (Export of Sheep by Sea to Middle East) Order 2018*.

#### Discussion

A number of submissions proposed that chaff or hay should make up at least one per cent of the on board ration. Several went into detail as to why; citing the importance of chaff in enticing shy feeders or cattle onto pellets, and as a management tool for treating bloat. A number of industry submissions noted the importance of the issue and referenced work commissioned through the Livestock Export Program to review fodder quantity and quality on export voyages. The results of this study could be beneficial in setting fodder levels in the future.

There was support amongst many submissions for additional/contingency fodder on voyages of 10 or more days. Additional/contingency fodder is essential for mitigating risks of a possible break down or delay in voyage duration. One submission also suggested calculating fodder for the voyage based on the day of departure (once all livestock loaded) and final date of disembarkation (last animal leaves the vessel). This would exclude any fodder consumed whilst the vessel is being loaded from the calculation. The inclusion of hay and chaff in the on board ration for voyages over 10 days was again supported by most submissions, with one suggesting chaff or hay inclusion should be two per cent.

Submissions were fairly consistent on watering systems, with most recommending that automated or ad lib water systems be mandatory for all vessels.

Basic fodder and water allocations were not addressed in the literature review. However, feed and water provision were mentioned in relation to heat load, with studies indicating that the timing of feed, amount and composition can contribute to capacity of livestock to manage heat load.

#### Committee consideration

The committee considered the wide range of submissions concerning the provision of fodder, information from relevant research and from AAV workshops held on this topic in 2012 and 2016.

It is clear that there is a need for improved pelletised feeds and feeding regimes for use on ships, and that the current standards are in need of substantial updating. Issues include fodder quality and quantity, and pellet specifications (including in particular the problem of pellets breaking into ‘fines’ when put through mechanised pellet distribution systems on ships), use of chaff or hay, and contingency reserves of fodder.

The committee noted that the Livestock Export Program has commissioned a substantial study specifically addressing fodder quality, pellet specifications, chaff volumes, contingency reserve volumes, and how fodder requirements are best calculated/quantified. It is studying fodder needs of separate classes of animals such as young animals, growing animals and adults with respect to any specific energy and nutritional needs. The project includes an updated literature review, and includes consultation with pellet manufacturers and AAVs.

It was the committee’s view that it would be premature to recommend significant changes to the standard regarding these matters at this time ahead of these studies being completed. Notwithstanding this position, the committee considered that some revision to the standard was necessary and timely.

It is widely accepted that the use of chaff or hay is essential as a supplement to pellets, and many submissions advocated for revising the standards to require chaff/hay for cattle voyages other than just those loaded at southern ports. The committee was of the view that the evidence justifies extending the requirement that fodder for cattle and buffalo includes 1 per cent chaff/hay, to all voyages not just those loaded at southern ports. Additional chaff/hay (ie 2 per cent of feed carried) was justified for extended long haul voyages (greater than 30 days).

The committee also believes that further clarity is necessary in the standards with respect to the method of calculation of feed quantity to be carried, by specifying that the expected days of loading and discharge be included along with voyage length when calculating ‘the anticipated needs’ of the voyage. Similarly, the committee was concerned to ensure that it was explicit that the specified statutory fodder reserve was not to be used to meet normal livestock feeding requirements during loading and discharge. In consideration of a number of submissions and voyage reports, the committee’s found that fodder was not infrequently being rationed due to concern that voyage duration may be extended beyond that anticipated, and came to the view that the statutory reserve of fodder should be increased to 4 days for all long haul voyages for all species (while maintaining the current requirement for a 7 day fodder reserve for voyages travelling through the Suez Canal).

With respect to requirements for water in the standard, after considering the submissions and available evidence, the committee found no basis to recommend revision of the current requirements for calculating water allowances (Appendix G of the reformatted standards). The committee did take note of a previous concern (by Livecorp/MLA) that the health and welfare of livestock is jeopardised by any pre–discharge curfew with respect to subsequent land transport that follows. The committee has accepted the need for the standards to require water to be provided *ad libitum* throughout the entire voyage, and that curfewing of access to water to meet trade requirements should not be permitted in summer in Middle Eastern ports.

The matter of automated water delivery systems on vessels concerns the construction and design of vessels, and is out of scope for the standards under review. Nonetheless, the committee does note that all ships carrying sheep (and cattle) to the Middle East now have automated watering systems (a McCarthy recommendation), but has found no evidence to support recommending to the department that this be extended to cattle watering systems on all vessels.

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| **Draft recommendations:**   1. That the standards require that all livestock be offered feed and water as soon as possible after being loaded on the vessel, and at the very least within 12 hours. 2. That the standards require water to be provided *ad libitum* throughout the voyage (including days of loading and discharge). The standards should also prevent any water curfew prior to unloading in the northern hemisphere summer in Middle East ports. 3. That the standards require that for voyages of 30 days or less, at least 1 per cent of the fodder required for cattle must be chaff and/or hay. For voyages of 31 days or more, at least 2 per cent of the required fodder must be chaff and/or hay. 4. That in relation to 3A.3.2, the ‘anticipated needs of the animals’ must include expected days of loading and discharge, rather than applying from the time of departure. 5. That in relation to 3A.3.2, the statutory reserve should be increased to 4 days for all voyages longer than 10 days, regardless of species (while maintaining the current requirement for a 7 day fodder reserve for all voyages travelling through the Suez Canal). 6. That the standards are further reviewed without delay once current studies into fodder quality, quantity and pellet specifications are completed. |

## Onboard personnel

#### Current requirements

The qualifications and role of personnel on board the vessel has been discussed in a number of reviews. Part 3B.5 of the reformatted standard released with the issues paper reflected requirements currently set out in ASEL v2.3. Whilst not specified in the standards, in practice the department requires an AAV to be present on all voyages to or through the Middle East, as well as for voyages to new markets (i.e. export to a new country), new market trial voyages, maiden voyages, and for any other voyage at the department’s discretion.

***Table 17: Competent personnel***

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| **Requirements in reformatted standard (issues paper)** |
| Accredited stock person must accompany each consignment and remain with it until discharge is complete at final port. |
| AAVs must accompany each consignment where required by the department and remain with it until discharge is complete at final port. Lists the following circumstances where required:   * Voyage travels through Middle East. * Voyage involves new or recently renovated vessels. * It is the first consignment for the exporter. |
| AAV and accredited stock person can be the same person. |
| Accredited stockperson and AAVs must work with the vessel’s Master and crew to ensure and maintain health and welfare of the livestock. |
| Requires all personnel handling and caring for stock to be able to demonstrate adequate level of experience and skill. |
| Pregnant livestock must be accompanied by an accredited stockperson with experience. |

#### McCarthy review

In his recommendations, Dr McCarthy suggested that a taskforce, perhaps the ASEL Review Technical Advisory Committee, determine the roles and responsibilities of AAVs, independent observers and accredited stockpersons. The relevant discussion in Dr McCarthy’s report includes a number of questions around what qualifications, training, knowledge and skills are required to enable a veterinarian or stockperson to perform their role effectively. He also considers what tools or information are required, for example to perform and interpret environmental monitoring and ventilation, specifically in relation to voyages to the Middle East during the northern summer.

The department has carriage of the independent observer program, and the consideration of their role is outside the scope of this review. The responsibilities for AAVs are also broadly contained in legislation including the *Export Control (Animals) Order 2004*. The framework under which AAVs and accredited stockpersons are engaged is outside the scope of this ASEL review.

#### Discussion

Submissions agreed that having appropriately skilled and competent personnel on voyages is essential. A large number of submissions recommended having an AAV accompany every voyage (regardless of length). Some suggested they should be independent of the exporter. Others were comfortable with maintaining the current arrangements, with the regulator having discretion to put an AAV on board voyages as needed (Export Advisory Notice 2016–14 refers).

Several submissions, including one submitted by a group of AAVs, called for stockpersons to be allocated based on a ratio of stockperson to livestock. Others were of the view that stockpersons should be allocated on an outcomes basis to ensure livestock receive necessary care and oversight on voyages.

Several submissions raised the need for further clarification on the roles of AAVs and accredited stockpersons, particularly in light of the introduction of independent observers. Submissions defined the role of stockpersons to include basic husbandry, health care, feeding, watering and hygiene of livestock. AAVs were seen to be responsible for overall monitoring and maintenance of livestock health.

#### Committee consideration

In its consideration of on board personnel and their respective roles in the monitoring and management of animals, the committee noted the mutual interdependence of these personnel and the importance of good working relationships between company–employed people (ie. AAVs, accredited stockpersons, competent stock handlers) and the ship’s crew. The committee also noted the importance of appropriate training for all personnel involved in the care and management of livestock.

The committee examined the specific requirements of Section 3B.5 (Animals are managed by sufficient competent personnel) of the reformatted (issues paper) standards to ascertain whether any of these requirements should be amended. In doing so, the committee’s underlying objective was to ensure that the extent of veterinary care and supervision available is proportionate to the risk of the journey and the type and number of animals carried.

The committee recommends that the requirement that an accredited stockperson accompany each consignment of livestock should be retained in its current form (ie. Section 3B.5(a)).

In respect of the provisions for AAVs (Section 3B.5(b), the committee agreed that departmental discretion to require an AAV to accompany any export consignment should be retained, along with the provisions in section 3B.5(b)(i) relating to shipments travelling to or through the Middle East, shipments in new or recently renovated vessels or the first consignment for an exporter. However, the committee recommends that a further provision should be added to this section to require an AAV to accompany each consignment on long haul voyages, extended long haul voyages and voyages with pregnant livestock, unless otherwise agreed by the department. This proposed new provision would strengthen the risk–based approach to monitoring and managing livestock. At the same time, it would enable the department to retain some regulatory flexibility to recognise good performance based on sound performance measures.

The committee also considered Section 3B.5(b)(ii) which allows the AAV and accredited stockperson to be the same person if that person holds both current accreditations. The committee recommends that this provision be removed. In the committee’s view, the AAV and accredited stockperson are there for specific individual purposes which should not be taken up with duties that would otherwise be filled by one or the other.

The committee recommends that the requirements in Sections 3B.5(c), 3B.5(d) and 3B.5 (e) be retained in their current form.

The committee noted that a number of submissions raised concerns about the sufficiency of personnel available at loading and during the voyage to manage livestock husbandry and welfare. This issue was also raised in the ASEL 2012–13 review. To address these concerns, the committee recommends that on every voyage there should be one competent stock handler per 3,000 cattle or buffalo, and one per 30,000 sheep. The accredited stockperson would count towards this requirement.

The committee noted that many submissions commented on the value of training and the need for training to be commensurate with the roles and responsibilities of on board personnel. The committee believes there would be considerable value in shipboard veterinarians completing the accredited stockpersons course as part of obtaining their AAV accreditation and that the department consider incorporating this into accreditation requirements.

The committee also noted that a number of submissions provided a set of practical suggestions that could be used to develop standardised duty statements for AAVs and accredited stockpersons. The committee suggests that the department consider using that information, and role descriptions developed in the 2012–13 review, to develop a set of clear roles and responsibilities for AAVs and accredited stockpersons.

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| **Draft recommendations:**   1. That the standards continue to require an *accredited stockperson* to accompany each consignment of livestock. 2. That the standards require one *competent stock handler* (as defined in the reformatted standards) per 3,000 (or part thereof) cattle and buffalo, and/or one per 30,000 (or part thereof) sheep. The standards should allow the accredited stockperson to count towards this requirement. 3. That the standards require an AAV to accompany any export consignment where required by the department. Notwithstanding that, an AAV must accompany each consignment on long haul voyages, extended long haul voyages and voyages with pregnant livestock, unless otherwise agreed by the department. 4. That the standard not allow the same person to be both the AAV and the accredited stockperson for any given voyage. |

## Other recommendations

In Stage 1 of the review process, the committee identified a number of amendments that should be made to the standards based on agreements reached in the 2012–13 review process and comments made in Stage 1 submissions. These interim recommendations were outlined in the committee’s Stage 2 issues paper, including supporting arguments. In response to views submitted, the committee has agreed the following.

***Table 18: Other amendments***

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| **Issue** | **Current committee position** |
| Export of deer and camelids | Remove specific requirements relating to the export of deer and camels by sea and replace a requirement for consignment specific management plans. The department will need appropriate expertise to assess these plans, with the requirements in ASEL v2.3 available as a reference point. |
| Export of goats | Retain requirements in relation to the export of goats by sea, given that whilst exports are not occurring, they are technically possible under the terms outlined in Export Advisory Notice 2016–10.  Amend paragraph 1.A.1.1(b) to require that for export of goats by sea, a secondary inspection be conducted at the registered premises – excluding the day of arrival and final inspection prior to loading – to confirm that the goats have been held in the registered premises for five (5) days and fed appropriately. |
| Definitions | Update definitions, including for pastoral and station sheep, and considering definitions used in the Australian Animal Welfare Standards and Guidelines. |
| Body scoring | Update as outlined in the Issues Paper. |
| Onboard veterinary medicines | Apply requirements in Table 10 to all cattle and buffalo exported by sea.  Agree that Appendix F be updated following completion of the Livecorp project on shipboard drug use, which will have findings for broader veterinary requirements. In the interim, add the following requirements for pregnant cattle:   * 5 litres of obstetrical lubricant per 2000 [dairy?] cattle * Calving ropes (1 set per ship) * Obstetrical gloves (1 box per ship) * Oxytocin (50ml per 1000 cattle) * Additional chlorohexidine (or equivalent) of 5 litres per ship * 1 litre iodine per ship (umbilical testing) * Uterine pessaries (10 per 2000 cattle) * Surgical equipment adequate to conduct a caesarean section. |
| Minimum liveweights | Increase the minimum liveweight of sheep and goats for export by sea to 32kg and 24kg respectively, to address higher mortality risk. |
| Horn requirements | Require that horned cattle have the nonvascular tip removed to a diameter of 3cm.  Retain the requirement that if horned, buffalo must have horns no longer than the spread of the ears. However, industry should quickly commission research to establish the impact of a longer horn for on board management of buffalo, including assessing the impact on access to feed and water. A more informed decision can then be made on horn length. In the meantime, producers and exporters must not implement inappropriate management practices to achieve a particular horn length and avoid a long horn management plan. De–horning should be conducted earlier. |
|  | Retain requirements for a long horn management plan. |
| Sourcing sheep | Remove references to sourcing through ports of Darwin, Weipa and Wyndham, and instead prohibit sourcing from all ports north of 26° south. |
| Water engorgement | Remove provisions relating to water engorgement. |
| Land transport standards | Retain requirements in 2B.1(a) and (b) – aimed at minimising the amount of time for which access to feed and water is restricted.  Retain curfew and rest requirements at set out in Appendix B – aimed at addressing cumulative stress of transport through the supply chain. |
| Extension of long haul voyage requirements | Require that all sea voyages via the Suez Canal, the Cape of Good Hope, the Panama Canal and Cape Horn, as well as any other route where the voyage is expected to be longer than 30 days, have at least seven days reserve of additional fodder. |

## Financial and economic analysis

The committee’s terms of reference require it to examine ‘viable, genuine, policy options’ and state that its recommendations must ‘balance the implications for animal welfare with the practicalities of livestock management, compliance costs and industry sustainability’.

These requirements make clear that the committee cannot focus solely on enhancing animal welfare—it must consider the impact of any proposed changes on the future viability of the industry. This chapter summarises the committee’s assessment of changes proposed in previous chapters on industry sustainability.

There have been several studies and reports done about the economics of the live export trade and possible options available to farmers[[1]](#footnote-2). This report will not repeat those analyses. Nor will it repeat analyses of how to value animal welfare[[2]](#footnote-3). Its focus is limited to assessing whether or not the welfare improvements recommended in previous chapters will leave the industry in a sustainable position.

### Live export trade

In 2016-17, ABARES estimated that the live export trade was worth $1.432 billion at free on board (fob) prices. Of this, sheep accounted for $0.233 billion and cattle $1.199 billion (see Table 20, Appendix C). ABARES data indicates that the average fob price per head for sheep exported to the Middle East rose from $89 in 2013-14 to $121 in 2016-17, and the average fob price per head for slaughter cattle rose from $790 to $1,262 over the same period.

Data published by the department provides a breakdown of exports by origin, destination and species (see Table 21 and Table 22, Appendix C). In calendar year 2017 approximately 86 per cent of all sheep exports originated in Western Australia, 13 per cent in South Australia and just 1 per cent in Victoria. The origin of cattle exports was more evenly spread between the states, although northern Australian regions dominated the slaughter/feeder trade and Victoria the breeder trade. The Northern Territory was the largest source of cattle, accounting for 36 per cent of exports, followed by Western Australia with 28 per cent and Queensland with 25 per cent.

In calendar year 2017 the major customers for sheep were Qatar (36 per cent) and Kuwait (33 per cent), while the main customers for slaughter/feeder cattle were Indonesia (60 per cent) and Vietnam (19 per cent). For breeder cattle, the main customer was China.

Table 23 (Appendix C) provides FAO data on the major importers and exporters of live sheep and cattle. Australia ranks as the fourth largest exporter of live sheep and third largest exporter of live cattle. Saudi Arabia, a market no longer accessible to Australian live sheep exporters, is by far the largest importer, accounting for almost 43 per cent of all trade in live sheep, followed by Kuwait at 7 per cent. The largest exporters—Sudan, Romania and Somalia—all enjoy a geographical advantage over Australia into Middle Eastern markets. Of the ten largest cattle importers, only one—Indonesia—is a major market for Australian cattle.

Data obtained by the committee shows that in Australia’s two largest sheep markets—Kuwait and Qatar—we are the major supplier with about 80 per cent of Qatar’s imports and about 40 per cent of Kuwait’s. And for cattle, Australia accounts for more than 95 per cent of Indonesia’s imports.

As noted in several submissions, the volume of sheep exported has declined significantly from a peak of around 7.3 million in 1983. In recent times, sheep exports have fallen from 2.916 million in 2010-11 to 1.851 million in 2016-17 (ABARES, Commodity Statistics). A range of factors have contributed to this decline[[3]](#footnote-4) but there remains a viable industry, albeit on a smaller scale than previously.

Meat and Livestock Australia price data shows that in 2018, the average price paid for an export sheep has been $117. For export cattle ex-Darwin, the average price for a ‘light steer’ has been $2.96 per kilogram liveweight and for a ‘heavy steer’ $2.67. The corresponding prices ex-Townsville have been $2.70 and $2.40. The difference is, in part, due to the higher freight cost to market ex-Townsville to destination markets compared to ex-Darwin and the inability of exporters to pass on higher freight costs to end buyers (ie.the market price in the destination sets the final amount and all logistics costs are then deducted to arrive at a price the exporter can pay the farmer).

### Cost implications for the trade

Some of the proposed changes outlined in this report will have minimal impact, while others are likely to have a more significant impact. The principal changes factored into the committee’s assessment of the sustainability of the trade are:

* A reduction in onboard stocking densities.
* Additional space requirements onboard for pregnant cattle and horned animals.
* An increase in minimum fodder reserves.
* An increase in minimum bedding requirements.
* An increase in the minimum number of clear days animals must spend in pre-export facilities.
* A need for veterinarians to be placed on more voyages than under the current ASEL.
* The need to conduct a HSRA for all voyages that cross the equator.
* An increase in the number of competent stock handlers.

While outside the committee’s terms of reference, placing an independent observer on all export voyages from 1 November 2018 will increase costs for exporters and has been factored into the cost model. In addition, the phasing out of double tiered decks for sheep carriers under the revised Marine Order 43 will change the economics for some vessels but has not been factored into the Committee’s modelling.

#### Approach used

The sheer number of variables in the export process means it was not possible to develop a single, definitive cost model. Ship sizes and economics, different flag states, animal weights, journey lengths, weather vagaries, capital and depreciation costs across different nations, interest rate variances, tax rate differentials, labour rate differences, etc can all change the overall cost equation. In the reduced time available to the committee it had to curtail development of a detailed and complex model with a substantial database for one that could be achieved in the timeframe.

Given this, the committee decided to examine four typical journeys that cover Australia’s major markets. They are:

* Freemantle to Kuwait (sheep)
* Darwin to Indonesia (slaughter & feeder cattle)
* Townsville to Vietnam (slaughter cattle), and
* Portland to China (breeder and slaughter cattle).

No mixed cargo voyages (i.e. cattle and sheep, or cattle and buffalo) were modelled.

The committee sought assistance from ABARES and a number of commercial operators in developing a model for each journey. On the cost side, the model covers livestock acquisition costs, land transport costs, pre-export facility costs, sea journey costs and overhead costs. On the revenue side, the model covers sale in the export destination and some minor revenue from wool gained from pre-shipment shearing of sheep.

A baseline scenario was first developed for each journey using the existing ASEL requirements. Once this was established, the inputs were progressively varied by changing those items that the committee is proposing—for example, by reducing stocking densities, the number of sheep onboard is reduced. While some costs will decrease (e.g. fodder consumed onboard) others do not and have to be spread over a reduced number of sheep (e.g. cost of veterinarian, port charges, etc). By changing each of the items and slowly adding more of them in until the full suite of proposed changes was included, the impact on profitability—and hence sustainability—could be assessed.

The committee is grateful to ABARES and the commercial operators who shared sensitive information to calibrate and test the model.

There is no escaping the fact that the changes proposed by the committee will increase costs, and that there are only a few outcomes that can follow:

* The exporter is able to pass on the costs in the form of higher prices in the destination market; or
* The exporter passes the costs back to farmers in the form of a reduced purchase price; or
* The exporter absorbs the cost increases and accepts a lower profit; or
* A combination of the first three; or
* The exporter exits the market.

The following section summarises the outcome of the work for the sheep and cattle markets. Buffalo rarely account for a full cargo and normally take a limited amount of space on a cattle voyage. They have not been modelled directly but can be expected to incur similar cost increases to those described below for cattle.

### Implications for affected stakeholders

The base data used in the analysis is commercially sensitive and not for publication. The results presented in this section are summarised and presented so as to maintain the confidentiality of the source data.

For both sheep and cattle, the major cost impost arising from the committee’s recommendations is due to changes in stocking densities. The current ASEL stocking densities are, in most cases, already superior to those of our major competitors and the lower densities recommended by the committee will widen this gap (see Table 19, below). The EU is often held up as the leader in regulating animal welfare standards but its space requirements for both sheep and cattle are considerably less—for a 50kg sheep the space proposed by the committee is 26 per cent higher than the EU requirement, and for a 400kg steer it is 20 per cent above the EU requirement. Brazil, which has recently issued new regulations concerning the trade in live animals, has adopted the space requirements as contained in ASEL v2.3.

***Table 19: Comparison of on-board stocking densities between exporters***

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|  | **Proposed space** | | **Required for others** | | | |
| **Sheep** | **Middle East (Nov-Apr)** | **Middle East (May-Oct)** | **EU** | **USA** | **Brazil** | **NZ** |
| 30 | 0.283 | 0.311 | 0.265 |  | 0.26 | NZ does not export live sheep |
| 40 | 0.342 | 0.377 | 0.290 | 0.226 | 0.29 |
| 50 | 0.397 | 0.436 | 0.315 | 0.260 | 0.31 |
| 60 | 0.447 | 0.492 | 0.340 | 0.294 | 0.36 |

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| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | **Proposed space** | | **Required for others** | | | | | **Cattle** | **Northern, >/= 10 days** | **Northern, <10 days** | **EU** | **USA** | **Brazil** | **NZ** | | 300 | 1.294 | 1.294 | 1.058 | 1.110 | 1.11 | 1.110 | | 400 | 1.565 | 1.565 | 1.305 | 1.450 | 1.45 | 1.450 | | 500 | 1.813 | 1.813 | 1.553 | 1.790 | 1.79 | 1.790 | | 600 | 2.130 | 2.045 | 1.800 | 2.130 | 2.13 | 2.130 | |

Sources: ASEL submission, p65, EU Regulation 1/2005, Annex I, Brazilian Regulatory Instructions No.46 of 28 August 2018.

As described in Chapter 3, the change in stocking densities is greater for sheep than cattle. The current ASEL already gives heavier cattle more space than the allometric formula generates and for lighter cattle the differences between the current space requirements and those being proposed are smaller than is the case for sheep. The implied k values from current ASEL stocking densities for 30-65kg sheep are 0.024-0.027 and these will increase to 0.030-0.033. But for 300-550kg cattle, the implied k value under current requirements ranges from 0.026 to 0.035 and will increase to 0.030-0.035. Consequently, the financial impact is less for cattle shipments than sheep shipments.

While many of the input costs are denominated in Australian dollars (e.g. livestock purchase price, pre-export facility housing), some are in foreign currencies (e.g. ship chartering is commonly in US dollars) and subject to currency fluctuations. Similarly, the sale price in the destination market is often specified in a currency other than the Australian dollar. The modelling has assumed a constant exchange rate throughout. A variation in the Australian dollar exchange rate and hedging practices of the exporters can have a material impact on the financial results and the following sections need to be considered accordingly.

#### Sheep

The committee modelled a large vessel capable of carrying approximately 70,000 sheep averaging 50 kg each under current ASEL requirements as the base case scenario. Two base cases were modelled, one covering November through April and the second from May through October. The space allowances used in the base case scenario for May through October were those contained in the existing ASEL, not those applied for 2018 following the McCarthy Review.

Weight ranges from 30kg to 60kg per head were modelled and the results presented here relate to the most common weight categories of 45-50kg.

Under *current ASEL requirements*, the model generated a margin above 10 per cent for each voyage at the 50kg class all year round. It fell to below 10 per cent at the 60kg class during November to April and fell a further 2 percentage points during May to October.

Changing the stocking densities as proposed in this report for the 50kg class reduced the margin by 6 percentage points during November to April and 4 percentage points during May to October, all other factors being held constant. In both instances the margin fell to well below 10 per cent. Given the risks involved in an export shipment, a margin of less than 10 per cent is unlikely to be acceptable to exporters and their financiers. So the committee set the margin to 10 per cent, held every variable other than the sheep purchase price constant, and derived what would have to happen to sheep prices to achieve a 10 per cent margin. The analysis revealed that sheep prices would have to fall $5-15 per head depending on the time of year. This would reduce the total cost base sufficiently to achieve a 10 per cent margin.

Noting though that the current margin for the northern winter period is above 10 per cent at the 50kg category, setting the margin at 10 per cent implies that the cost impost from the new requirements would be split fairly evenly between the exporter and the farmer. If the exporter wanted to maintain current margins then sheep prices would have to fall $15-25 per head.

Meat and Livestock Australia (MLA) price data for export wethers at WA sales in 2018 shows an average sale price of $117. A $25 reduction would result in a sale price in the range of $90-95 per head, which is at the low end of prices over the last five years (see Table 19, Appendix C). Even the lowest average price over the last five years—$89 in 2013-14—would be in excess of $95 when inflated to 2018 dollars. Given the alternatives available to farmers with current domestic prices for lamb and wool, exporters may not be able to pass the full cost increases back to farmers. A sharing of the costs would seem more likely if exporters want to remain in business.

The committee did not consider a scenario where the sale price in the overseas market was increased to cover the increased costs as realistic. Customer countries have other options available to them to source sheep and already do so. For example, Australia supplies only 40 per cent of sheep imported by Kuwait with the remainder coming from competitor countries. Similarly, Saudi Arabia, which used to take more than 100,000 sheep from Australia, was able to source them readily when it ceased importing from Australia. As noted in MLA’s September market report, the lack of exports from Australia to the Middle East over the northern summer period in 2018 has resulted in customers sourcing sheep from other countries. Qatar and Kuwait are reported to be sourcing sheep from Somalia, Sudan and Armenia; Jordan has been importing from Romania; and Israel has been importing from Portugal.

The committee accepts that the changes it is recommending will increase costs, but it does not believe these increases will make the live sheep export industry unsustainable. It is possible for exporters to achieve a reasonable margin on shipments given the risks involved and farmers to be able to receive a reasonable price, albeit reduced from recent times. But there will have to be a sharing of the costs: the committee’s analysis suggests that if the exporters are to absorb all of the cost increase then their returns will fall to unacceptably low levels given the business risks involved; and if farmers are to absorb all of the costs in the form of lower prices for their sheep that they are likely to pursue other options available to them.

#### Cattle

The committee modelled a medium sized vessel of 4500 square metres of pen space for each of the journeys. The results are, in general, less dramatic than those for sheep as the changes in stocking density are not as great. The biggest changes in stocking density relate to lighter cattle (200-350kgs) and this affects the feeder cattle trade more than the slaughter trade. The current ASEL usually provides heavier cattle with space allowances greater than that calculated using allometry with a k-value of 0.030. In some instances, the implied k-value in the current ASEL is 0.034-0.036.

**Darwin-Jakarta (Tanjung Priok)**

The modelling for this route focussed on feeder cattle using a live weight of approximately 300-350kgs. At 350kgs, the space allowance moves from 1.28 square metres per head to 1.433 square metres, an increase of roughly 10 per cent. The modelling resulted in a fall in the profit margin of about 3.5 percentage points and the total margin of less than 10 per cent. At this level, it could be expected that exporters will pass a proportion of the cost increases back to farmers in the form of lower purchase prices in order to keep the margin at or above 10 per cent. As noted above, there is already a price differential for cattle ex- Darwin and ex-Townsville which illustrates the practice of exporters needing to pay different prices for cattle depending on the freight costs to market.

For heavy cattle, such as those going directly into slaughter, the difference is much smaller as there are no space allowance differences. The additional costs from the committee’s other recommendations (e.g. minimum fodder reserves, time in pre-export facility) reduce the profit margin by less than 1 per cent.

**Townsville-Vietnam (Vung Tau)**

The modelling for this route looked at all weights from 300kgs up to 550kgs, with the results below focussed on the 400-450kgs range. At the 400kgs mark, the space allowance moves from 1.450 square metres to 1.565 square metres, an increase of just over 7 per cent. At this liveweight, the margin fell by about 3 percentage points but remained at a level that the committee considered sustainable.

For lighter weights of around 300kgs where the proposed space allowance increase results in a 14.2 per cent reduction in the number of cattle that can be carried, the results were more pronounced. The margin fell to less than 2 per cent. The liveweight price for live cattle of less than 350kgs ex-Townsville in 2018 has been 270 cents per kilogram and this would have to fall to 230-240 cents per kilogram to return the export margin to around 10 per cent. In this scenario, the exporter would have little choice but to reduce the price to farmers.

**Portland-China (Tianjin)**

This scenario covered the export of cattle from south of 26 degrees south latitude. As with the other cattle scenarios, the impact is greatest for lighter weight cattle as the space allowances being proposed by the Committee are the same as the current ASEL requirements for heavier cattle.

An export shipment of feeder/slaughter cattle was modelled first, then an export shipment of breeder cattle. Each was modelled for the May to October period and the November to April period.

For the May to October period the space allowance changes are less than for the November to April period. For a 300kg animal the space allowance increases by 5.7 per cent during May to October but by 14.2 per cent during November to April. The corresponding profit margin reductions were 2 and 5 percentage points respectively. At the 400kg point, there is no change in space allowance during May to October and minimal change in profit margin. But for November to April the space allowance for a 400kg animal increases by 7.3 per cent and the profit margin reduces by almost 3 percentage points. It is unlikely that the exporter could absorb the full cost increases and so is likely to pass some of the increases back to farmers in the form of lower prices.

**Summary**

The modelling reveals that while the industry is likely to be able to remain financially viable, the cost imposts cannot be absorbed fully by the exporter. Nor could the full costs be passed back to the farmer and the industry remain sustainable. There would need to be a sharing of the costs between farmers and exporters, with each taking a reduction in their profit margins. The consequent reduction in the margin of both the exporter and farmers may well result in the least efficient industry participants exiting the market, with only the most efficient remaining.

### Regulatory approach

The committee is mindful that the current ASEL is predominately an input based regulation model. It assumes that if the inputs are controlled then a satisfactory animal welfare outcome will follow.

However, best practice regulation is to focus on the outcomes desired and to promote compliance via incentive based mechanisms as well as input based processes. This encourages innovation in achieving the desired outcomes rather than simply ‘ticking the boxes’ to demonstrate compliance with the regulation.

An input based regulation model assumes that there is only one way – the regulated way – to achieve the desired outcomes. Achieving good animal welfare outcomes can be achieved by different combinations of factors and the proportion of each. Some exporters already exceed the current ASEL minimum requirements to achieve superior outcomes (e.g. hold stock longer than minimum period in registered premises, load more chaff and bedding, and provide pregnant cattle with more space). And some factors cannot be regulated. For example, the committee was told several times about the importance of the relationships between the exporter, the AAV, the stock persons, the ship crew and the Master of the vessel—the anecdotal stories told to the committee in submissions and meetings emphasised how excellent relationships between all the key individuals yield superior animal welfare outcomes, but this is not an area where regulation is very useful. But it should be recognised and encouraged.

The committee accepts that there needs to be a minimum set of requirements and has outlined these in earlier chapters. Minimum standards and enforcement are essential if the public is to regain trust in the system. But it also believes that there should be scope for the Regulator to reward superior performance based on demonstrated outcomes. It has the data to identify those operators who consistently achieve better welfare outcomes including low mortality and other reportable incidents and those that do not. The AAVs—and now independent observers—are able to report on the results of innovative practices being used and their results, and how different combinations of inputs can achieve the same or better outcomes. This should be encouraged, not discouraged by limiting operators to just the requirements of the standard and not considering alternative, innovative ways in which to achieve the desired welfare outcomes.

In addition, the committee has recommended increased data collection (e.g. see Section 5) to identify contributing factors to livestock outcomes and to enable improved risk mitigation for future consignments. This additional data would enable the Regulator to justify a more flexible approach and to incentivise continuous improvement.

In the reduced time available to the committee it has not been possible to explore alternative regulatory models in detail. However, the committee believes that the Regulator should be given some scope to approve exports that do not strictly tick every box in the standard. It should only have the power to do so where the exporter in question is able to demonstrate through an extensive history of superior animal welfare outcomes, and the additional data the committee is recommending be collected, that it should be permitted to deviate from the standard. And most importantly, the Regulator should be compelled to publish the decision to grant such a deviation and the reasons for granting it. Transparency is essential if such a power is to be granted to the Regulator so that all interested persons can understand it and retain confidence in the system.

In earlier stages of the review, the committee recommended that ASEL v2.3 Standard 2, Land Transport of Livestock, be deleted as it is no longer needed. The more recent Australian Animal Welfare Standards and Guidelines for the Land Transport of Livestock should apply. This removes any inconsistencies that may have existed between the two documents and also means that operators need to refer to one, rather than two, sets of requirements.

The committee’s Terms of Reference also require it to review the format of the standards and in earlier stages of the review the committee proposed a new framework. A further version of the reformatted standard has now been produced—the working draft reformatted standard— which incorporates the committee’s recommendations. However, the committee is mindful of other reviews and work underway (e.g. HSRA Review, Moss Review), and the narrowing of the scope of the terms of reference to exclude air transport. These processes may well result in recommendations that require further changes to the standard.

There is merit in amending the standard once—or at least as few times as possible—rather than multiple times. Those subject to complying with the regulations should not have to learn a new regulation every couple of months. Pending the finalisation of those other reviews, and the review of the standards for air transport, the regulator could incorporate the committee’s recommendations into the current format of the standard pending the outcome of those other processes. This may be less onerous on both the regulator in legislative drafting, and those subject to the standard in learning a new format as well as the new content.

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## Appendix A – Daily reports

|  |  |
| --- | --- |
|  | Daily reporting must commence on day one of the voyage and must include the following information.  *[Note: key areas of change from current daily reports are highlighted yellow]* |
| 1 | Veterinarian’s name and AAV accreditation number (if on–board) |
| 2 | Stockperson’s name |
| 3 | Date of report |
| 4 | Journey day number (must be consistent with the day number used by the Master of the Vessel) |
| 5 | Vessel’s position and estimated time of arrival at next port |
| 6 | The number of animals loaded by port of loading and species. For example:   |  |  |  | | --- | --- | --- | | **Species** | **e.g. Portland** | **e.g. Fremantle** | | Cattle | 100 | 200 | | Buffalo | 0 | 5 | | Sheep | 5 000 | 1 000 | |
| 7 | Daily environmental recordings:   * Average dry bulb and wet bulb temperature (°C) for each deck * Humidity (%) for each deck * Bridge temperature (°C) (ambient/wet bulb) and humidity (%) * Environmental conditions e.g. Sea swell; calm (1), moderate (2), rough (3) |
| 8 | Feed and water consumption (average per head), |
| 9 | Animal health and welfare by deck/tier, based on an assessment of at least 1–2 representative pens of each species, representative of the class or line, per deck.  The assessment must address the matters indicated in the table below. The final two columns provide example material.   |  |  |  |  | | --- | --- | --- | --- | | **Mandatory matter** | **Further mandatory detail** | ***Example*** | ***Example*** | | Pen ID |  | *3FWD* | *3AFT* | | Breed/line |  | *B wether* | *Euro steer* | | General pen demeanour | Alert/active/lethargic/anxious/ dull or other | *alert* | *dull* | | Fodder type | Pellets only/pellets mixed with chaff | *pellets* | *Pellets & chaff* | | Feeding behaviour & trough space | Normal (1), mild lunging (2), many aggressive (3) | *1* | *2/ inadequate trough space* | | Water quality and any supply issue | Clean/moderately clean/dirty | *clean* | *moderately clean* | | Faeces type | Normal (1), sloppy (2), runny diarrhoea (3), firm pellets (4) | *1* | *2* | | Manure pad score | Dry (1), sticky (2) and sloppy (3) | *1* | *2* | | Panting score \* | 0–4 (see ‘Respiratory type’ below) | *1* | *1–2* | | If any animals at panting score \_≥ PS 3, describe percentage of animals in pen at each panting score; approx. how many pens have animals \_≥ PS 3, | | *10% PS3*  *rest at PS2*  *only x3 pens* | *20% PS 3*  *50% PS1*  *Most pens* | |
| 10 | Respiratory type, by class and line and by deck, per day.  If a panting score of 3 or 4 is observed, wet and dry bulb readings should be taken twice per day near those pens and included in the daily report. |
| 11 | Health and hospital pen report.  Pen/Tag ID; clinical sign, medications, treatments or other actions |
| 12 | Mortality details, including Pen ID and tag numbers   * By species and class of livestock   + Number of animals euthanised, including reasons if known   + Number of animals found dead, including reasons if known * Daily/cumulative mortality figure by species and class   EXAMPLE:   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Mortality** | **Species/class** | **Pen ID / tag ID** | **Euthanasia (reasons)** | **Found dead (reasons)** | **Deck** | | Daily | *Cattle/Heavy euro bull*  *Buffalo* |  | *1 – BRD*  *0* | *0*  *1 – unknown* | 1 | | Cumulative | *Cattle Heavy euro bull*  *Buffalo* |  | *3 BRD*  *0* | *0*  *1 trauma* | 2 | | Average daily | *Cattle*  *Buffalo* |  |  |  |  | |
| 13 | For sheep exported to the Middle East: number or per cent of sheep showing clinical signs of scabby mouth. |
| 14 | Births and abortions (including estimated stage of pregnancy) and ear tag ID/Pen ID |
| 16 | General comments |

## Appendix B – End of voyage reports

|  |  |
| --- | --- |
| # | The end of voyage report must provide a general overview of the voyage, with mention of any specific issues relevant to the health and welfare of the livestock. It must include the following information.  *[Note: key areas of change from current end of voyage reports are highlighted yellow.]* |
| 1 | Vessel name |
| 2 | Voyage number(s) |
| 3 | Departure port(s)  Date the animals were loaded (by port if more than one)  Total number of animals loaded, by port of loading and species. Do not combine cattle and buffalo. |
| 4 | Discharge port(s)  Date the animals were unloaded (by port if more than one)  Total number of animals unloaded, by port of unloading and species. Do not combine cattle and buffalo. |
| 5 | Feed and water issues, including fodder and water consumed during the voyage and detail of any issues surrounding supply, availability/accessibility and quality  Maintenance issues and equipment failure |
| 6 | Environmental conditions, including sea conditions  Weather  Temperature (°C) and humidity (%) (where the livestock is kept)  Ventilation  Conditions of decks and bedding, if used. If used for sheep, provide information on type of bedding, amount used and purpose. |
| 7 | Detail on health and welfare of livestock, including any treatments given, reasons for the treatment and outcomes  Number of livestock born during the voyage, and the dam(s) by species, class and ear tag  Number of abortions during the voyage, and identities of the dam(s) by species, class and ear tag  Number of mortalities (per day, by deck/tier, species and class of livestock) including reasons (where known), pen ID and tag numbers. Separately identify animals that were euthanised, including pen ID and tag numbers. |
| 8 | Relationships with Master/crew/accredited stockperson/AAV |
| 9 | Comments on discharge operations |
| 10 | Information about any unexpected animal health or welfare issues. Information can include video and photographs, animal identification and location on the vessel and information which may allow trace backs. |
| 11 | Stockperson’s name.  Veterinarian’s name and AAV accreditation number (if on–board) |

## Appendix C – Chapter 9 tables

***Table 20: Exports of live sheep and cattle, 2010–11 to 2016–17***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **2010-11** | **2011-12** | **2012-13** | **2013-14** | **2014-15** | **2015-16** | **2016-17** |
| **SHEEP** | | | | | | | | |
| **Number**  **(‘000)** | Middle East | 2,447 | 2,232 | 1,903 | 1,968 | 2,038 | 1,782 | 1,788 |
| Other | 469 | 330 | 97 | 52 | 142 | 77 | 63 |
| Total | 2,916 | 2,562 | 2,000 | 2,020 | 2,180 | 1,859 | 1,851 |
| **FOB value**  **($m)** | Middle East | 295 | 300 | 183 | 176 | 213 | 209 | 216 |
| Other | 53 | 45 | 11 | 9 | 32 | 19 | 17 |
| Total | 348 | 345 | 194 | 185 | 245 | 228 | 233 |
| **Average FOB value per head** | Middle East | $121 | $134 | $96 | $89 | $105 | $117 | $121 |
| Other | $113 | $136 | $113 | $173 | $225 | $247 | $270 |
| Total | $119 | $135 | $97 | $92 | $112 | $123 | $126 |
| **CATTLE** | | | | | | | | |
| **Number**  **(‘000)** | Indonesia | 456 | 375 | 266 | 614 | 741 | 562 | 518 |
| Vietnam | 0 | 1 | 16 | 132 | 307 | 277 | 161 |
| Other | 272 | 203 | 231 | 260 | 247 | 275 | 138 |
| Total slaughter | 728 | 579 | 513 | 1,006 | 1,295 | 1,114 | 817 |
| Breeders | 77 | 105 | 121 | 127 | 84 | 144 | 99 |
| **FOB value**  **($m)** | Indonesia | 287 | 252 | 165 | 452 | 595 | 578 | 620 |
| Vietnam | 0 | 1 | 12 | 124 | 319 | 365 | 243 |
| Other | 212 | 159 | 162 | 219 | 249 | 337 | 168 |
| *Total slaughter* | *499* | *412* | *339* | *795* | *1,163* | *1,280* | *1,031* |
| Breeders | 161 | 239 | 251 | 255 | 192 | 271 | 168 |
|  |  |  |  |  |  |  |  |  |
| **Average FOB value per head** | Indonesia | $629 | $672 | $620 | $736 | $803 | $1,028 | $1,197 |
| Vietnam | na | na | $750 | $939 | $1,039 | $1,318 | $1,509 |
| Other | $779 | $783 | $701 | $842 | $1,008 | $1,225 | $1,217 |
| Total slaughter | $685 | $712 | $661 | $790 | $898 | $1,149 | $1,262 |
| Breeders | $2,091 | $2,276 | $2,074 | $2,008 | $2,286 | $1,882 | $1,697 |
| **COMBINED EXPORTS OF SHEEP AND CATTLE** | | | | | | | | |
| **Number (‘000)** | | 3,721 | 3,246 | 2,634 | 3,153 | 3,559 | 3,117 | 2,767 |
| **FOB value ($m)** | | $1,008 | $996 | $784 | $1,235 | $1,600 | $1,779 | $1,432 |

Source: ABARES, Commodity Statistics

***Table 21: Origin and destination of live sheep exports***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Origin** | | | **Total** | **Per cent of total** |
| **Destination** | **SA** | **VIC** | **WA** |
| Israel |  |  | 84,336 | 84,336 | 5% |
| Jordan |  |  | 53,702 | 53,702 | 3% |
| Kuwait | 74,594 | 1,990 | 528,094 | 604,678 | 33% |
| Oman | 6,000 |  | 108,820 | 114,820 | 6% |
| Qatar | 96,893 | 9,834 | 551,273 | 658,000 | 36% |
| Turkey | 53,958 |  | 144,345 | 198,303 | 11% |
| United Arab Emirates | 11,824 |  | 122,982 | 134,806 | 7% |
| Total | 243,269 | 11,824 | 1,593,552 | 1,848,645 | 1 |
| Per cent of total | 13% | 1% | 86% |  |  |

Source: Department of Agriculture and Water Resources

***Table 22: Origin and destination of live cattle exports***

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Destination** | **NT** | | | **QLD** | | | **SA** | | |
| **Slaughter** | **Breeder** | **Total** | **Slaughter** | **Breeder** | **Total** | **Slaughter** | **Breeder** | **Total** |
| Brunei | 3,872 | 0 | 3,872 | 0 | 0 | 0 | 0 | 0 | 0 |
| China | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indonesia | 237,935 | 7,609 | 245,544 | 136,838 | 2,430 | 139,268 | 0 | 0 | 0 |
| Israel | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Japan | 0 | 0 | 0 | 12,375 | 0 | 12,375 | 0 | 0 | 0 |
| Jordan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kuwait | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 50 |
| Malaysia | 12,745 | 512 | 13,257 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pakistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Philippines | 0 | 0 | 0 | 3,116 | 0 | 3,116 | 0 | 0 | 0 |
| Qatar | 0 | 0 | 0 | 0 | 0 | 0 | 199 | 0 | 199 |
| Sabah | 0 | 2,640 | 2,640 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sarawak | 800 | 1,943 | 2,743 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sri Lanka | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Thailand | 800 | 0 | 800 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turkey | 0 | 0 | 0 | 0 | 0 | 0 | 2,240 | 0 | 2,240 |
| UAE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vietnam | 39,989 | 0 | 39,989 | 63,115 | 213 | 63,328 | 0 | 0 | 0 |
| Total | 296,141 | 12,704 | 308,845 | 215,444 | 2,643 | 218,087 | 2,489 | 0 | 2,489 |
| % total | 35% | 1% | 36% | 25% | 0% | 25% | 0% | 0% | 0% |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Destination** | **VIC** | | | **WA** | | | **Australia** | | |
| **Slaughter** | **Breeder** | **Total** | **Slaughter** | **Breeder** | **Total** | **Total** | **% Total** |
| Brunei | 0 | 0 | 0 | 739 | 0 | 739 | 4,611 | 1% |
| China | 5,524 | 66,283 | 71,807 | 1,726 | 1,969 | 3,695 | 75,502 | 9% |
| Indonesia | 0 | 2,128 | 2,128 | 123,738 | 1,936 | 125,674 | 512,614 | 60% |
| Israel | 0 | 0 | 0 | 32,405 | 0 | 32,405 | 32,405 | 4% |
| Japan | 0 | 0 | 0 | 0 | 0 | 0 | 12,375 | 1% |
| Jordan | 0 | 0 | 0 | 10 | 0 | 10 | 10 | 0% |
| Kuwait | 0 | 0 | 0 | 554 | 0 | 554 | 604 | 0% |
| Malaysia | 0 | 0 | 0 | 717 | 0 | 717 | 13,974 | 2% |
| Pakistan | 0 | 5,988 | 5,988 | 0 | 684 | 684 | 6,672 | 1% |
| Philippines | 0 | 0 | 0 | 0 | 0 | 0 | 3,116 | 0% |
| Qatar | 0 | 0 | 0 | 1,449 | 0 | 1,449 | 1,648 | 0% |
| Sabah | 0 | 0 | 0 | 0 | 0 | 0 | 2,640 | 0% |
| Sarawak | 0 | 0 | 0 | 0 | 0 | 0 | 2,743 | 0% |
| Sri Lanka | 0 | 3,030 | 3,030 | 0 | 0 | 0 | 3,030 | 0% |
| Thailand | 0 | 0 | 0 | 0 | 0 | 0 | 800 | 0% |
| Turkey | 0 | 0 | 0 | 18,551 | 0 | 18,551 | 20,791 | 2% |
| UAE | 0 | 0 | 0 | 45 | 0 | 45 | 45 | 0% |
| Vietnam | 1,787 | 0 | 1,787 | 59,111 | 0 | 59,111 | 164,215 | 19% |
| Total | 7,311 | 77,429 | 84,740 | 239,045 | 4,589 | 243,634 | 857,795 | 100% |
| % total | 1% | 9% | 10% | 28% | 1% | 28% | 4,611 | 1% |

Source: Department of Agriculture and Water Resources

***Table 23: FAO data on major importers and exporters of live sheep and cattle***

|  |  |  |
| --- | --- | --- |
| **LIVE SHEEP EXPORTS** | | |
| **Exporters** | **Head** | **Percent** |
| Sudan | 4,843,747 | 28% |
| Romania | 2,553,171 | 15% |
| Somalia | 2,161,706 | 13% |
| Australia | 1,870,412 | 11% |
| Spain | 1,132,960 | 7% |
| Iran | 556,680 | 3% |
| Hungary | 553,782 | 3% |
| France | 486,650 | 3% |
| Jordan | 436,801 | 3% |
| Other | 2,666,941 | 15% |
| Total | 17,262,850 | 100% |
| **LIVE SHEEP IMPORTS** | | |
| **Importers** | **Head** | **Percent** |
| Saudi Arabia | 7,171,647 | 43% |
| Kuwait | 1,185,835 | 7% |
| Italy | 1,103,678 | 7% |
| Libya | 1,092,151 | 7% |
| Jordan | 650,560 | 4% |
| Greece | 547,356 | 3% |
| Qatar | 533,517 | 3% |
| Oman | 406,785 | 2% |
| Senegal | 400,000 | 2% |
| United Arab Emirates | 382,031 | 2% |
| Yemen | 380,000 | 2% |
| Israel | 317,567 | 2% |
| Other | 2,565,154 | 15% |
| Total | 16,736,281 | 100% |

|  |  |  |
| --- | --- | --- |
| **LIVE CATTLE EXPORTS** | | |
| **Exporters** | **Head** | **Percent** |
| France | 1,480,824 | 14% |
| Mexico | 1,130,460 | 11% |
| Australia | 1,130,328 | 11% |
| Germany | 827,024 | 8% |
| Canada | 765,914 | 7% |
| Mali | 314,263 | 3% |
| Uruguay | 307,131 | 3% |
| Brazil | 292,515 | 3% |
| Ethiopia | 287,000 | 3% |
| Romania | 276,470 | 3% |
| Other | 3,507,546 | 34% |
| Total | 10,319,475 | 100% |
| **LIVE CATTLE IMPORTS** | | |
| **Importers** | **Head** | **Percent** |
| United States of America | 1,708,174 | 17% |
| Italy | 1,150,563 | 11% |
| Indonesia | 652,547 | 7% |
| Spain | 643,342 | 6% |
| Netherlands | 576,501 | 6% |
| Turkey | 494,194 | 5% |
| Nigeria | 400,000 | 4% |
| Lebanon | 343,308 | 3% |
| South Africa | 263,060 | 3% |
| Laos | 234,724 | 2% |
| Other | 3,569,599 | 36% |
| Total | 10,036,012 | 100% |

## Appendix D – On board stocking densities

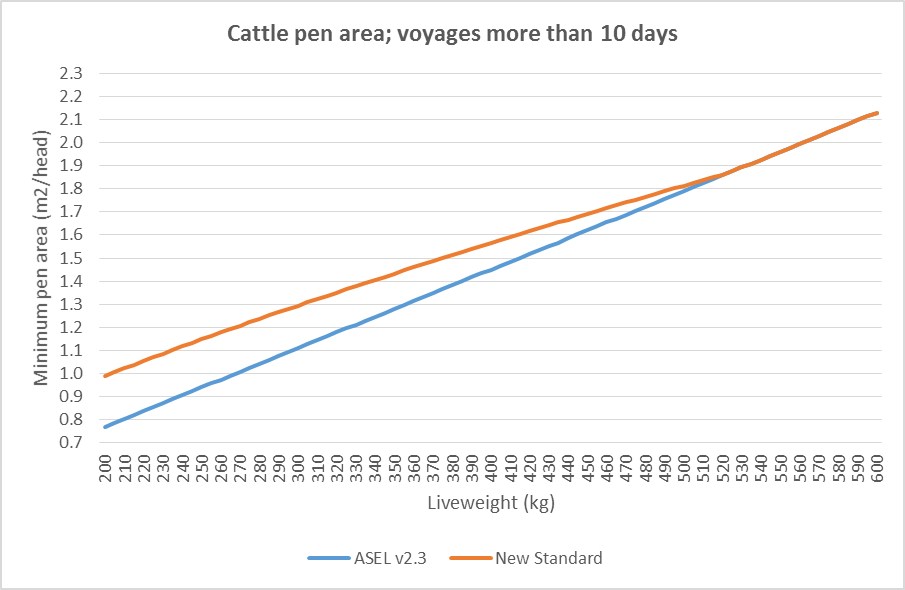
**Note: for the tables in this Appendix, green cells indicate figures calculated using allometric model and yellow cells indicates figures taken from ASEL V2.3.**

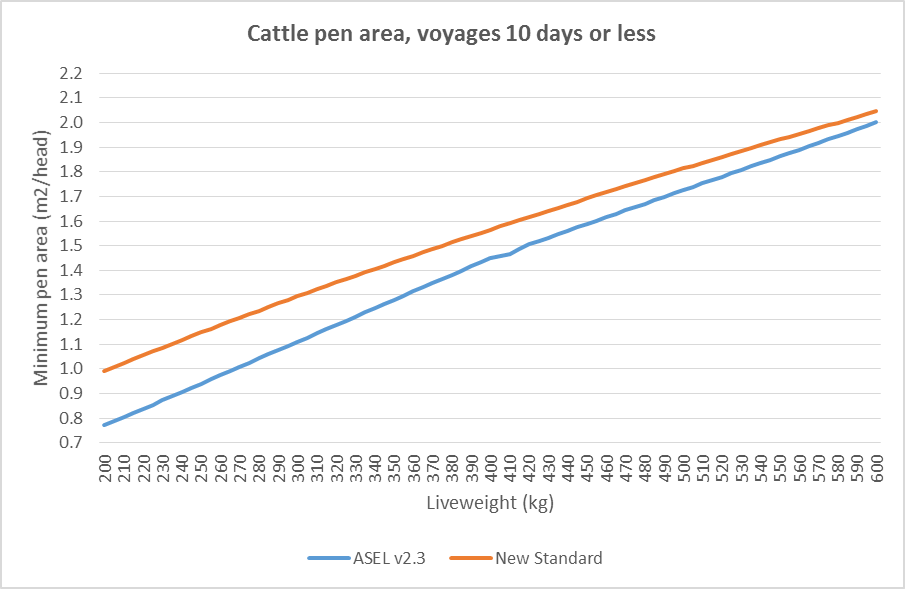
***Table 24: Minimum pen area per head for cattle exported by sea—default table***

|  |  |  |  |
| --- | --- | --- | --- |
| **Liveweight (kg)** | **Minimum pen area (m2/head)** | **Liveweight (kg)** | **Minimum pen area (m2/head)** |
| 200 or less | 0.990 | 305 | 1.308 |
| 205 | 1.007 | 310 | 1.323 |
| 210 | 1.023 | 315 | 1.337 |
| 215 | 1.039 | 320 | 1.351 |
| 220 | 1.055 | 325 | 1.364 |
| 225 | 1.070 | 330 | 1.378 |
| 230 | 1.086 | 335 | 1.392 |
| 235 | 1.102 | 340 | 1.406 |
| 240 | 1.117 | 345 | 1.419 |
| 245 | 1.132 | 350 | 1.433 |
| 250 | 1.148 | 355 | 1.446 |
| 255 | 1.163 | 360 | 1.460 |
| 260 | 1.178 | 365 | 1.473 |
| 265 | 1.193 | 370 | 1.486 |
| 270 | 1.207 | 375 | 1.500 |
| 275 | 1.222 | 380 | 1.513 |
| 280 | 1.237 | 385 | 1.526 |
| 285 | 1.251 | 390 | 1.539 |
| 290 | 1.266 | 395 | 1.552 |
| 295 | 1.280 | 400 | 1.565 |
| 300 | 1.294 | (cont.) | (cont.) |

***TABLE 25: Minimum pen area per head for cattle weighing 405 to 600 kg exported by sea—default table***

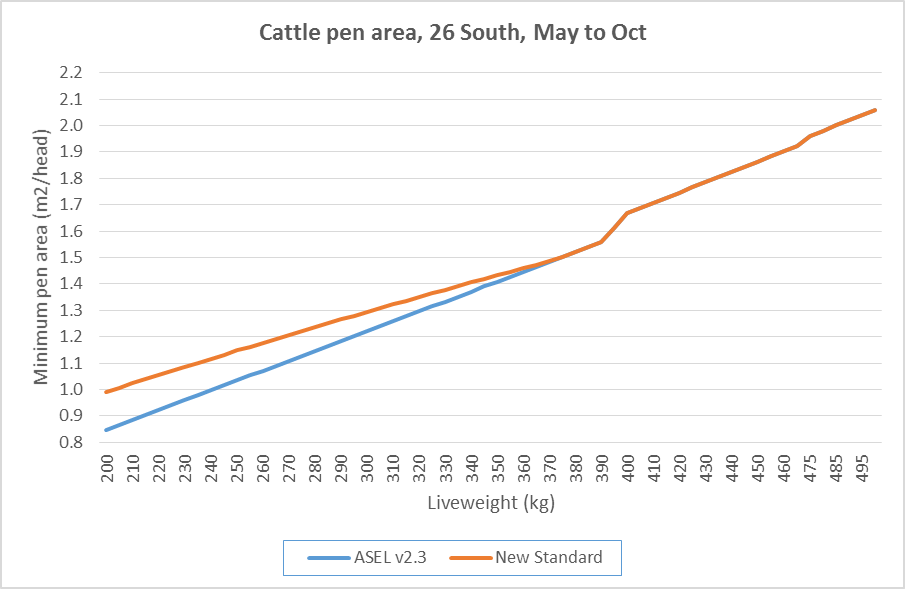
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Liveweight (kg)** | **Minimum pen area (m2/head)** | | **Liveweight (kg)** | **Minimum pen area (m2/head)** | |
| **Voyages of 10 days or more** | **Voyages of less than 10 days** | **Voyages of 10 days or more** | **Voyages of less than 10 days** |
| 405 | 1.578 | 1.578 | 505 | 1.825 | 1.825 |
| 410 | 1.591 | 1.591 | 510 | 1.837 | 1.837 |
| 415 | 1.603 | 1.603 | 515 | 1.849 | 1.849 |
| 420 | 1.616 | 1.616 | 520 | 1.861 | 1.861 |
| 425 | 1.629 | 1.629 | 525 | 1.875 | 1.873 |
| 430 | 1.641 | 1.641 | 530 | 1.892 | 1.884 |
| 435 | 1.654 | 1.654 | 535 | 1.909 | 1.896 |
| 440 | 1.666 | 1.666 | 540 | 1.926 | 1.908 |
| 445 | 1.679 | 1.679 | 545 | 1.943 | 1.919 |
| 450 | 1.691 | 1.691 | 550 | 1.96 | 1.931 |
| 455 | 1.704 | 1.704 | 555 | 1.977 | 1.942 |
| 460 | 1.716 | 1.716 | 560 | 1.994 | 1.954 |
| 465 | 1.728 | 1.728 | 565 | 2.011 | 1.966 |
| 470 | 1.741 | 1.741 | 570 | 2.028 | 1.977 |
| 475 | 1.753 | 1.753 | 575 | 2.045 | 1.988 |
| 480 | 1.765 | 1.765 | 580 | 2.062 | 2.000 |
| 485 | 1.777 | 1.777 | 585 | 2.079 | 2.011 |
| 490 | 1.789 | 1.789 | 590 | 2.096 | 2.022 |
| 495 | 1.801 | 1.801 | 595 | 2.113 | 2.034 |
| 500 | 1.813 | 1.813 | 600 | 2.13 | 2.045 |





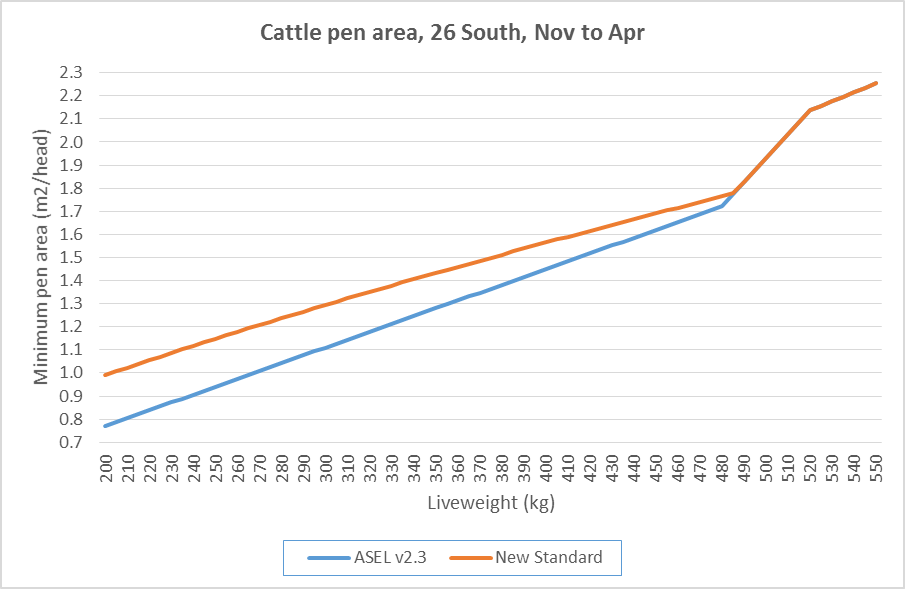
***TABLE 26: Minimum pen area per head for cattle exported by sea from a port south of latitude 26° south, from 1 May to 31 October***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Liveweight (kg)** | **Minimum pen area (m2/head)** | **Liveweight (kg)** | **Minimum pen area (m2/head)** | **Liveweight (kg)** | **Minimum pen area (m2/head)** |
| 200 or less | 0.990 | 300 | 1.294 | 400 | 1.668 |
| 205 | 1.007 | 305 | 1.308 | 405 | 1.688 |
| 210 | 1.023 | 310 | 1.323 | 410 | 1.707 |
| 215 | 1.039 | 315 | 1.337 | 415 | 1.727 |
| 220 | 1.055 | 320 | 1.351 | 420 | 1.746 |
| 225 | 1.070 | 325 | 1.364 | 425 | 1.766 |
| 230 | 1.086 | 330 | 1.378 | 430 | 1.785 |
| 235 | 1.102 | 335 | 1.392 | 435 | 1.805 |
| 240 | 1.117 | 340 | 1.406 | 440 | 1.824 |
| 245 | 1.132 | 345 | 1.419 | 445 | 1.844 |
| 250 | 1.148 | 350 | 1.433 | 450 | 1.863 |
| 255 | 1.163 | 355 | 1.446 | 455 | 1.883 |
| 260 | 1.178 | 360 | 1.460 | 460 | 1.902 |
| 265 | 1.193 | 365 | 1.473 | 465 | 1.922 |
| 270 | 1.207 | 370 | 1.486 | 475 | 1.961 |
| 275 | 1.222 | 375 | 1.502 | 480 | 1.98 |
| 280 | 1.237 | 380 | 1.52 | 485 | 2 |
| 285 | 1.251 | 385 | 1.539 | 490 | 2.019 |
| 290 | 1.266 | 390 | 1.558 | 495 | 2.039 |
| 295 | 1.280 | 395 | 1.613 | 500 | 2.06 |



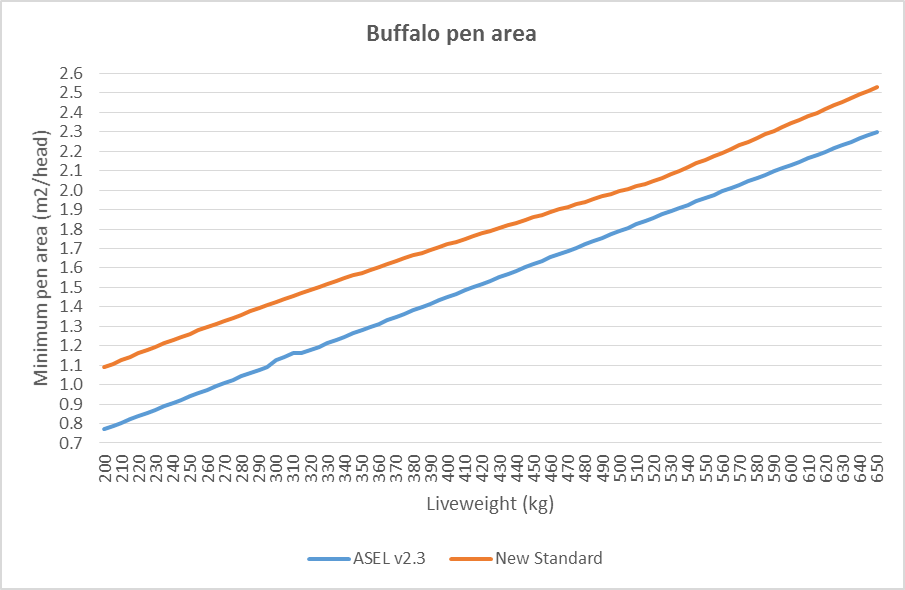
***TABLE 27: Minimum pen area per head for cattle exported by sea from a port south of latitude 26° from 1 November to 30 April***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Liveweight (kg)** | **Minimum pen area (m2/head)** | **Liveweight (kg)** | **Minimum pen area (m2/head)** | **Liveweight (kg)** | **Minimum pen area (m2/head)** |
| 200 or less | 0.990 | 320 | 1.351 | 440 | 1.666 |
| 205 | 1.007 | 325 | 1.364 | 445 | 1.679 |
| 210 | 1.023 | 330 | 1.378 | 450 | 1.691 |
| 215 | 1.039 | 335 | 1.392 | 455 | 1.704 |
| 220 | 1.055 | 340 | 1.406 | 460 | 1.716 |
| 225 | 1.070 | 345 | 1.419 | 465 | 1.728 |
| 230 | 1.086 | 350 | 1.433 | 470 | 1.741 |
| 235 | 1.102 | 355 | 1.446 | 475 | 1.753 |
| 240 | 1.117 | 360 | 1.460 | 480 | 1.765 |
| 245 | 1.132 | 365 | 1.473 | 485 | 1.777 |
| 250 | 1.148 | 370 | 1.486 | 490 | 1.827 |
| 255 | 1.163 | 375 | 1.500 | 495 | 1.88 |
| 260 | 1.178 | 380 | 1.513 | 500 | 1.932 |
| 265 | 1.193 | 385 | 1.526 | 505 | 1.984 |
| 270 | 1.207 | 390 | 1.539 | 510 | 2.035 |
| 275 | 1.222 | 395 | 1.552 | 515 | 2.086 |
| 280 | 1.237 | 400 | 1.565 | 520 | 2.137 |
| 285 | 1.251 | 405 | 1.578 | 525 | 2.157 |
| 290 | 1.266 | 410 | 1.591 | 530 | 2.176 |
| 295 | 1.280 | 415 | 1.603 | 535 | 2.196 |
| 300 | 1.294 | 420 | 1.616 | 540 | 2.215 |
| 305 | 1.308 | 425 | 1.629 | 545 | 2.235 |
| 310 | 1.323 | 430 | 1.641 | 550 | 2.255 |
| 315 | 1.337 | 435 | 1.654 |  |  |



***TABLE 28: Minimum pen area per head for Buffalo exported by sea***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Liveweight (kg)** | **Minimum pen area (m2/head)** | **Liveweight (kg)** | **Minimum pen area (m2/head)** | **Liveweight (kg)** | **Minimum pen area (m2/head)** |
| 200 | 1.089 | 355 | 1.591 | 510 | 2.021 |
| 205 | 1.107 | 360 | 1.606 | 515 | 2.034 |
| 210 | 1.125 | 365 | 1.620 | 520 | 2.047 |
| 215 | 1.143 | 370 | 1.635 | 525 | 2.063 |
| 220 | 1.160 | 375 | 1.650 | 530 | 2.081 |
| 225 | 1.177 | 380 | 1.664 | 535 | 2.100 |
| 230 | 1.195 | 385 | 1.678 | 540 | 2.119 |
| 235 | 1.212 | 390 | 1.693 | 545 | 2.137 |
| 240 | 1.229 | 395 | 1.707 | 550 | 2.156 |
| 245 | 1.246 | 400 | 1.721 | 555 | 2.175 |
| 250 | 1.262 | 405 | 1.736 | 560 | 2.193 |
| 255 | 1.279 | 410 | 1.750 | 565 | 2.212 |
| 260 | 1.295 | 415 | 1.764 | 570 | 2.231 |
| 265 | 1.312 | 420 | 1.778 | 575 | 2.250 |
| 270 | 1.328 | 425 | 1.792 | 580 | 2.268 |
| 275 | 1.344 | 430 | 1.806 | 585 | 2.287 |
| 280 | 1.360 | 435 | 1.819 | 590 | 2.306 |
| 285 | 1.376 | 440 | 1.833 | 595 | 2.324 |
| 290 | 1.392 | 445 | 1.847 | 600 | 2.343 |
| 295 | 1.408 | 450 | 1.861 | 605 | 2.362 |
| 300 | 1.424 | 455 | 1.874 | 610 | 2.380 |
| 305 | 1.439 | 460 | 1.888 | 615 | 2.399 |
| 310 | 1.455 | 465 | 1.901 | 620 | 2.418 |
| 315 | 1.470 | 470 | 1.915 | 625 | 2.437 |
| 320 | 1.486 | 475 | 1.928 | 630 | 2.455 |
| 325 | 1.501 | 480 | 1.941 | 635 | 2.474 |
| 330 | 1.516 | 485 | 1.955 | 640 | 2.493 |
| 335 | 1.531 | 490 | 1.968 | 645 | 2.511 |
| 340 | 1.546 | 495 | 1.981 | 650 | 2.530 |
| 345 | 1.561 | 500 | 1.995 |  |  |
| 350 | 1.576 | 505 | 2.008 |  |  |



***TABLE 29: Minimum pen area per head for sheep and goats exported by sea***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Liveweight (kg)** | **Minimum pen area (m2/head)** | | **Liveweight (kg)** | **Minimum pen area (m2/head)** | |
| **November to April k=0.03** | **May to October k=0.033** | **November to April k=0.03** | **May to October k=0.033** |
| 28 | 0.271 | 0.298 | 51 | 0.402 | 0.442 |
| 29 | 0.277 | 0.305 | 52 | 0.407 | 0.448 |
| 30 | 0.283 | 0.311 | 53 | 0.412 | 0.453 |
| 31 | 0.289 | 0.318 | 54 | 0.417 | 0.459 |
| 32 | 0.295 | 0.325 | 55 | 0.422 | 0.465 |
| 33 | 0.302 | 0.332 | 56 | 0.427 | 0.470 |
| 34 | 0.308 | 0.338 | 57 | 0.433 | 0.476 |
| 35 | 0.313 | 0.345 | 58 | 0.438 | 0.481 |
| 36 | 0.319 | 0.351 | 59 | 0.442 | 0.487 |
| 37 | 0.325 | 0.358 | 60 | 0.447 | 0.492 |
| 38 | 0.331 | 0.364 | 61 | 0.452 | 0.498 |
| 39 | 0.337 | 0.370 | 62 | 0.457 | 0.503 |
| 40 | 0.342 | 0.377 | 63 | 0.462 | 0.508 |
| 41 | 0.348 | 0.383 | 64 | 0.467 | 0.514 |
| 42 | 0.354 | 0.389 | 65 | 0.472 | 0.519 |
| 43 | 0.359 | 0.395 | 66 | 0.476 | 0.524 |
| 44 | 0.365 | 0.401 | 67 | 0.481 | 0.529 |
| 45 | 0.370 | 0.407 | 68 | 0.486 | 0.535 |
| 46 | 0.375 | 0.413 | 69 | 0.491 | 0.540 |
| 47 | 0.381 | 0.419 | 70 | 0.495 | 0.545 |
| 48 | 0.386 | 0.425 | 75 | 0.518 | 0.570 |
| 49 | 0.391 | 0.431 | 80 | 0.541 | 0.595 |
| 50 | 0.397 | 0.436 | 90 | 0.585 | 0.643 |

1. See, for example, ABARES 2014, *Live Export Trade Assessment*, and Pegasus Economics 2017, *Economic Issues Associated with the West Australian Live Sheep Export Trade*. [↑](#footnote-ref-2)
2. See, for example, McInerney J 2004, *Animal Welfare, Economics and Policy*, report of a study undertaken for DEFRA in the UK. [↑](#footnote-ref-3)
3. For example, the reduction in the Australian flock making fewer sheep available for export, Saudi Arabia ceasing to be a buyer as it is not participating in ESCAS, the end of subsidies for live animal processing in Bahrain, and the resurgence of the wool price. [↑](#footnote-ref-4)