



Australian Government  
Department of Agriculture

# Live sheep exports to or through the Middle East— Northern Hemisphere summer

## Draft regulation impact statement

Live Animal Export Division, OBPR ID: 23822



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# Summary

This draft regulation impact statement (RIS) has been prepared by the Department of Agriculture to consult on the economic benefits and impacts of proposed regulatory options to limit the risk of heat stress in live sheep exported to, or through the Middle East during the Northern Hemisphere summer. Improving animal welfare outcomes, by reducing the risk of heat stress, will support the sustainability of the live sheep export trade.

The department released the *Middle East sheep exports policy options discussion paper* (discussion paper) on 27 September 2019 for a 5 week public consultation. The discussion paper sought comments from interested stakeholders on 4 potential policy options. The discussion paper also posed a range of questions relating to the potential benefits and impacts of each option. Stakeholders were also asked to identify any additional options as well as types of data the department should collect to support its analysis of live export voyages.

The discussion paper received 66 submissions from a broad range of stakeholders, including livestock export industry organisations, producer groups, animal welfare non-government organisations, members of the public and other parties.

In drafting the options set out in this RIS the department considered information from public consultation including the McCarthy Review, the Heat Stress Risk Assessment (HSRA) Review, the mortality rate outcomes under the 2019 Northern Hemisphere summer conditions, voyage reports, independent observer reports, analysis of climatological data supplied by the Bureau of Meteorology (Bureau) and analysis of the environmental data and observations aboard vessels that travelled to the Middle East during May, September and October 2019.

Based on this information, 3 regulatory options are presented:

- Option 1: maintain the regulatory status quo (pre 2019).
- Option 2: implement a prohibition on live sheep exports from 1 June to 14 September with additional prohibited periods for Qatar and Oman.
- Option 3: implement a revised HSRA model consistent with recommendations of the HSRA Review.

A non-regulatory option has not been explored because it would not meet the fundamental expectation of the Australian community for Australian Government regulatory oversight of live animal exports. Removing or diminishing the role of the Australian Government in the regulation of live animal exports would pose a significant risk to the industry and could adversely impact on Australia's trading relationships and economy. In addition to seeking to protect animal welfare, regulation of the trade seeks to avoid a major incident that could adversely impact on Australia's trading relationships and economy.

This draft RIS analyses the economic and regulatory benefits and impacts of each policy option, with a focus on the department's preferred option (option 2). The draft RIS has been released for a period of public consultation and all responses from stakeholders will be considered before making final policy recommendations to the Australian Government.

The intended outcome of the adoption one of these policy options, or a different option after consideration of feedback, is to manage the risk of heat stress in live sheep exports and achieve desirable welfare outcomes on voyages while supporting a sustainable live sheep export trade to, or through, the Middle East.

The department acknowledges the ongoing research into heat stress management and the possibility that new science and technology could provide valid alternatives to the proposed options in the RIS. New developments in this area will be considered in an informal post-implementation review in late 2020 and more formally after the 2021 Northern Hemisphere summer.

# Make a submission

This draft regulation impact statement (RIS) encourages individuals and organisations to make submissions regarding the impact of the policy options outlined in [section 4](#). The department is particularly seeking to collect evidence and factual data on the impact of each option on you, your organisation and the community.

Please submit your feedback through our online stakeholder engagement platform, [Have Your Say](#).

In making a submission, please provide:

- evidence, references and data to support your statements
- a copy or link to any supporting evidence relevant to your submission.

The department will respect any request for confidentiality. Please mark your submission as confidential if this is the case. The department may need to incorporate de-identified general evidence in the RIS in consideration of a final decision.

Please include in your submission:

- name
- title
- contact address
- telephone number
- organisation, if applicable.

Please upload your submission as one file in one of these formats:

- Microsoft Word Document—DOC/DOCX
- PDF.

**Submissions close 5pm 3 February 2020.**

For more information, contact [MEsheepexports@agriculture.gov.au](mailto:MEsheepexports@agriculture.gov.au).

## Questions to consider in your submission

Stakeholder responses to these questions will assist the department to prepare the final RIS. We encourage you to answer these questions in your submission:

- For each option, what would be the financial benefits and/or impacts on you, your organisation and the community?
- For each option, are there any non-financial benefits and/or impacts on you, your organisation and the community?
- Which option do you prefer? What benefits and/or impacts does your preferred option provide over the other options?



- Can you compare the impacts or benefits of option 2 and option 3 on you, your organisation and community?
- Would Australia's live export industry be significantly disadvantaged by any of the options? If so, which option(s) and why?
- Can you provide any information about the flow-on effects of implementing each option, which has not been considered in this draft RIS?
- Are there any other factors you feel the department has not considered?

# Introduction

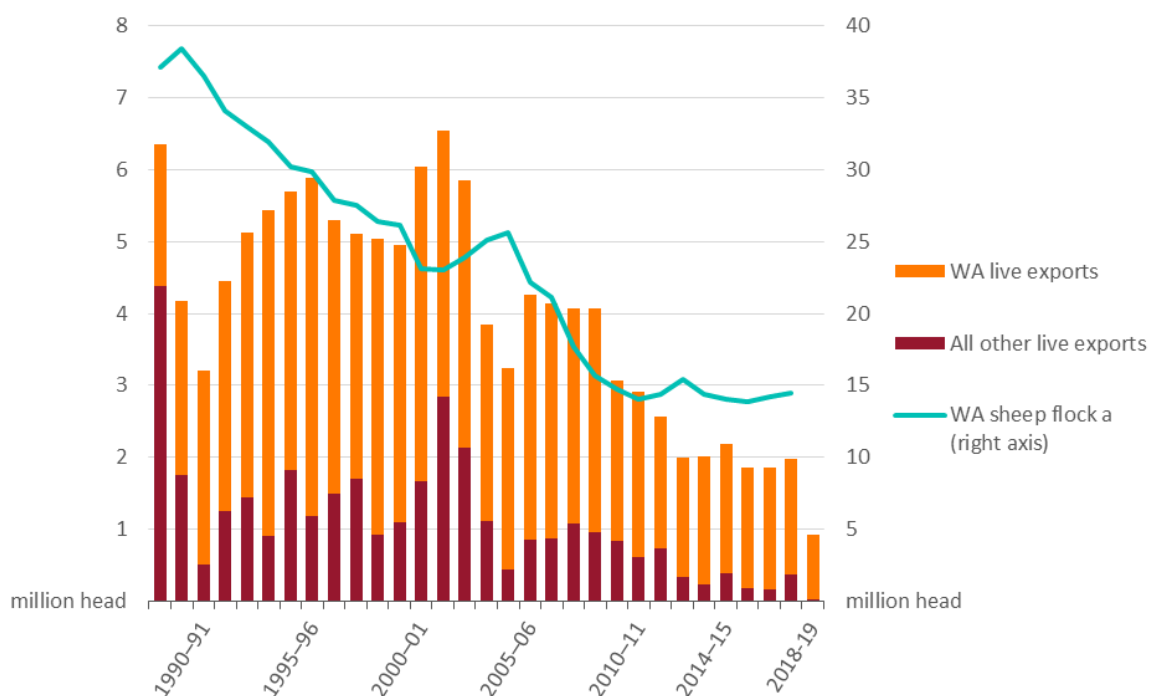
## 1.1 Live sheep export industry

In 2017–18 Australia exported around 2 million live sheep (valued at \$239 million). In that year, live sheep exports contributed 7% of the value of Australia's sheep and sheep meat exports, or about 3% of the global trade in sheep meat. Currently live sheep exports contribute around 0.5% of the value of Australia's total agricultural exports (ABARES 2019).

Exports of live sheep have generally declined since the 1990s due to a decline in the size of Australia's sheep flock and growing acceptance of chilled and frozen sheep meat in the Middle East (Figure 1). Low wool prices following the collapse of the wool reserve price scheme in 1991 provided a long term incentive for farmers to switch from sheep to cropping. As a consequence, Australia's flock numbers fell from 170 million in 1988–89 to 70 million in 2017–18 (ABS 2013, 2019a).

The WA sheep flock was estimated to be 14.5 million in 2017–18 (ABS 2019a). In 2017–18, 1.6 million sheep were exported live from Western Australia, which equated to 82.1% of Australia's total live sheep exports (Figure 1). Ports in South Australia accounted for 16.8% of live sheep exports to, or through, the Middle East, while ports in Victoria and New South Wales accounted for 0.8% and 0.3%, respectively. In 2018–19 the drought affecting eastern Australia meant that almost all live sheep exports were from Western Australia. The drought, combined with the shipping standstill following the suspension of 2 exporter licences in mid 2018 and the prohibition of live sheep exports to the Middle East in June, July and August 2019, resulted in significantly less exports in 2018–19.

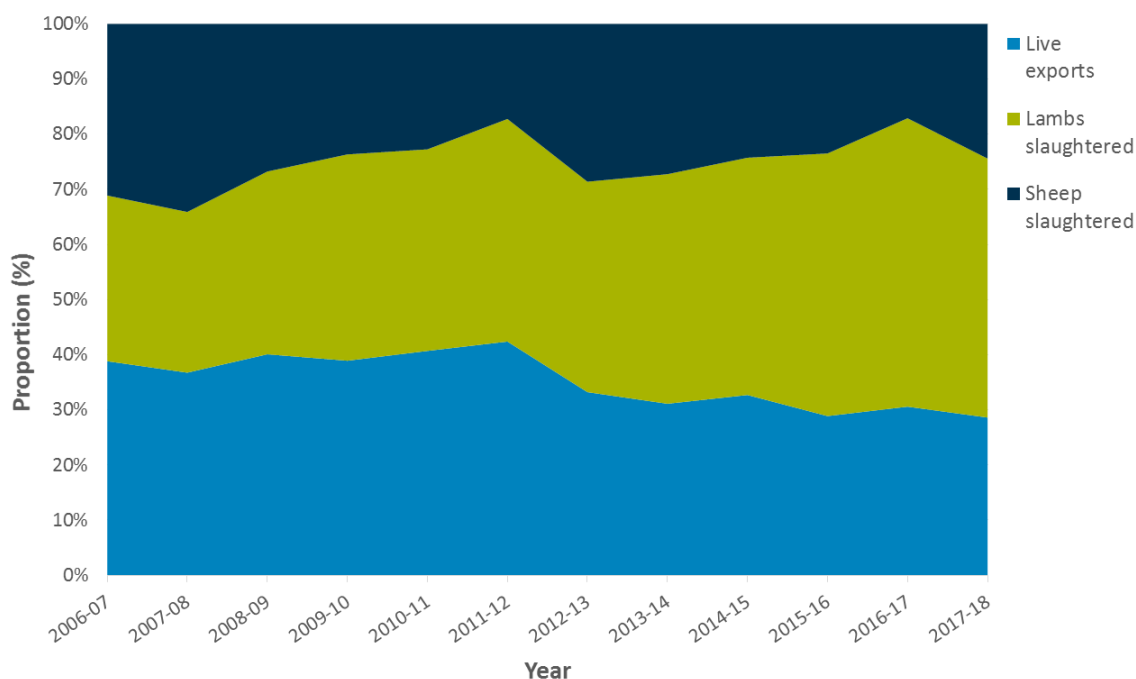
**Figure 1 Australian live sheep exports and WA sheep flock, 1988–89 to 2018–19**



Sources: Australian Bureau of Statistics (ABS) 2019, ABS 2013; Australian Bureau of Agricultural Research and Economic Sciences (ABARES).

Live sheep have been declining as a share of total WA sheep turn-off and comprised an average of 30% over the 5 years to 2017–18 (Figure 2).

**Figure 2 Breakdown of WA sheep turn-off, 2006–07 to 2017–18**



Source: ABS 2019b; ABARES

Within Australia, the live sheep export industry has a range of stakeholders, many of whom also participate in other economic activities. The export supply chain includes producers, livestock agents, shearers and wool agents, veterinarians, exporters, ship owners and operators, land transporters, operators of registered premises, stock feed growers and manufacturers, and other ancillary service providers. LiveCorp's schematic of the supply chain is provided in [Appendix A](#). Other interested parties in live sheep export policy include peak industry groups, animal welfare lobby groups, veterinary professional bodies, meat processors and state and territory governments.

### 1.1.1 Producers

In 2017–18 there were an estimated 1,800 sheep specialist farms (more than half of their income derived from sheep, lambs and wool) and 2,400 mixed-cropping sheep farms in Western Australia (less than half their income derived from sheep, lambs and wool). The WA sheep flock has evolved over the last 30 years, from being a wool-dominant flock to a flock producing both wool and sheep meat. In 2017–18, 47% of sheep turned-off in Western Australia were lambs for slaughter (Figure 2). The ABARES farm survey data show that lamb production has been consistently more profitable than wool production over the last 2 decades (Department of Agriculture 2019). Both specialist sheep farms and mixed farms have oriented production towards lamb production.

The ABARES farm surveys also show that most farms with sheep in Australia sell sheep for live export from time to time (Department of Agriculture 2019). A small proportion of sheep farms sell sheep for live export every year and most of these are in Western Australia.

Exporters mostly purchase sheep for live export directly from farms, although may also purchase sheep that have come through saleyards. In some cases, at the time of sale through saleyards it may not be known if sheep are to be processed locally or exported live.

Live sheep exports complement and add to the profitability of lamb production for Australian sheep farmers. This is especially true for sheep farmers in Western Australia where a combination of transport, market and agronomic factors have oriented the sheep industry towards live exports. Most of WA's pastoral areas have a short growing season before hot summer conditions restrict pasture growth. Therefore lambs may not reach the weight and quality standards of the 'prime' lamb market without supplementary feeding. In these situations, live sheep exports provide WA sheep farmers with a profitable alternative to the local 'prime' lamb market. This means that a farmer can set out at the beginning of the season to produce prime lambs, but sell the same sheep for live export at reasonable prices if seasonal conditions are not favourable. Due to its proximity, Western Australia has a significant transport advantage for vessels to the Middle East relative to eastern Australian states.

In addition, fewer buyers are present in WA sheep markets compared to eastern Australian states, and the competition provided by the live export market provides a relatively stable price floor for WA producers.

### **1.1.2 Transporters**

The Australian Livestock and Rural Transporter's Association is a federation of 6 state associations, representing around 850 transport businesses. It includes owner-drivers, small fleet operators and large fleet operators. The number of businesses heavily reliant on live sheep exports is likely to be much smaller than this. In their submission to the discussion paper, LiveCorp advised that livestock transporters are specialised. As such, stock trucks and trailers are not designed to carry other bulk loads, which may restrict livestock transporters from finding alternative work.

### **1.1.3 Shearing services**

Shearing is a specialist skill and shearing is normally conducted on a seasonal basis. Shearing services form part of the live export supply chain, with the requirement under the Australian Standards for the Export of Livestock (ASEL) 2011 (version 2.3, S1.19) that sheep for live export must have wool not more than 25mm in length. This means that sheep for live export may need to be shorn out of the normal annual cycle to meet this requirement. Discussion with industry indicated that shearing for the live export trade can fill a gap in the work calendar for shearing services providers. A prohibition may distort the distribution of their workload, resulting in an imbalance between strenuous work periods and no work.

### **1.1.4 Registered premises**

Registered premises are used for assembling and preparing livestock prior to export by sea. Sheep are currently quarantined for 5 days in a registered premises for Northern Hemisphere summer voyages, where they undergo inspection for health and welfare and other preparations prior to export.

At present, there are 13 registered premises in Australia approved to hold sheep prior to export. Depending on the time of year, between 75% and 100% of sheep destined for live export to the Middle East will be prepared at 3 of these premises, with all 3 located in Western Australia.

A registered premises may have indoor housing in elevated sheds or outdoor housing in paddocks, or a combination of both. Approved holding capacities for premises varies seasonally. The largest premises has a winter holding capacity of 140,000 sheep and a summer holding capacity of 84,000 sheep. If not used for live exports, these facilities could potentially be used as sheep feedlots to finish animals for domestic slaughter.

### **1.1.5 Stock feed manufacturers**

There are 6 feed mills supplying feed to the live export sheep trade, 3 in Western Australia, 2 in South Australia and 1 in Victoria. The proportion of product sold to domestic markets versus live exports varies from business to business, with some manufacturers focusing their business on supplying live exports. In discussion with industry, it is estimated that for these 6 feed mills, between 50% and 90% of production is for the live sheep trade, producing fodder specifically for consumption at registered premises and during voyages. It is estimated that these feed mills combined would employ around 100 staff. Feed mills may also provide fodder for domestic prime lamb production.

### **1.1.6 Meat processors**

The Western Australian Agriculture Authority estimated approximately 72% of meat processed in Western Australia was exported as chilled or frozen sheep meat (Western Australian Agriculture Authority 2016). In 2018, around 70% of sheep sold for meat by WA producers were processed in Australian abattoirs.

There are 11 meat processing plants in Western Australia, 8 of which are licensed to export sheep meat.

Sheep meat processing within Western Australia is under capacity. A long term trend towards crop production reduced WA sheep numbers from around 36.5 million in 1990 to around 14 million in 2010. A plateau in sheep numbers since then has reduced annual slaughter by 22% from an average annual 4.6 million over the 10 years between 2000 and 2009, to 3.6 million per year over the 9 years from 2010 to 2018. Based on consultation with industry in 2018, it is estimated the under-utilised capacity in Western Australia is around 2 million head per year.

Meat processing often operates seasonally and routinely adapts to quite large fluctuations in demand. The department is aware of some industry interest in recommissioning existing but dis-used capacity.

### **1.1.7 Exporters**

There are 40 licensed exporters of sheep from Australia, with 32 of these licensed to export sheep by sea. The majority of sheep exports are undertaken by 15 companies. Two exporters account for just over 50% of the trade by volume.

It has been estimated that between 8,000 to 10,000 people are involved in the live export (sheep and cattle) industries (Clarke et al. 2007) including all ancillary industries such as transport, veterinary and feedlot services. The number of people employed exclusively in live exports is smaller than this and includes buyers, staff operating registered premises, staff of exporting companies and specialist livestock staff working on ships (who may not be employed under Australian contracts).

Some operators in the live export industry are vertically integrated, owning vessels, feed mills, abattoirs and registered premises.

### **1.1.8 Ship owners**

Sixteen different vessels carried live sheep to the Middle East from 2015 to 2019. Three vessels accounted for almost 75% of live sheep exports from 2015 to 2018. These 3 vessels currently servicing the Middle East market from Australia are either owned by exporters or by shipping companies closely associated with exporters.

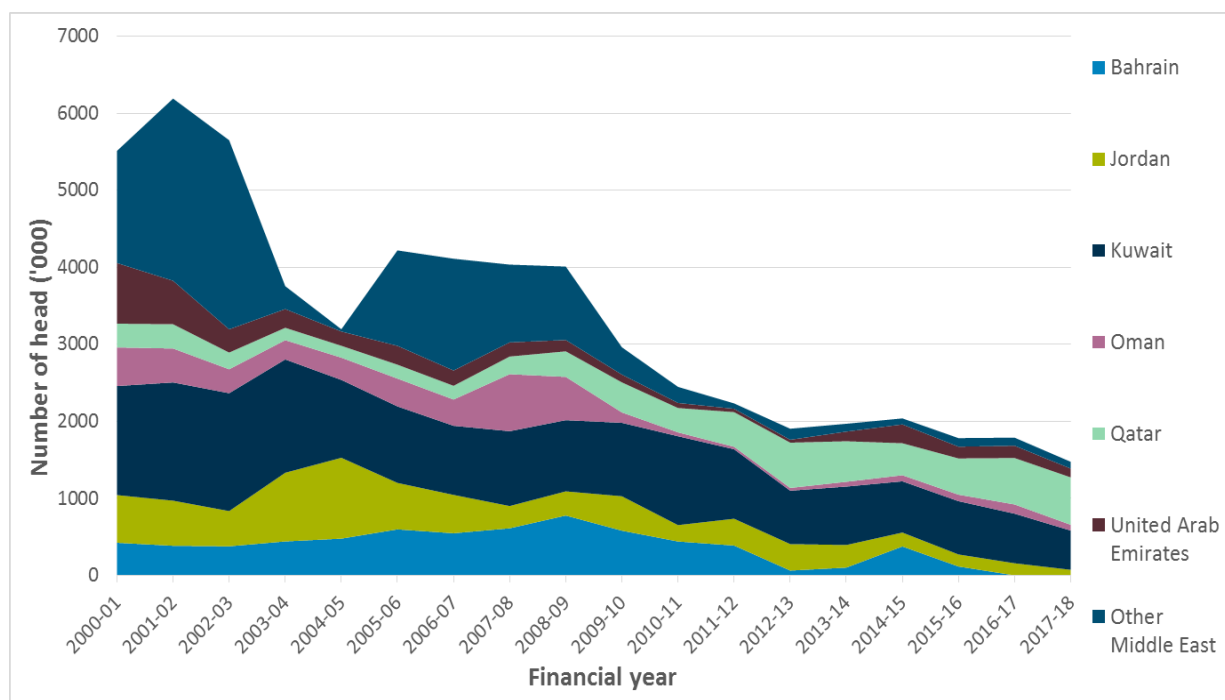
### **1.1.9 Destination markets**

The Gulf Cooperation Council (GCC) countries of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates are the largest market for Australian live sheep exports, accounting for an average of 81% of exports since 1988. Australia has not exported live sheep to Saudi Arabia since 2012 however prior to 2012 it was a major market. The Middle East, including the GCC plus Turkey, Jordan and Israel received an average of 96% of Australia's live sheep exports over the same period. Figure 3 demonstrates that Kuwait and Qatar have been the top 2 destinations for live sheep over recent years.

Many countries in the Middle East that import live sheep have historically subsidised consumer prices for food staples. Subsidies generally apply to live animal imports, to assist those countries' domestic meat processors, but not to imports of processed meat. A combination of food subsidies and lower labour costs for meat processing in the Middle East enable exporters to pay Australian farmers a premium for live sheep.

The Middle East is also Australia's largest export market for sheep meat. Growing populations, incomes and changing consumer preferences are driving an increased demand for pre-packaged meat in supermarkets. In response, frozen and chilled sheep meat exports to the Middle East from Australia increased from around 24,000 tonnes in 2006 to over 50,000 tonnes in 2018. Due to cultural preferences however, it is unlikely that frozen and chilled meat would entirely replace live sheep in the short to medium term.

**Figure 3 Australian live sheep exports to Middle East destinations**



Source: ABARES 2018

## 1.2 Regulatory framework

The Australian Government regulates the live animal export trade under the *Australian Meat and Livestock Industry Act 1997*, the *Export Control Act 1982* and associated orders, regulations and standards. This includes the ASEL and the Exporter Supply Chain Assurance System (ESCAS).

The regulatory framework is complex and covers a range of matters not specifically related to this RIS, for example, the issuing of livestock export licences and the regulation of registered premises. [Appendix B](#) outlines the regulatory framework in more detail.

### 1.2.1 Australian Standards for the Export of Livestock (ASEL)

Livestock export licence holders are required to comply with the ASEL (version 2.3). The ASEL set the minimum requirements to ensure animals are fit to export from Australia, and their health and welfare is managed throughout the export voyage. The standards cover the sourcing and on-farm preparation of livestock for export as well as loading, onboard management and reporting requirements.

Managing the risk of heat stress in exported livestock using a HSRA was incorporated in the ASEL in 2004 and is now required for any shipment to, or through, the Middle East. Standard 4 part 12 of the ASEL (version 2.3) states that:

Stocking densities and pen-group weight-range tolerances for species of livestock must be in accordance with specifications in Appendix 4.1 and heat stress assessment using an agreed H unless a variation is required and approved by the relevant Australian Government agency.

HotStuff (version 4) has been the agreed HSRA tool between industry and the department since 2012. Note that Appendix 4.1 defines minimum pen area requirements for exported livestock before HSRA is applied.

The most recent review of the ASEL (for exports by sea) concluded in March 2019. There will be no changes to the requirement for a HSRA on Middle East sheep voyages. The review did recommend that a HSRA be mandated for all livestock sea voyages that cross the equator. The next version of the ASEL (version 3) will be implemented in 2020.

### **1.2.2 Heat stress risk assessment**

A HSRA is required for all sheep exports to, or through, the Middle East. It forms part of the regulatory status quo of option 1 in this RIS.

In 2003 industry developed the first version of HotStuff, a predictive heat stress model to manage the risk of heat stress on live export vessels. Deck conditions are determined by the ambient temperature, the metabolic heat produced by the livestock on deck and the ship's ventilation rate for that deck. HotStuff adjusts stocking densities to limit the total metabolic heat production to ensure deck conditions experienced by livestock remain within agreed risk parameters. It considers voyage inputs relating to sheep, climate and ship ventilation factors.

More detail about heat stress risk assessment and the HotStuff model is at [Appendix C](#).

### **1.2.3 Regulation introduced since July 2018**

In April 2018, the Australian Government commissioned Dr Michael McCarthy to review the conditions for the export of sheep to the Middle East during the Northern Hemisphere summer (the McCarthy Review). The McCarthy Review stated that 'the central issues relevant to sheep health and welfare during shipping to the Middle East in the months of May to October are stocking density, ventilation and thermoregulation in the sheep'.

#### **The Middle East Order**

Based on recommendations from the McCarthy Review, the department implemented changes, set out in the Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East) Order 2018 (Middle East Order), which applied to voyages of sheep to, or through the Middle East departing in the Northern Hemisphere summer, between the months of May to October (inclusive). These changes aimed to more adequately address the risk of heat stress in the Northern Hemisphere summer and included requirements for:

- exporters to have a heat stress management plan for each voyage
- a reduction in reportable mortality levels from 2% to 1%
- stocking densities calculated using allometric principles
- independent verification of pen air turnover
- 10% extra space for horned rams
- all vessels to be installed with automated watering systems
- provision of additional bedding.

McCarthy noted the importance of space allocation stating that it was 'recommended that an 'allometric' approach be adopted by the industry...with a k-value of 0.033 (k=0.033)'. Allometric



principles use the relationship between the physical characteristics of an animal, such as size and body shape, and aspects of its physiology, to estimate the space requirements of an animal. McCarthy cited Petherick and Philips (2009) explaining that  $k=0.033$  is the 'threshold below which there are consistent adverse effects on welfare outcomes in intensive housing'. McCarthy also stated that a 'lesser  $k$ -value of 0.027 provides sufficient space for animals to stand and lie down but does not, according to the authors, allow free access to troughs'.

The allometric approach provides an additional 11–39% space compared to requirements under the ASEL (version 2.3).

The Middle East Order is part of the regulatory status quo in option 1.

### **Independent observers**

In April 2018, the live animal exports Independent Observer Program commenced, following the airing of the [Awassi incident](#). Independent Observers (IOs) are required to monitor, review and report on the implementation of activities in an exporter's approved export program. This may include taking still and video digital images to document onboard procedures and conditions. Information collected by the IO is provided to the department for review to inform and support effective regulation of the livestock export trade.

It is the responsibility of the exporter and the Australian Government Accredited Veterinarian (AAV) on the vessel to ensure the health and welfare of livestock for each livestock export consignment.

### **1.2.4 Interim conditions during 2019**

As an interim measure for 2019 only, pending completion of this RIS, the Australian Meat and Live-stock Industry (Prohibition of Export of Sheep by Sea to Middle East-Northern Summer) Order 2019 was implemented to prohibit live sheep exports to the Middle East from 1 June 2019 to 22 September 2019. This Order has now expired and does not form part of the regulatory status quo for this RIS.

For voyages in May, September and October 2019, exporters were also required to place environmental data loggers on all decks of vessels, and to collect and report this data to the department to provide a comprehensive picture of conditions on board vessels. This data is being analysed by the department.

## **1.3 Defining animal welfare**

The concept of animal welfare can be difficult to define as it has a number of dimensions, including psychological and physical aspects, people's subjective evaluations as well as historic and cultural differences.

There are internationally agreed concepts of animal welfare. The World Animal Health Organisation (OIE) is an intergovernmental organisation responsible for improving animal health and animal welfare standards worldwide. In 2019 it had 182 member countries, including Australia. The OIE's guiding principles for animal welfare note that there is a critical relationship between animal health and animal welfare.

The OIE defines animal welfare to mean:

The physical and mental state of an animal in relation to the conditions in which it lives and dies. An animal experiences good welfare if the animal is healthy, comfortable, well-nourished, safe, is not suffering from unpleasant states such as pain, fear and distress, and is able to express behaviours that are important for its physical and mental state. Good animal welfare requires disease prevention and veterinary care, appropriate shelter, management and nutrition, a stimulating and safe environment, humane handling and humane slaughter or killing. While animal welfare refers to the state of the animal, the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment.

Multiple studies have linked heat stress to poor animal welfare. Caulfield et al 2014 specifically identifies that heat stress is a major contributor to poor animal welfare associated with long-haul live export voyages, negatively affecting livestock health and productivity.

### **1.3.1 Public perceptions of animal welfare and the live sheep export industry**

Many studies indicate that the welfare of animals is becoming increasingly important to livestock industries, governments, consumers and the general public, both in Australia and overseas.

Futureeye consultancy provided advice to the department in 2018, tracking issues around farm animal welfare and how they may influence the social license of parts of the industry. According to Futureeye, the public's view on the status of animals is evolving particularly in relation to the issue of animal sentience, rights and freedoms and especially the freedom from pain and cruelty. There are high levels of agreement in Australian society on an animal's right to not be subjected to unnecessary pain and suffering.

Clear findings from surveys of the Australian public carried out by Futureeye, show 95% of people view farm animal welfare to be a matter of concern, and 91% wanting more effective regulation or reform. Futureeye also found that poor animal welfare standards on board live export ships ranks as the highest driver of community concern, particularly when accompanied by graphic pictures and widespread media attention. Futureeye surveys found that over 80% of the public found live animal exports moderately to extremely concerning, and that 60% thought live animal exports should be banned.

While concern for animal welfare is widespread throughout the community the underlying set of ethical values used to interpret and act on this concern varies between individuals and groups, raising significant challenges for policy makers.

## 2 The problem

In April 2018, video footage obtained by Animals Australia showed Australian sheep in severe heat stress while being transported to the Middle East on 5 consecutive voyages on the MV *Awassi Express*, with most footage taken during a voyage in August 2017 (the *Awassi* incident). The footage publicly exposed unacceptable animal welfare outcomes, shocked the Australian community, and undermined public confidence in the live export trade and the department as the regulator. Based on media released at the time and other research (Sinclair et al. 2018), the public expects transparent regulation of the industry and that industry participants will uphold animal welfare standards throughout the entire supply chain. As such, animal welfare outcomes have become critical to the ongoing sustainability of the live sheep trade.

The well-publicised heat stress event and associated mortalities highlighted weaknesses in a number of areas relating to heat stress risk management on vessels:

- There is insufficient detail in existing regulation on how the HSRA should be undertaken.
- The risk settings for the existing HSRA are now considered to be insufficient to manage the risk of heat stress.
- The regulatory framework and its implementation more generally is not sufficient to meet community expectations relating to animal welfare.

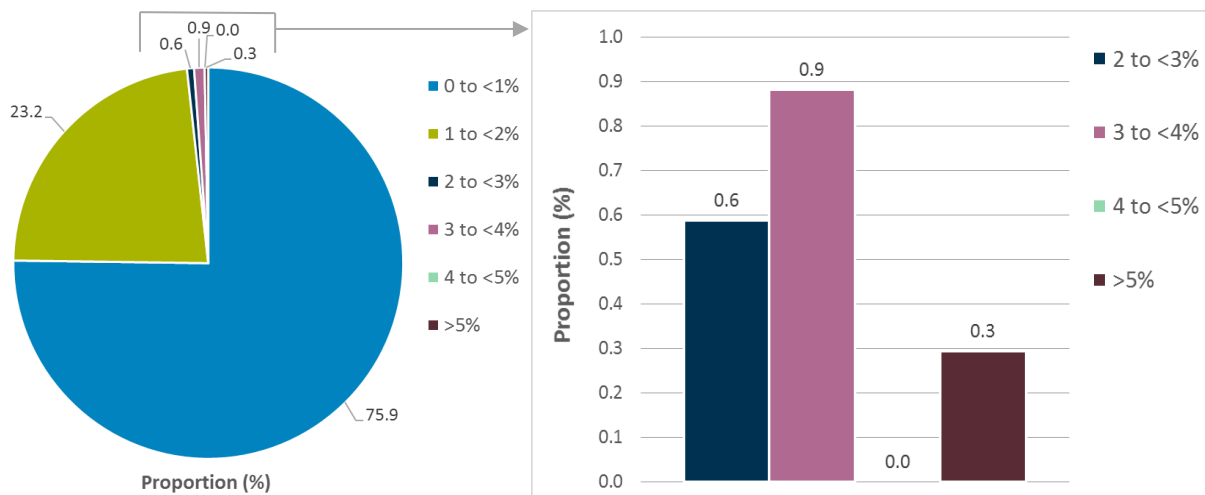
These weaknesses were also identified in the McCarthy Review (2018), which stated 'the regulatory framework around the export of sheep to the Middle East during the northern summer is ineffective'.

### 2.1 Scale and scope of the problem

The current risk setting used for heat stress was agreed with industry in 2003. It was set at a 2% probability of a 5% mortality event. The August 2017 *Awassi* voyage recorded a 3.76% mortality event and, although within risk parameters of the existing HSRA model (HotStuff), this mortality outcome and associated poor welfare of sheep led to a strong public outcry for reform or banning of the trade.

Mortality events of this level in Australian sheep exported by sea are unusual (Figure 4). However, heightened public scrutiny of the live export industry and the core theme of the McCarthy Review to place a much stronger emphasis on animal welfare, have raised awareness about the onboard welfare of sheep. While it is not known what level of heat stress event would spark further public outrage, it is assumed that any reportable mortality from a heat stress event (a mortality level greater than 1%) would be considered unacceptable. Prior to 2018, the reportable mortality limit was 2%. This was reduced to 1% in the Middle East Order following a recommendation in the McCarthy Review.

**Figure 4 Proportion of sheep voyages to the Middle East by mortality rate 2009 to 2018**



## 2.2 The need for further regulation

The widespread media attention of poor animal welfare on the August *Awassi* voyage placed public and political pressure on the Australian Government and industry to act to protect animals from poor welfare outcomes. This led to the commissioning of various reviews, the introduction of new regulations, such as the Middle East Order ([section 1.2.3](#)) and this RIS process.

While some regulatory intervention has already occurred, this is only part of the solution. The welfare benefits of additional space allowances under the Middle East Order are real but limited. If ambient temperatures are very hot, as they can be during June to September (inclusive) even one sheep on a deck could experience conditions that resulting in heat stress and poor welfare.

Industry demonstrated some initiative to address heat stress risk, though this was limited to 2018 and 2019. Prior to the *Awassi* incident industry operated within the then regulatory framework and had not publicly identified the need to address heat stress risks by implementing industry-led measures. If risk management measures were identified, these were not widely publicised, nor were they implemented by all exporters. The *Awassi* incident prompted industry, under the leadership of the Australian Livestock Exporters' Council (ALEC), to implement a 3-month moratorium on trade during June, July and August 2019. This demonstrated a willingness to address some aspects of heat stress risk. However, not all exporters are members of the ALEC and the department has no regulatory basis to enforce compliance with a voluntary industry moratorium. Therefore reliance on industry-led initiatives alone may not encompass all exporters.

Additionally, the industry-led moratorium is not quite long enough to effectively manage the risk of heat stress. While developing the interim conditions in 2019, the department undertook a technical analysis of the risk of heat stress. This analysis considered the best available science and evidence including climatological analysis by the Bureau (2019), information from the McCarthy Review, the HSRA Review, public submissions to these reviews, independent observer reports and voyage reports and data. The Bureau's analysis demonstrates that the risk of temperature extremes is 5% or more during and beyond the moratorium period. For example, the risk of extreme temperatures in September is as high, or higher than the risk in June. The

Bureau's analysis also shows that some destinations, such as Qatar, Bahrain and Oman, have longer hot periods with greater risk of extreme temperatures. An explanatory note outlining the department's technical analysis is at [Appendix D](#).

The *Awassi* incident, McCarthy and HSRA Reviews also highlighted that actual onboard conditions were not being adequately captured by existing mandatory reporting mechanisms. Therefore additional monitoring has been and is necessary for a growing understanding of heat stress on export voyages and for future reviews of regulation.

For these reasons reliance on existing regulations and industry-led initiatives is not considered sufficient to manage heat stress. Government intervention is deemed necessary to adequately mitigate the risk of heat stress in sheep on voyages to, or through, the Middle East, and to ensure all exporters comply with conditions that will support the regulatory objective.

## 2.3 Consequences of inaction

Another heat stress event may lead to a swelling of public and political pressure against live sheep exports. The Australian public's opinion of the *Awassi* incident was evident in media released at the time and has been identified in research conducted by Futureye (2018). A repeat of such pressure could reduce the trade and potentially lead to its closure. Other consequences could include:

- damage to Australia's reputation with regards to animal welfare, and as a producer of high quality livestock
- loss of market share in agricultural products to trading partners with a strong animal welfare focus
- loss of income to farmers and associated businesses
- loss of trust in government and its role as a regulator
- loss of the live export industry's 'social license' to operate
- further disruptions to trade with the potential for extreme regulation
- decline in consumer trust for livestock production systems in general, leading to a decline in domestic demand for animal agricultural products.

## 2.4 Stakeholders affected by the problem

The *Awassi* incident and the regulatory failures it has highlighted have impacted:

- businesses in the live sheep export supply chain who suffered reputational damage and loss of social license
- businesses in the live sheep export supply chain who suffered lost income from disruptions to trade
- employees and communities directly reliant on the trade
- members of the public who are distressed by poor welfare in live exports
- the department, as regulator, as public confidence in its regulatory capability was eroded

- trading partners who want a reliable live export trade with high standards for animal welfare practices.

See [section 1.1](#) for more information about the live export supply chain.

## 3 Why is government action needed?

### 3.1 Objectives of government action

The primary objectives of government action are to:

- reduce the risk of heat stress in sheep exported to, or through the Middle East during the Northern Hemisphere summer to a very low level (less than 5% risk)
- maintain a viable live sheep export trade supported by improved animal welfare outcomes, that as a minimum meets the requirements of the ASEL and relevant legislation
- uphold Australia's reputation as an exporter of high quality livestock.

### 3.2 The need for government intervention

The department as the regulator is responsible for setting the operating rules for livestock exports and responding to regulatory failures and non-compliances. The regulatory framework for live animal exports places the responsibility on exporters to ensure the health and welfare of animals throughout the export supply chain.

The problem section highlights that without effective government-led regulation, live-exported sheep have been subjected to levels of heat stress risk and consequent poor welfare that was considered unacceptable by the public. [Section 2](#) also highlights that, if these risk levels and welfare outcomes were considered unacceptable by industry, proactive steps were not taken to address them until after the airing of the *Awassi* incident. In fact, according to the Moss Review, some exporters 'may have behaved in a non-complaint way that has adversely affected the reputation of the industry as a whole'.

Therefore, government intervention is necessary to ensure heat stress risk in sheep exports is managed before the onset of the 2020 Northern Hemisphere summer period.

### 3.3 Government capacity to intervene successfully

As regulator of the live export industry, the department has the necessary legislative authority and organisational resources to intervene. In summary, these interventions include:

- three independent reviews, initiated in response to the *Awassi* incident ([Appendix E](#))
- the making of the Middle East Order in response to recommendations of the McCarthy Review including the provision of pen space allowance by an allometric calculation ([section 1.2.3](#))
- the making of the Northern Winter Order to provide sheep on voyages to, or through the Middle East from November to April with additional space (ASEL +17.5%)
- the requirement for all live sheep voyages to, or through, the Middle East to be overseen by independent observers
- interim regulatory conditions for the Northern Hemisphere summer period of 2019.

### **3.4 Constraints or barriers to achieving objectives**

In addressing the regulatory objective, the department notes a number of constraints or barriers.

There is difficulty in articulating objective and measurable animal welfare outcomes specific to the live export trade as they have not yet been thoroughly researched or defined. The McCarthy Review recommended a shift from a HSRA based on mortality to a HSRA based on animal welfare. However, objective animal welfare measures suitable for practical application have not yet been defined. Further, appropriate risk settings for welfare relating to heat stress in sheep have not been tested or agreed across stakeholders.

There is limited science and research on heat stress in sheep during live exports. The HSRA Review highlighted gaps in existing research in areas such as diurnal and day-to-day variation in deck temperatures, respite from heat, duration of exposure and appropriate settings for lambs. There is also a lack of consensus on the validity of the research that has been conducted. Some submissions to the draft HSRA Review noted limitations in the science that was used to justify the recommendations made around heat stress thresholds.

Another challenge to policy setting is the different underlying views and values of interested stakeholders. Submissions to the Middle East sheep exports discussion paper elicited widely differing opinions on what is acceptable animal welfare. For example, some submissions called for a complete ban on exports, some for a ban during the Northern Hemisphere summer and a small minority of submissions supported sheep exports year-round.



## 4 Policy options

This section outlines the 3 policy options, which have been identified to address the problem outlined in the problem [section 2](#). In different ways and to different degrees, the options address the policy objective stated in [section 3](#), to minimise the risk of heat stress and thereby improve animal welfare outcomes on live sheep export voyages to, or through the Middle East during the Northern Hemisphere summer, while sustaining a viable sheep export industry.

The options considered in this RIS are:

- Option 1: maintain the regulatory status quo; this option represents the baseline regulatory framework.
- Option 2: implement a prohibition on live sheep exports from 1 June to 14 September with additional prohibited periods for Qatar and Oman.
- Option 3: implement a revised HSRA model consistent with recommendations of the HSRA Review.

Some notes on the development of the options are at [Appendix F](#).

### 4.1 Option 1: Regulatory status quo

Option 1 represents the regulatory status quo and its inclusion in a RIS is a requirement of the Australian Government. The regulatory status quo for Northern Hemisphere summer live sheep exports comprises the existing acts and subordinate legislation, including the [Middle East Order](#), and requirements of the ASEL ([Appendix B](#)). This option does not include any interim regulations implemented during 2019 to manage the risk of heat stress in Northern Hemisphere summer sheep exports, such as the 2019 prohibition ([section 1.2.4](#)).

The regulatory status quo does not prohibit any voyages and therefore under option 1, trade could occur for all months of the Northern Hemisphere summer.

Under this option, the risk of heat stress in sheep is managed through the provision of additional space than required under the ASEL (version 2.3). The Middle East Order stipulates that pen space allowances should be the greater of:

- pen space calculated using allometric principles, or
- pen space determined by the HSRA model.

#### Box 1 Summary of option 1: Status Quo

Live sheep exports to, or through the Middle East permitted for all months of the Northern Hemisphere summer.

Conditions under the Middle East Order and in-force ASEL standards apply for voyages during the Northern Hemisphere summer months including pen space allowance according to the greater of allometric principles or a HSRA.

Requirement for all voyages to conduct a HSRA using the existing HSRA model, HotStuff (version 4).

## **4.2 Option 2: Prohibition from 1 June to 14 September to all ports with additional prohibited periods for Qatar and Oman**

Option 2 includes a prohibition on live sheep exports to, or through, the Middle East for 3.5 months (1 June to 14 September). There would be extended periods of prohibition for Oman from 1 May to 14 September and Qatar from 15 May to 22 September. While we do not presently export to Bahrain, a prohibition under this option would also extend to Bahrain from 15 May to 22 September.

Under option 2, the risk of heat stress is managed through the baseline regulations, the prohibition of exports during very hot periods and additional conditions to improve heat tolerance in sheep (for example, fleece length) and duration of exposure to hot conditions on vessels (for example, single port of discharge in the immediate shoulder periods to the prohibition).

The prohibition periods exclude exports from the times of year when there is a 5% or greater likelihood that ambient temperatures experienced on voyages to, through or at destinations in the Middle East would be likely to cause heat stress in sheep. [Appendix D](#) outlines the technical analysis and rationale for this risk threshold.

In addition to a prohibition, option 2 includes other conditions aimed at reducing heat stress and improving welfare outcomes of sheep exported during the Northern Hemisphere summer period or reducing unnecessary regulatory burden.

### **Single discharge port for voyages arriving in the Persian Gulf during June or departing Australia between 15 to 30 September**

Voyages to the Persian Gulf routinely discharge at multiple ports, with the largest recipient of sheep being Kuwait. The regulatory status quo requires that if Kuwait is one of the destinations, the exporter must discharge sheep in Kuwait first. The purpose of this requirement is to ensure as many sheep as possible are discharged before the voyage continues onto hotter and more humid parts of the Persian Gulf. The single port discharge condition reduces the duration of time sheep would be required to stay on vessels in the Persian Gulf, providing additional heat stress risk management during shoulder periods immediately before and after the prohibition. This requirement would not apply to voyages to the Red Sea. Red Sea voyages often go to multiple ports but the hottest part of the voyage pertains to only one route. At the point of discharge, vessels are in cooler climates.

### **Wool length of 15mm or less and maximum body condition score not higher than 3.5**

This condition minimises animal traits that may contribute to heat stress and poor welfare.

### **Voyage monitoring**

As occurred during 2019, this condition would require exporters to equip vessels with automated environmental data loggers. In addition, targeted behavioural observations would be required. All monitoring would be reported to the department within 5 days of the end of the voyage. While not a direct welfare benefit for sheep, this information improves the department's

awareness of onboard conditions and provides evidence to inform future reviews of sheep export conditions.

#### **4.2.1 Removal of requirement to use existing HSRA model**

This option proposes removing the requirement to use the existing HSRA model until such time that an appropriate revised model has been developed. The existing model, as applied in option 1, routinely permits full stocking rates for most voyages during every month of the year. Outside the prohibition period of option 2, allometric pen space allowances provide 25% to 35% extra space over the existing HSRA model ([Appendix G](#)). Therefore the model serves no purpose in its current form and is an unnecessary regulatory burden.

The majority of submissions to the discussion paper supported the continued use of a HSRA ([section 8.3](#)). Other than the revised model proposed in option 3, no alternative form of the HSRA model is available for consideration or impact analysis at the time of undertaking this RIS.

Industry has committed to revising the HSRA model to be based on robust welfare science by the end of 2021.

#### **Box 2 Summary of option 2: Prohibition from 1 June to 14 September to all ports with additional prohibited periods for Qatar and Oman**

Live sheep exports to, or through the Middle East prohibited from 1 June to 14 September for all ports with additional prohibited periods for Qatar and Oman:

- Qatar prohibited from 15 May to 22 September
- Oman prohibited from 1 May to 14 September.

For voyages between 1 May and 31 October:

- base regulation of the Middle East Order and the in-force version of the ASEL
- single discharge port for voyages arriving after 1 June and departing between 15 and 30 September
- all sheep must have wool length less than 15mm and maximum body condition score not higher than 3.5
- all voyages monitored with automated environmental measurements and targeted behavioural observations and this monitoring reported to the department
- no requirement for a HSRA.

Interim review following the 2020 Northern Hemisphere summer period by March 2021.

Post implementation review by March 2022.

### **4.3 Option 3: implement a revised HSRA model consistent with recommendations of the HSRA Review**

Under option 3, the risk of heat stress in sheep would be managed using a revised HSRA model with risk settings based on a measure of welfare. It would use heat stress thresholds (HSTs) instead of the mortality thresholds used in the current model ([section 1.2.4](#)). This option aligns with recommendations from the [HSRA Review](#).

The revised HSRA model would assess the likelihood that a particular welfare temperature threshold was breached. The HSRA Review recommended adverse sheep welfare, due to heat, be measured against a [wet bulb temperature \(WBT\)](#) welfare threshold instead of a mortality limit. The review's Technical Reference Panel (panel) advised that these WBT welfare thresholds were consistent with the HSTs currently embedded (but not used) in HotStuff (version 4). The recommendations suggested that the revised HSRA model should limit the likelihood to a 2% chance that deck temperatures would exceed a sheep's WBT welfare threshold (or HST). By comparison, the existing HSRA model (in option 1) uses risk parameters of a 2% chance that deck WBTs will reach a level that would result in a 5% mortality incident.

The existing and revised HSRA models both manage heat stress risk by reducing stocking densities. Temperatures experienced on a ship's deck are a combination of the ambient temperature and the metabolic heat produced by the animals themselves. The model reduces stocking rates to decrease the amount of metabolic heat produced and to allow for sufficient space for airflow around the animals to remove heat. In extreme weather, the model may require that a vessel be fully destocked because even if there was only one sheep on the deck the ambient temperature would already exceed the acceptable WBT threshold.

The existing model, as applied in option 1, permits full stocking rates for most voyages during every month of the year. It has required reduced stocking rates only in July and August and only for vessels with the very lowest ventilation rates.

Under option 3, the revised HSRA model is expected to reduce stocking rates on all voyages between 1 May to 31 October either completely or to such an extent that the voyage would not be economical. Therefore, while not explicitly stated, option 3 would effectively prohibit sheep exports for the entire Northern Hemisphere summer.

The revised HSRA model for this option does not yet exist. The data is already embedded in HotStuff version 4 but not currently used. A revision is not anticipated to be complicated, however, if the revision could not be achieved for the 2020 Northern Hemisphere summer period, interim regulatory measures would be necessary.

**Box 3 Summary of option 3: adopt a revised HSRA model with risk settings based on heat stress thresholds embedded in HotStuff version 4**

Manage the risk of heat stress using a revised HSRA model with risk settings based on heat stress thresholds embedded (but not used) in HotStuff (version 4).

Through destocking requirements of the revised model, this option effectively prohibits trade for the whole Northern Hemisphere summer period (May to October).

Interim review following the 2020 Northern Hemisphere summer period by March 2021.

Post implementation review by March 2022.

## 5 Benefits and impacts of option 1

Option 1 represents the regulatory status quo and includes baseline regulation of the Middle East Order and requirements under the ASEL. The Middle East Order was made in July 2018 and did not require a RIS by a Prime Minister's exemption, dated 17 May 2018. As such the impacts of the Middle East Order will not be explored here.

Under option 1, the risk of heat stress in sheep would be managed by conditions of the Middle East Order (including additional space for sheep) and the existing HSRA model. Analysis of historical HSRAs submitted to the department by exporters for voyages in 2016 and 2017 suggests the model has minimal impact on stocking rates. Vessels with the lowest ventilation rates in the fleet were historically destocked by the HSRA model by 9–10% more than would be required by allometric calculations, but only for August ([Appendix G](#)). This means that most exports for the Northern Hemisphere summer months would be conducted at allometric requirements. Trade would be permitted for all months of the Northern Hemisphere summer.

### 5.1 Option 1 benefits

This option would have the least direct impact on trade numbers:

- Exporters would be permitted to trade for all months of the Northern Hemisphere summer at stocking rates based on status quo requirements of the Middle East Order (allometric principles). This would allow for year-round income streams from sheep exports and the maintenance of stable commercial relationships given importers can rely on stable supply.
- Producers, especially in Western Australia, would have greater flexibility for turning off sheep as and when needed.
- Other members of the supply chain could continue to operate under status quo arrangements and levels of dependence on live exports.
- Reliable year-round trade, especially over the religious festival seasons, which can occur during the Northern Hemisphere summer, would be welcomed by importing countries in the Middle East.

#### The Middle East Order

Some direct animal welfare benefits have been derived since the introduction of the Middle East Order in 2018. The most significant condition that contributes to improved animal welfare outcomes is the provision of more space to each sheep through the use of an allometric space allocation formula. Greater space allowance has a number of welfare benefits:

- Fewer sheep on a deck means less total metabolic heat, which contributes to temperatures on a deck. This is particularly important for voyages during hot periods (MLA 2000).
- Greater space also provides for better air flow and improved dispersal of metabolic heat through radiation, conduction, convection and evaporation (Barnes et al. 2019).
- Fewer sheep per deck area is associated with lower levels of urine and faeces excretion that, in turn, is correlated with lower levels of ammonia, humidity and drier pad conditions. However on a per sheep basis, additional urine output is expected in very hot conditions. The Middle East Order requires additional bedding, which helps keep the manure pad

sufficiently dry, resulting in less moisture, less humidity and improved air quality (McCarthy & Banhazi 2016).

- More space also permits better access to food and water for all animals in a pen, as well as space to lie and rest (Petherick and Phillips, 2009).

The benefits of using the allometric space allowances have been demonstrated in the outcomes of voyages conducted since the implementation of the Middle East Order. These voyages have consistently produced low mortality rates and by implication, better welfare outcomes. Common causes of sheep morbidity and mortality such as inanition, salmonellosis and enteritis have been reported at much lower rates than encountered on voyages prior to the Middle East Order being implemented. Caulfield et al. (2014) state that heat stress can compound health problems for sheep already weakened by other conditions such as salmonellosis and inanition.

AAV and Independent Observer reporting from the 5 voyages conducted during May, September and October 2019 recorded several occasions where sheep exhibited moderate levels of heat stress during periods of high WBT. This was assessed through panting scores and other behavioural observations. However, heat stress was not reported as a specific cause of mortalities by AAVs on any of the voyages during the 2019 Northern Hemisphere summer.

The provision of extra space has been assessed as being a major factor contributing to the AAV observations of no heat-related mortalities. Video observations taken by Independent Observers on the Northern Hemisphere summer 2019 voyages indicate that the extra space allocated to sheep under allometric stocking was very important in allowing each sheep to adopt optimum individual cooling behaviours at times of high WBTs.

Figure 5 shows the incremental decline in average mortalities recorded on voyages during consecutive 6 month periods under the different regulatory frameworks that have been implemented since the McCarthy report was released in April 2018. The graph is divided into periods:

- January 2013 to April 2018 stocking rates determined by the ASEL (version 2.3) and the existing HSRA model.
- May 2018 to October 2018—no voyages in July and August. A variety of temporary stocking rates used providing 15% or 17.5% additional space to the ASEL (version 2.3) or allometric stocking rates under the Middle East Order (July onwards). This period includes additional oversight by Independent Observers. This most closely approximates the impact of the Middle East Order alone, noting however that there were no voyages in July and August.
- November 2018 to April 2019 stocking rates 17.5% above the ASEL (version 2.3) under a newly written Northern Winter Order with Independent Observer oversight.
- May 2019 to October 2019—prohibition 1 June to 22 September. Allometric stocking rates under the Middle East Order, 2019 prohibition from 1 June to 22 September with Independent Observer oversight.

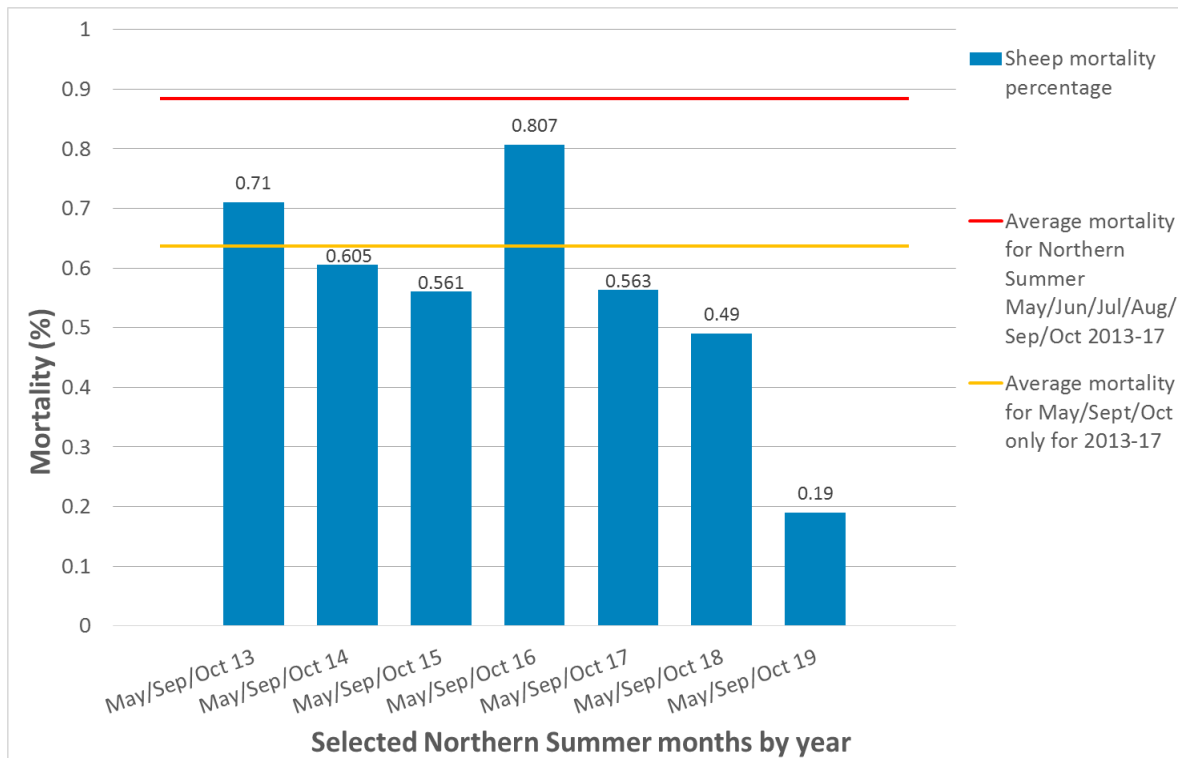
**Figure 5 Average sheep mortality compared to stocking density 2013 to present**



The shipping standstill during much of the 2018 Northern Hemisphere summer and the regulated prohibition during 2019 limited the number of voyages during June, July, August and part of September from which mortality data was drawn. This, and the Middle East Order, means direct comparison of voyage outcomes in 2018 and 2019 against earlier years is not a like-for-like comparison.

To assist in making approximated comparisons between years, June, July and August figures have been excluded from the analysis of Northern Hemisphere summer voyages over the period 2013–2018 (Figure 6). This shows a reduction in average mortality rates for voyages during the months of May, September and October in 2018 and 2019 (average 0.64%), compared to voyages in the same periods in the previous 5 years (average 0.88%). While these are averages, and therefore representative of a range of outcomes, these comparisons demonstrate the animal welfare value of the Middle East Order alone (option 1), as distinct from the additional value of a prohibition of voyages during the hotter months of the Northern Hemisphere summer.

**Figure 6 Sheep mortality for Northern Hemisphere summer 2013–2019: May/Sep/Oct**



In addition to direct welfare benefits, there are additional benefits to be gained from good animal welfare outcomes.

### Industry sustainability

If Australia is to maintain a sustainable live sheep export trade supported by animal welfare outcomes, it is vital to establish trust and identify mutual benefits between the live export industry, the regulator and the Australian community.

Research and analysis undertaken by Futureye consultancy (2018) identifies that the Australian public is demanding better treatment of animals. Futureye also identified that improving animal welfare outcomes can mitigate the risk to the viability of the live export industry due to bad publicity, the potential loss of social license and in extreme cases, complete market collapse. Futureye states that widespread media attention of poor animal welfare can draw large audiences into the debate, with reactive calls for extreme regulation. The Australian community have shown that they place a priority on good welfare outcomes, and as a stakeholder, the Australian community can exert influence. For example, in 2011 when video footage emerged showing animal cruelty in Indonesian abattoirs, the Australian Government faced public and political pressure and committed to the suspension of all live cattle exports to Indonesia. In 2013, video footage emerged showing cruelty to cattle exported live to Egypt, resulting in suspension of exports of all Australian livestock to Egypt.

This indicates that improved animal welfare outcomes are important, not only for the benefit of transported animals, but also to promote the public’s approval and ongoing acceptance of the industry, its standards and practices.



## Strategic business benefits

There are difficulties in measuring animal welfare gains quantitatively. McInerney (2016) suggested that the key question is not 'what does welfare improvement cost' but 'what is animal welfare worth?' This is relevant for the live sheep export industry, which must assess if animal welfare benefits sufficiently exceed economic costs and if they are critical to the survival of the industry.

Some studies highlight the conflict between animal welfare and efficient farming, stating that improving animal welfare, particularly in farm animal production, comes with an inevitable economic cost (McInerney 2016). Other studies argue that it is possible to reduce or avoid the conflict between animal welfare and efficient farming by reinforcing the financial and human benefits that can be derived from giving priority to animal welfare (Dawkins, 2017).

Improving animal welfare may have financial benefits. The most obvious example of this is through the reduction in mortality. The 2017 August *Awassi* voyage recorded 2400 deaths from heat stress, a mortality rate of 3.76%, nearly a 4% reduction in value of the consignment as a direct result of mortalities. Exporters could derive a financial benefit by planning shipments in cooler months of year where mortality rates are typically lower. If onboard conditions promoted good animal welfare, there may also be reduced morbidity, resulting in sheep arriving at the destination port in improved body condition. Not only does this promote the exporter as a provider of quality livestock, healthy animals cost less in medications and effort needed to treat them.

Some studies show that consumers are willing to pay more (but not much more) to purchase ethically-produced meat from high welfare systems (Bennett et al 2012, Vanhonacker & Verbeke 2014). Evidence of welfare-based marketing claims on animal products can be seen in Australian and international retail outlets: organic food, free-range pork, grain-fed beef, RSPCA-approved chicken and barn-laid eggs.

Improving animal welfare may also offer exporters and producers a commercial advantage to market their products as being from high welfare systems. Sheep Producers of Australia (SPA) recognise the positive marketing opportunities of improving the health and welfare of animals. Goals in their Sheep Industry Strategic Plan (SISP), include 'developing measurable improvements in sheep welfare across the supply chain, which can build community support and increase productivity outcomes'. They identify that ethically-producing lamb and mutton underpins access to domestic and international markets (SPA 2019).

Corporate social responsibility is an increasingly important policy of many companies from multi-nationals to community entities and at all stages of the supply chain. Companies are increasingly demonstrating a preference to participate in initiatives that benefit society, such as promoting animal welfare. These activities may enhance the reputation of involved companies and become an important part of their marketing strategy (Dawkins, 2017).

In November 2019, one of Australia's biggest agricultural lenders, National Australia Bank (NAB), issued a statement that they will no longer provide finance to businesses non-compliant with animal welfare rules. NAB said its principles were based on 'generally accepted, contemporary, scientific understanding of animal welfare' and were in line with international conventions, Australian Government and state government regulations.

McDonald's states that the welfare and humane treatment of animals is an important part of their selection process for suppliers. They specifically note live exports and name Australia as a country with a live export program. McDonald's have a policy that no beef may come from cattle that were shipped for more than 24 hours by sea and sent directly for slaughter. Suppliers of animal products are audited to comply with welfare expectations.

### **Human and community benefits**

There is a growing awareness of the close links between animal welfare and human health and wellbeing, as described by the One Health and One Welfare concepts. One Health is 'the collaborative efforts of multiple disciplines working locally, nationally, and globally, to attain optimal health for people, animals and our environment'. This definition was developed by the One Health Initiative Task Force, established in 2006 in response to global concern surrounding outbreaks of the H5N1 bird-adapted flu virus. One Welfare, similar to One Health, looks at issues surrounding animal welfare, human welfare and societal mental health, from a similar national and global perspective (One Welfare 2019).

Examples of One Welfare issues include:

- risks to human health of operating in environments that are poor for animal welfare such as exposure to pathogens and zoonoses
- risks to human health from the non-therapeutic use of antibiotics in farm animal production and emerging antibiotic resistance
- reduced injury and sickness in humans who work with animals from high welfare systems.

A recent study on community opinion on the live export trade showed that the Australian public suffers sadness, distress and anger from the knowledge of poor treatment of Australian animals and will not support continuation of the trade without conditions being addressed (Sinclair et al 2018).

Another study identifies improved psychological wellbeing, good staff retention and job satisfaction of humans working with animals in high welfare systems (Dawkins 2017). Futureye (2018) identifies the potential for improved psychological wellbeing of the Australian community due to the increased confidence that our animals are being treated humanely, which may then result in increased levels of support for the ongoing existence of the live export trade and increased trust in the industry.

### **Increased trust in the industry and the regulator**

Improved animal welfare outcomes through improved regulation could build community trust and confidence in the department as regulator and thereby improve community support for the live export industry.

Industry groups have identified that it is important for them to have certainty around the operational structure of their industry to enable efficient planning, to encourage investment and to sustain research and development.

## 5.2 Option 1 impacts

### 5.2.1 Non-regulatory impacts

The risk of heat stress in sheep is not sufficiently managed by the existing HSRA model and Middle East Order, especially when conditions are very hot. While the existing requirements under the status quo have provided some benefits such as reduced mortality rates, these measures will not be effective when temperatures are very hot. In extreme conditions, even one sheep on a deck would experience heat stress. Such climatic conditions occur with a likelihood of 5% or greater during June to September (inclusive) in and around the Persian Gulf and Red Sea. This is explained in more detail in [Appendix D](#).

The biggest impact of option 1 would arise if a welfare event occurred that generated significant public and political pressure against the trade. The consequence of this could place further restrictions on exports (than proposed in options in this RIS) and, in the worst case scenario, lead to the end of the trade. Further restrictions could have the same outcome as the worst case scenario by rendering live sheep exports uneconomical.

A range of previous studies have analysed the economic impacts of the worst case impact under option 1—banning live sheep exports, and the results vary with the perspective taken.

Modelling studies funded by animal welfare advocates tend to conclude that the economic impacts of banning the live sheep exports would be relatively small because farmers and meat processors can readily adjust to alternative markets.

For example, a recent study for Animals Australia by Davey and Fisher (2018) concluded that phasing out live exports would mean that WA sheep farmers would collectively lose around \$9 million. The study estimated that the cash receipts of sheep specialist farms would fall by 0.5%, while those of mixed sheep-cropping farms would fall by 0.17%. Losses to sheep farmers would be offset by an additional 350 jobs and an additional \$18 million of value-added in the meat processing sector.

ACIL Tasman (2009a) conducted a study into the economic impact of banning live sheep exports for the World Society for the Protection of Animals. The study found that there would be no sustained impact on sheep and lamb prices if live exports were phased out over a 5 year period. It estimated that banning live exports would reduce the value of the average sheep flock in Western Australia by around \$11 000, and the value of the sheep industry in Western Australia by \$74.5 million (at 2006–07 flock levels).

In a related study for the Royal Society for the Prevention of Cruelty to Animals, ACIL Tasman (2009b) found that potential adjustments by WA sheep farms 'do not appear to be extensive compared to other structural adjustments already underway in the industry'. This study found that the option of selling live sheep for export was worth between \$2 and \$6 per head depending on the degree to which each farm's sheep flocks were oriented toward wool or meat production.

In contrast, modelling studies funded by industry tend to assume that farmers have few viable alternatives to live exports, and that a ban would have a significant effect on prices and farm incomes. Three of these industry studies are based on the Global Meat Industry Model (GIM) developed by the Centre of International Economics (CIE). Hassall and associates conducted the first study in 2006, and this was updated in 2011 and again in 2013.

The study by Hassall and Associates (2006) for Meat and Livestock Australia and LiveCorp estimated that banning live exports would cause sheep prices to fall by around 17 cents per kilogram, and lamb prices by 7 cents per kilogram. This study estimated the aggregate effect of a ban would reduce the gross value of the Australian sheep meat industry by \$219 million.

In a report for Meat and Livestock Australia, the Centre for International Economics (2011) estimated that the farm gate price of older sheep would fall by 14.6 cents per kilogram if live exports were banned, with the price of lambs falling by 12.2 cents per kilogram. This was estimated to reduce the gross value of production of the sheep meat industry by around \$119 million.

There was a 46% difference between the predicted impact on the value of the sheep meat industry predicted by Hassall and Associates (2006) and the Centre for International Economics (2011). The authors attribute the lesser impact predicted by the later study to improved modelling and more conservative assumptions about the number of livestock that would be transported for processing in eastern Australia. Structural changes reduced the importance of live exports to the industry between the 2 studies.

In a later report for Australian Wool Innovation, the Centre for International Economics (2013) estimated that the average saleyard price of older sheep in Australia would fall by \$13.30 per head (24.4%) and lamb prices by \$4.07 per head (7.5%) if live exports were banned. This was projected to reduce the gross value of the sheep industry by 10.3%.

Mecardo (2018) estimated that if sheep currently exported live were slaughtered in Western Australia, sheep and lamb prices in Western Australia could fall by between 18 and 35%. This was projected to reduce farmers' revenues by between \$80 million and \$150 million. Mecardo appear to have reached these results by assuming that sheep slaughter in Western Australia determines the state's export prices of mutton and lamb, rather than prices being determined in world markets.

### **5.2.2 Regulatory impacts**

As the status quo option, there are no regulatory costs to note.

## **5.3 Option 1 net benefits**

Although the Middle East Order has provided some improvements to animal welfare outcomes, it is unable to adequately mitigate the likelihood of heat stress and adverse welfare outcomes during the hottest months of the Northern Hemisphere summer (June to September). During these months, additional space will not be a sufficient mitigating measure if temperature extremes are realised. The likelihood of temperature extremes during these months is 5% or more, which is considered too high by risk analysis undertaken by the department. The regulatory status quo does not meet the welfare objective of the RIS.

While conditions under option 1 would have the least impact on trade, an adverse welfare event occur (in light of insufficient risk management), could jeopardise the sustainability of the trade. This would not meet the objective of maintaining a sustainable trade.

Therefore the net benefit of option 1 does not meet the regulatory objective of this RIS.

## 6 Benefits and impacts of option 2

Option 2 represents the middle ground approach. For the Northern Hemisphere summer period, it combines a prohibition period from 1 June to 14 September with requirements under the Middle East Order and additional conditions for voyages in May, late September and October. Based on analysis of voyage routes and destination climates, there would be an extended prohibition for Qatar and Oman.

The conditions applied in this option are proposed to be the minimum regulatory intervention necessary to reduce the risk of heat stress on voyages to, or through, the Middle East to an acceptable level?.

### 6.1 Option 2 benefits

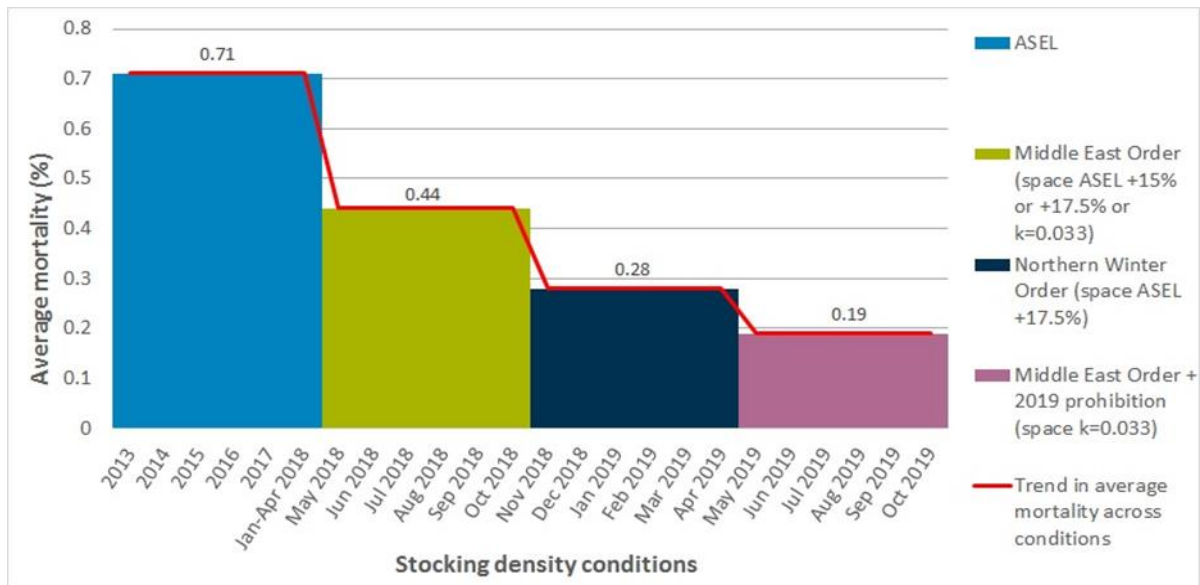
With regards to animal welfare benefits from option 2, the main difference over option 1 will be derived from greater certainty that the risk of heat stress will be managed to promote improved animal welfare outcomes. The animal welfare benefits themselves in option 1 will also apply to voyages in option 2, however option 2 has some added benefits.

#### **Reduced risk of heat stress morbidity and mortality**

Based on Figure 5, which was discussed in [section 5.1](#), voyages conducted under Middle East Order conditions record lower average mortalities, none of which were reported to be heat related, and fewer sheep experienced morbidity.

Figure 7 (a duplicate of figure 5) also depicts the benefit from a prohibition—the reduction in mortalities derived from the exclusion of the hottest months of the Northern Hemisphere summer. In 2019, under conditions of the Middle East Order and a prohibition from 1 June to 22 September, average voyage mortalities declined from 0.71% (prior to the Middle East Order) to 0.19%. This provides a proxy for what could be expected from option 2 over option 1.

**Figure 7 Average sheep mortality compared to stocking density 2013 to present**



### Single destination for voyages arriving in June and departing Australia 15 to 30 September

Around 84% of voyages to the Persian Gulf discharge sheep at multiple destinations. This means that some sheep may spend additional days on board vessels as they move between ports. The risk of heat stress in sheep increases with each extra day sheep spend on vessels. This is due to 2 reasons. Sheep could be more likely to experience heat stress from the cumulative heat load that could occur from several days on vessels in hot temperatures. Risk is also greater due to the increased likelihood of temperature extremes for each extra day spent in the Persian Gulf.

A single port of destination during immediate shoulder periods of the prohibition reduces the time sheep would be required to stay on vessels in the Persian Gulf, providing additional heat stress risk management. Therefore this condition provides another benefit over option 1.

### Fleece length of 15mm or less and no shearing of legs below the knee and hock

Option 1, in accordance with the ASEL (version 2.3), requires sheep sourced for export to have a fleece length of 25mm or less. It also requires that sheep sourced for export should be a minimum of 10 days off shears (i.e. post shearing) or, if shearing is to be conducted within 10 days of export, that sheep be housed in sheds at the registered premises.

Under the existing HSRA model, HotStuff (version 4) sheep with shorter fleeces are allocated less deck space. HotStuff has only 2 categories of fleece length; '10mm or less' and 'greater than 10–25mm'. It is common practice for exporters to shear sheep very close to loading so they meet the 10mm or less classification; hence maximising the number of sheep that can be loaded. However, recently shorn sheep are more likely to have fresh shearing cuts that can become infected in vessel conditions. Infected shearing cuts are commonly recorded as the cause of poor welfare and mortality in voyage reporting.

The change to allometric stocking calculations provides more pen space per sheep than the HSRA model, regardless of fleece length. This nullifies the stocking density benefits of the 10mm

or less fleece length and removes the perverse incentive to delay shearing and endanger animal welfare.

Option 2 proposes a maximum permissible fleece length at the time of loading to 15mm for sheep exports during the Northern Hemisphere summer. It also proposes to permit sheep to remain unshorn below the knee and hock, a practice that is anecdotally reported to be of practical benefit in reducing leg wounds from shearing. A 15mm fleece length limit will provide exporters with an expanded window to shear their sheep and for any shearing cuts to heal. This change is intended to:

- ensure that sheep still have a fleece short enough to assist with tolerating hot conditions
- reduce the likelihood of sheep with unhealed shearing wounds being loaded on export vessels by providing a shearing condition that supports shearing times further from the time of export
- reduce handling stress on sheep in pre-export period through removing the disincentive to shear sheep prior to their entry to the RP
- provide greater flexibility to exporters in export sheep management.

## **6.2 Option 2 impacts**

### **6.2.1 Non-regulatory impacts**

The main impacts to the supply chain from this option will arise from the exclusion of live sheep exports during prohibition. There will be supply chain disruptions and market impacts due to a greater number of sheep, that may otherwise have been exported, turned off in the domestic market or retained for longer.

Restricting live exports would have 2 distinct market impacts:

1. A decline in world sheep meat prices due to an increase in sheep meat supply out of Australia.
2. A decline in domestic saleyard/direct sale prices due to an increase in the supply of sheep for slaughter into the domestic processing market and the removal of a source of competition for meat processors (that is live export) and therefore increased processing costs.

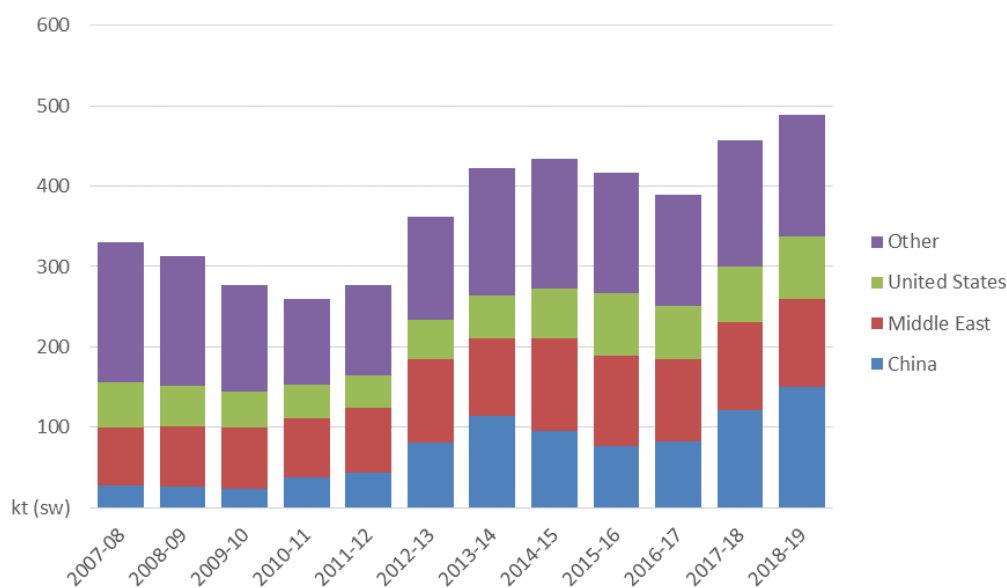
#### **World sheep meat price impacts**

World sheep meat prices are likely to fall as supply of sheep meat out of Australia increases (due to increased domestic processing). If live sheep (from 6 months of trade) were converted into processed meat, this would be expected to increase world supply by 1.5%. In reality, some exports will be rescheduled outside the prohibition and some sheep will be retained by producers. However, a 1.5% increase in supply is likely to result in slightly lower world prices because Australia is one of 2 significant exporters in world markets. On average, over the 5 years to 2016, Australia and New Zealand contributed 36% and 37% of world exports by volume (UN Comtrade 2019). Assuming an average carcass weight of 18.5 kg per sheep, Australia's exports of live sheep in 2016 equate to around 9% of Australia's sheep meat exports by volume. This represents about 3% of the 2016 global trade in sheep meat in volume terms.

World sheep meat prices are unlikely to fall as much as the increase in supply. Consumption of sheep meat is likely to be higher than it would otherwise be due to a slight fall in price, although consumers in the Middle East are expected to continue a longer-term trend of substituting towards other types of meat, especially chicken. Part of the household budget that consumers would save as a result of lower sheep meat prices is likely to be spent on chicken and other kinds of meat, as well as other types of food and non-food items. To capture this, a price elasticity of demand of  $-0.5$  is assumed. This means that, for an increase in world sheep meat volumes by 1.5%, world sheep meat prices might fall by 0.75% if live exports are confined to the northern winter (November to April). The prohibition in option 2 is 3.5 months and not 6 months but this analysis provides an approximation of option 2's impact on world sheep meat prices.

The shipping standstill in 2018 and the prohibition in 2019 also approximate the prohibition in option 2. In 2018 and 2019, Australia's lamb exports surged mainly due to strong demand in China as a result of rising incomes, changes in consumer preferences and substitution away from pig meat as a result of African swine fever (Figure 8). This increase in demand has more than offset any downward price pressure that may have resulted from a small increase in Australia's supply of sheep meat due to these disruptions to trade.

**Figure 8 Australian sheep meat exports, 2007–08 to 2018–19**



Source: ABS Note: ABS defines Middle East to include: Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates and Yemen.

### Domestic impacts

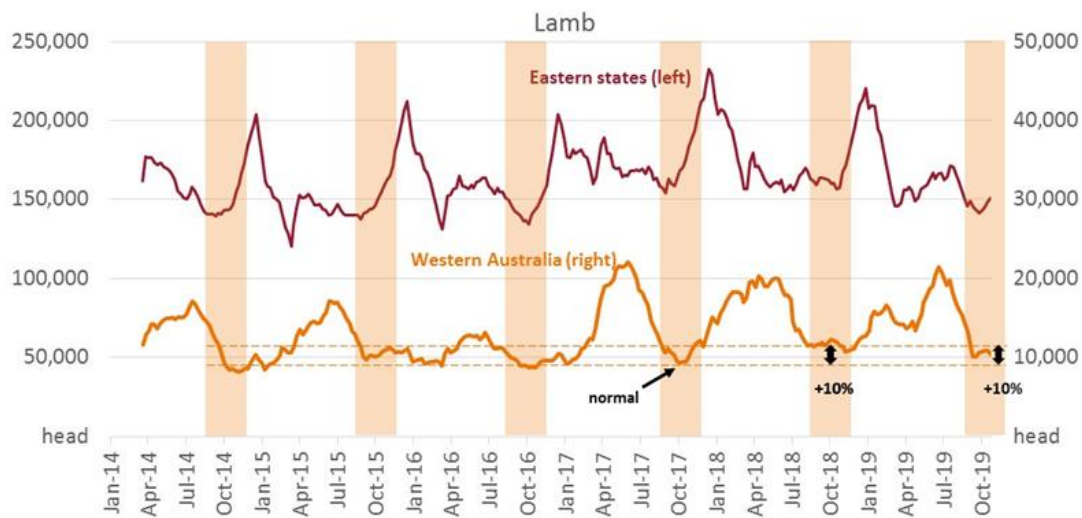
More significantly for most Australian stakeholders, diverting sheep from live exports to domestic processing could depress saleyard prices, particularly in Western Australia. To analyse the impacts of option 2, the department has reviewed the actual price impacts experienced during the shipping standstill in 2018 (little trade from June to October) and the prohibition in 2019 (3.75 month prohibition). These periods of trade disruption approximate the period of prohibition proposed in option 2 and therefore provide a proxy analysis of domestic price impacts that could be expected from option 2's 3.5 month prohibition. It is noted that price is influenced by many factors, therefore a relative analysis with prices in the eastern states has also been explored.



A high proportion of sheep destined for export are purchased directly from farms, not sold via saleyards. This means that an increase in the number of sheep delivered to saleyards is likely due to option 2's prohibition.

This was demonstrated in 2018 and 2019, when the number of sheep and lambs delivered to WA saleyards ('yardings') increased after reductions in the trading periods for live sheep exports. Increases were most significant in September and October, the months when slaughter is usually lowest (**Error! Reference source not found.**). During the months of September and October, from 2013 to 2017, lamb yardings averaged just under 9,300 per week in Western Australia. In 2018 and 2019 the number of lambs delivered to saleyards increased by 10% in the same months.

**Figure 9 Number of lambs sold through saleyards (12 week moving average) 2014 to 2019**

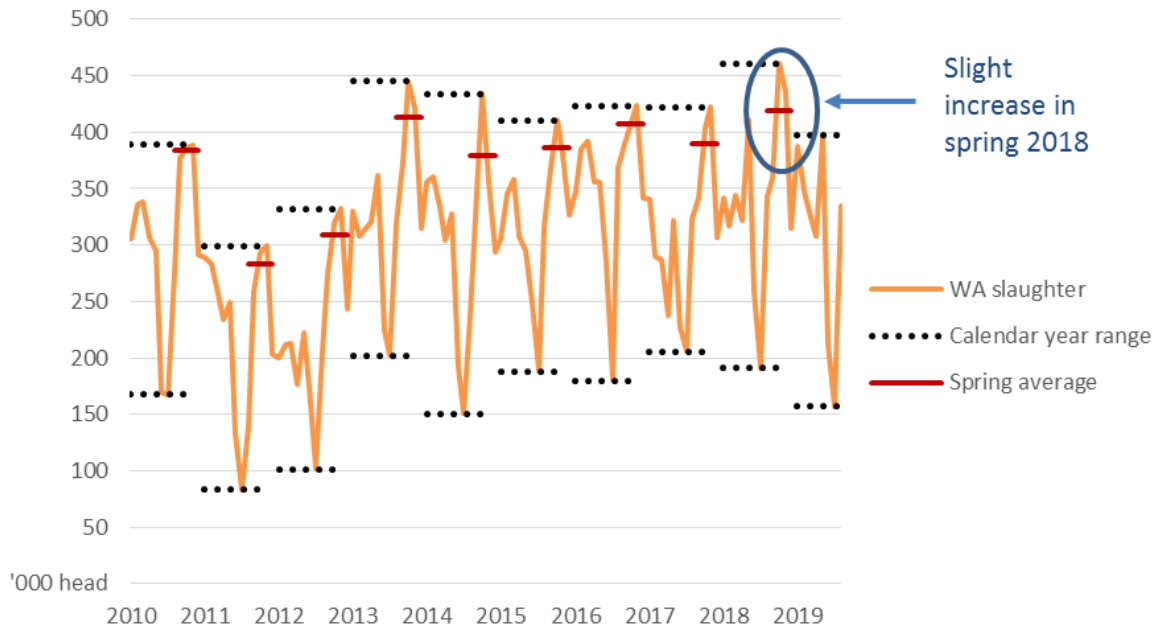


Source: Meat and Livestock Australia

Analysis by the department suggests that, due to better profitability, most sheep redirected from live export will be finished as lambs for domestic processing. At present, wether lambs not sold in autumn, off-shears to live export, may be carried through winter and sold in spring. In the absence of live export, if lambs are finished on farm to a higher standard for domestic processing, they are likely to be sent to slaughter some time in spring after the period during which live exports have been restricted.

This expectation was somewhat demonstrated in 2018 and 2019. In 2018 WA lamb and sheep slaughter increased after the introduction of new regulation, although these increases are small relative to the seasonal variability in slaughter rates (Figure 10). Monthly combined lamb and sheep slaughter in Western Australia between May and August 2018 was 12% higher than the average over the same months between 2013 and 2017. For the peak processing months between September and November, 2018 slaughter was 6% higher than the average between 2013 and 2017. Lamb slaughter was 11% higher between May and August 2018, and 13% higher between September and November 2018.

**Figure 10 Western Australia lamb and sheep slaughter, January 2010 to August 2019**

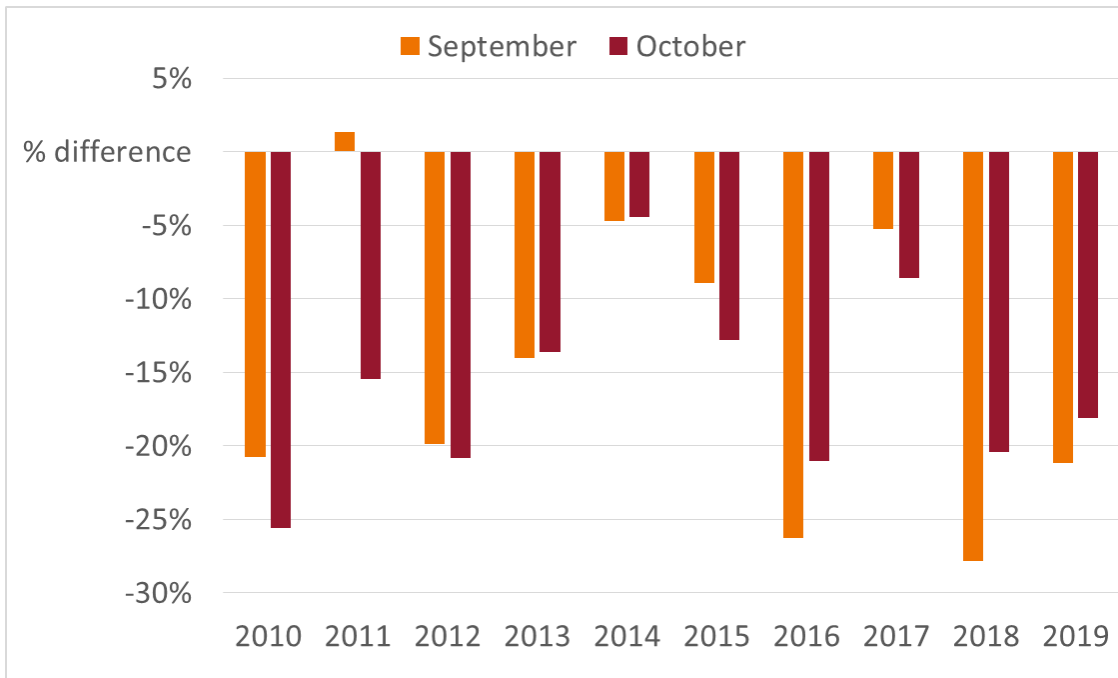


Source: Australian Bureau of Statistics (ABS) Livestock and Meat, Australia, cat. no. 7218.0, Canberra

In 2019, total sheep slaughter in Western Australia was within half a percent of the average for 2013 to 2017 for May through to August. Lamb slaughter was 8% lower than the 2013 to 2017 average for these months due mainly to restocking intentions earlier in the season. At the time of writing, data for September, October and November 2019 were not available.

The impact of a cessation of live exports on price is most apparent when relative prices are reviewed between eastern and Western Australia. WA saleyard lamb prices are usually lower than prices in Australia's eastern states. Over the 5 years from 2013 to 2017, WA trade lamb prices averaged 12% lower than eastern states prices in both September and October. In 2018, this discount for trade lamb prices in Western Australia widened to an average of 28% lower in September and 20% lower in October (Figure 11). In 2019, WA trade lamb prices were 20% and 18% lower in September and October when compared to the eastern states.

**Figure 11 Average monthly price difference between trade lamb (18–22kg) prices in the eastern states and Western Australia**



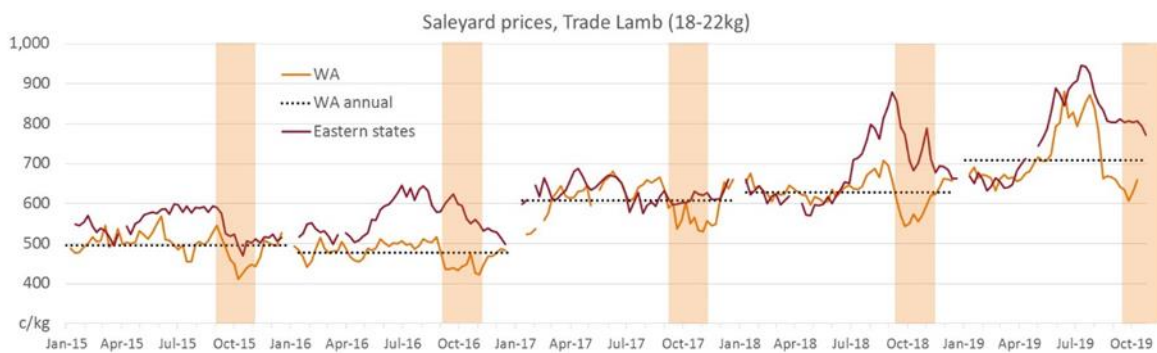
Note: A negative percentage difference here indicates that WA trade lamb prices were lower than in the eastern States.

Option 2's prohibition is expected to result in a maximum price decline of 20% compared to option 1. This is based on the assumption that the biggest differential would be the approximate cost of transporting sheep from Western Australia to eastern states for slaughter. Transport costs are around \$20 per head which is approximately 20% of the average 2017–18 saleyard price of wethers sold for live export. The 2018 and 2019 price declines relative to eastern state prices is consistent with this assumption.

Further it is expected that over time, the prohibition of option 2 would have a lesser impact on price. This is because businesses impacted by the prohibition would be better prepared to operate under different conditions. This fact may also demonstrated in the diminishing price differential between eastern and western states although 2 years is only a small sample size.

Despite the relative price impacts, in 2018 and 2019 absolute WA saleyard prices for trade lamb were historically high relative to prior years. As noted with world prices, this was due to strong global demand for sheep meat, particularly from China (Figure 12). So while the temporary cessation of live exports during the Northern Hemisphere summer depressed prices, this was only noticeable relative to prices in eastern states. The impact to the supply chain was buffered by current strong global demand.

**Figure 12 Weekly saleyard prices, trade lamb (18–22kg)**



### Stakeholder impacts—producers

If the live export trade were prohibited during some or all of the Northern Hemisphere summer months, Australian farmers wishing to turn off sheep to live exports during that period would need to switch to alternative markets.

Some alternatives available to producers could include one or more of:

- preparing and selling suitable animals prior to the prohibition to prioritise pasture for lambing ewes
- retaining and selling sheep to the live export market following the prohibition—sheep need to be maintained at condition score 2 or higher
- retaining sheep for wool production in the longer term—adult sheep need to be maintained at condition score 2 or higher for good health and wool production
- retaining sheep and redirecting efforts to prime lamb production (over time)
- selling all or some wether hoggets if needed for stocking density management during the pause for slaughter as mutton—the previously covered information on prices shows that producers wishing to do this faced a greater price differential with eastern states than the average over the 5 years 2013 to 2017 (12%).
- selling lighter lambs to the air freight market
- selling heavier merino lambs to slaughter while prices are good and processors are in short supply
- retaining sheep and then selling as heavy weight mutton—sheep need to reach fat score 3.

Farmers currently sell sheep for live export because it is more profitable than alternative markets. Most WA pastoral areas have a short growing season that adds to the risks associated with prime lamb production. A short growing season means that lambs may not reach the weight and quality standards of the prime lamb market before hot summer conditions restrict pasture growth, necessitating supplementary feeding. Live exports provide WA farmers with a more flexible market than prime lambs in terms of age, quality and timing of delivery, and this flexibility can be used to manage the risks associated with short growing seasons. This means that a farmer can decide whether to retain wethers and ewes over the winter period during seasons when there is more feed on the ground, or offload stock to live export if a poor season determines the need to destock.

In switching to alternative markets, there would be a strong price incentive to adjust farm production over time to the next most profitable option, which is likely to be finishing more prime lambs for local slaughter, and while this adjustment was taking place, to harvest more wool and sell more sheep for local processing as mutton. As discussed in [section 1.1.1](#), most sheep farms in Western Australia are already oriented to produce lambs, however without the 'relief valve' that live exports provides WA producers, additional feeding is likely to be required to bring lambs (and sheep) up to market specifications. The extra cost of production could reduce profitability relative to the situation in option 1 depending on market conditions. Some producers may decide that lamb production is no longer profitable, and so prioritise other farming activities such as cropping or wool production. It has been postulated that retaining sheep for wool production could face other initial constraints such as limited shearing services (Mecardo 2019).

Through consultation, producers have advised that April to June is a particularly critical decision-making period in the sheep production calendar—when sheep producers decide whether to sell or retain non-breeding stock over winter based on timing of the break in the season (around May) and expected quality of winter pasture growth. Decisions at this time can have material flow on impact for the remainder of the winter season. Producers have also advised through consultation, that a 3.5 month prohibition starting in June (option 2), is still a viable option—presenting the opportunity to make decisions into late autumn (albeit longer would be ideal) and a short enough period over which to supplementary feed should stock be retained.

If greater demands on processing facilities are required, producers who sell stock for processing are most likely to wear the short term costs of recommissioning these facilities in the form of lower prices for sheep and lambs. There is little scope for processors to pass these costs forward to consumers in world sheep meat markets. This is because consumers in world markets can substitute to alternative sources of sheep meat and to other sources of protein.

The amount sheep prices in Western Australia can fall is limited by alternatively transporting sheep and lambs to Australia's eastern states for processing. The absolute amount that processors can raise processing charges is limited to around \$20 per head by the approximate cost of transporting sheep to the eastern states for processing. This is just under 20% of the average 2017–18 saleyard price of wethers sold for live export so by approximation, would limit the domestic WA price declines by around 20%.

Analysis by Mecardo (2018) of interstate trade flow confirmed that significant movement of livestock from Western Australia to eastern states occurred during 2010, 2013, 2015 and 2016, when the price differential between the east and west coast was large enough to encourage the flow. Their analysis deduced that trade flows increased substantially out of Western Australia once the dollar per head gap widened beyond \$25–\$45.

Determining a profitability impact at the farm gate is more complex. This is because of the range of alternative options available to producers and the intricacies of estimating 'average' production costs. Put simply, a prohibition of live exports will have impacts to profitability by requiring producers to seek less profitable alternatives to live export. The magnitude of this impact is likely to be greatest in early years following implementation of a prohibition, diminishing as production systems are reorganised and rationalised to meet the alternative activities. A shorter period of prohibition, option 2, could be expected to impact profitability less

than a longer prohibition of option 3. This is because a shorter prohibition would still provide live export opportunities within existing sheep production systems.

Switching from live exports to lamb production is likely to have only minor impacts on employment in the sheep industry. On-farm employment could actually increase because the production of prime lambs requires more labour per sheep than producing sheep for live export.

#### **Stakeholder impacts—meat processors**

Diverting live exports to domestic processing would increase the supply of sheep available to processors and put downward pressure on the price of livestock. The limited potential for world meat prices to fall would provide processors with a strong economic incentive to increase slaughter. This is likely to increase the demand for meat processing facilities, particularly in WA. For at least the first few months following an unexpected restriction in trade (and possibly longer) the cost of recommissioning processing capacity is likely to increase processing costs. Significant investment in new processing facilities is unlikely to be needed, but some investment will be necessary to recommission facilities that have fallen into disuse. These additional costs could include recruiting and training new staff and leasing temporary processing and refrigeration while refurbishing more permanent facilities.

The cost of processing capacity would begin to fall once these initial investments have been made. Following 2 Northern Hemisphere summer periods of restricted live exports, it is assumed that some of these recommissioning costs have already occurred.

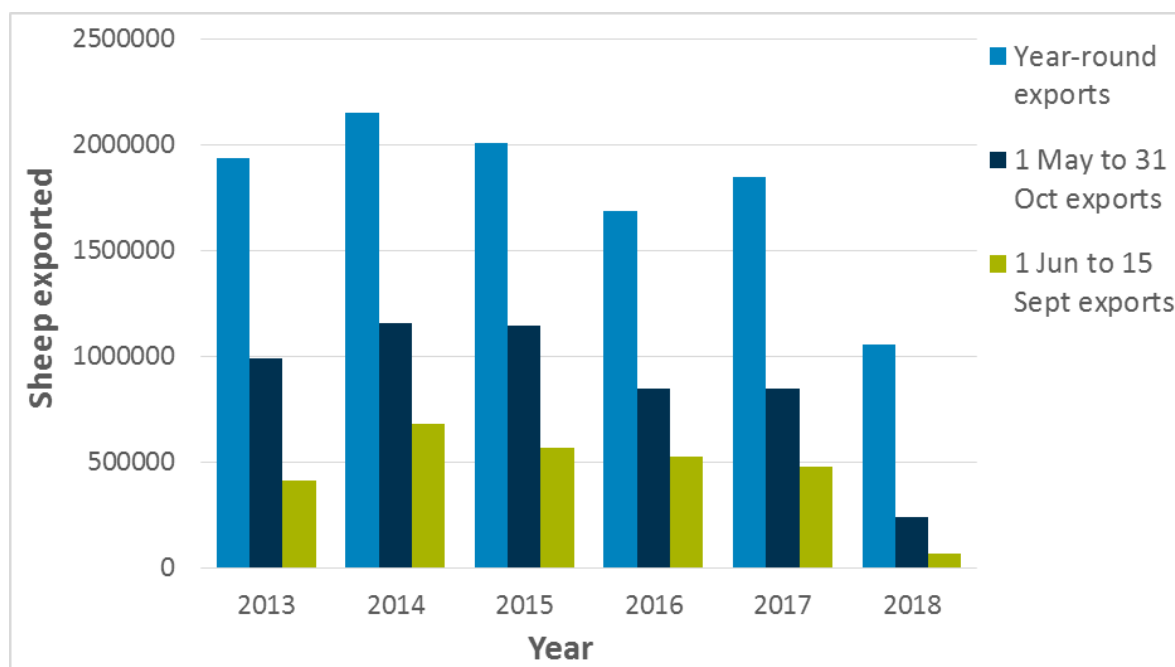
The duration of this price impact is uncertain—it depends on how quickly underutilised processing capacity can be brought back into production. Industry consultation suggests recommissioning of meat processing facilities in Western Australia could be complete within 36 months. Meat processing is a flexible industry which often operates seasonally and routinely adapts to quite large fluctuations in demand. The industry would be expanding well within past production capacity, and so can draw on previous experience and expertise. It is noted however that a constraint for the processing sector is a shortage of suitable labour. A survey of its processing members by Australian Meat Industry Council identifies the need for around 3000 extra staff to work at full capacity (AMIC 2018).

Total employment in Western Australia is likely to increase if sheep destined for live export are processed in Australia. This is because meat processing is labour intensive, and likely to employ more people than the live export industry it would replace (Davey & Fisher 2018). In the 3 years to 2016–17, 4,500 full-time staff were employed each year on average in the WA meat processing sector. A recent report by Pegasus Economics estimated that ending live exports could increase employment in the meat processing sector by 350 full-time employees (Davey & Fisher 2018).

#### **Stakeholder impacts—exporters and ship owners**

From 2013 to 2017, the average number of sheep exported between 1 June and 15 September was 533,964 or a range of 24.8% to 31.6% of total annual exports (Figure 13). In simplistic terms, the 3.5 month ban on live sheep exports in option 2 could reduce revenues derived directly from the export of sheep by approximately 30%. This does not consider alternative means of revenues that could be prioritised or alternative markets that could be accessed during a prohibition period.

**Figure 13 Sheep exported throughout the year 2013–18**



In a submission to the discussion paper, LiveCorp described the impacts on exporters of a partial ban on trade. One impact is the economic cost of carrying non income producing assets, which would impact profitability through lost economies of scale. Another impact is reputational damage due to an exporter's inability to provide reliable supply to markets in which we have a long history of trade and business relationships maintained over decades. Additionally, there is the cost borne by contract staff that are engaged directly by exporters (and occasionally importers) only when live export vessels are scheduled to operate. These include veterinarians and other supply chain participants, such as onboard stock handlers, sheep buyers and quality control staff.

If 2018 and 2019 can be used as a proxy for option 2, exporters consulted by LiveCorp noted a 10–25% reduction in revenue during the 2018 shipping standstill (approximately 3 months) and a 5–15% reduction in revenue during the 2019 prohibition period (3.75 months). The 2018 interruption to trade came with little notice. In 2019, disruption was expected which provided exporters the opportunity to plan such that some exporters were able to redirect their business focus and thereby reduce the impact.

**Stakeholder impacts—feed producers**

There are 6 feed mills servicing live sheep exports, 3 in Western Australia, 2 in South Australia and 1 in Victoria. The facilities are all located in regional areas contributing employment opportunities within the region. Information provided by industry suggests that feed producers allocate between 50–90% of their feed production to live animal exports. The dependence on live sheep exports (and not cattle) specifically was not differentiated. Other income sources may include production of feed for domestic use, sale and servicing of milling equipment.

The industry noted a range of impacts from a prohibition period on live sheep exports, particularly in Western Australia. These included lost income from not manufacturing feed, laying off employees, replacing and training new employees when production recommenced and the impact to regional communities as a result of reduced employment.

LiveCorp's submission to the discussion paper also noted that planning for fodder manufacture may begin 12 months prior to anticipated sale. The 2018 shipping standstill and 2019 prohibition left fodder manufacturers with limited capacity to prepare and adapt to the significantly lower demand for product, highlighting the importance of adequate notice ahead of any regulatory change. Further challenges arise due to the limited storage time for export feed.

Option 2's prohibition could be expected to have some impact on employment by these businesses compared to option 1. This would be dependent on individual business opportunities to focus away from live export. Fodder manufacturers directly employ manufacturing staff, and contract bailers and straw suppliers. The industry estimated that 10% of employees had been lost (or 10 full time equivalents) due to the 2019 prohibition period. The LiveCorp submission to the discussion paper noted that one manufacturer reported that during the 2019 prohibition, they had to reduce their operational capacity to 65–70%. As a result, one third of their casual staff were not required during this period.

In a stable regulatory environment, where the prohibition under option 2 was implemented, it is probable that fodder producers would seek out secondary or alternative markets during periods of low demand for live export fodder. One alternative income source would be supplying domestic producers who choose to retain stock to fatten on supplementary feed.

#### **Stakeholder impacts—road transport operators**

According to Mecardo (2019) livestock transporters capture around 1.5% of the value derived from live sheep export supply chain. However, LiveCorp explained that road transport operators in Western Australia are highly dependent on the live export trade, averaging 25–50% of business revenue. The movement of livestock on road requires specialist skills and customised vehicles, restricting the ability to find alternative work. According to LiveCorp, on average, the sale of sheep from farm to the live export trade requires 3.5 movements. In comparison, sheep sold to a WA abattoir would be moved just 1.5 times.

The impact of option 2 on road transporters is assumed to have similar consequences as experienced under the interim prohibition period during 2019. According to the LiveCorp submission to the discussion paper, the 2019 prohibition period reduced turnover of transporters and had flow on effects for managing employee numbers, although no numbers were provided.

#### **Stakeholder impacts—other supply chain participants**

Australian Government Accredited Veterinarians (AAVs) and local vets service the live export industry at various points on the supply chain to assist in the preparation and management of livestock prior to export or during a voyage. A 3.5 month prohibition on trade would reduce incomes of AAVs from livestock export related activities. A submission by a group of AAVs servicing sheep exports to the discussion paper reported income impacts from trade disruption over the past 18 months (including the 2018 shipping standstill and the 3.75 month prohibition in 2019). The AAV submission estimated a 30% loss of income for land-based activities and 20–50% loss of income for shipboard AAVs. This necessitated vets to seek alternative sources of income. The impact on AAVs in 2018 and 2019 can be used as a proxy for the impact of option 2.

Shearing services are another important part of the live export supply chain, with the ASEL requirement that all sheep must be shorn before export. The shearing of wethers intended for the live export trade fills in what would otherwise be a gap in the work calendar for shearing



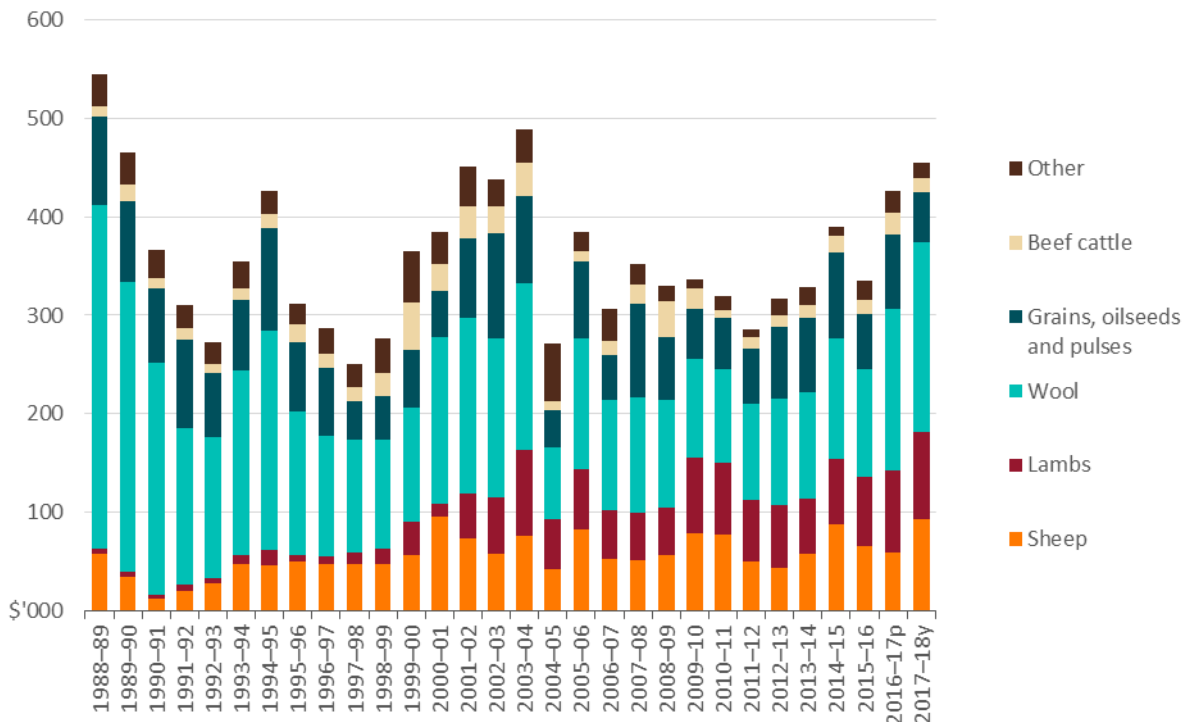
service providers through the May to July off-season period. LiveCorp noted in their consultations that some concerns were expressed for the social and mental health issues in regional communities, caused by the imbalance between demanding and strenuous work periods and no work. Mecardo (2018) highlighted that redirecting sheep that would otherwise have been exported to domestic wool production would increase demand for shearing services.

The livestock agent's role is to find the best marketing option for the customer's stock. The financial implication of a prohibition period is not as significant for livestock agents however in key live export supply regions, some agents note that 30–40% of their revenue is reliant on the live sheep export trade. Others have also experienced some disruption to the operation of their businesses. Most agents believe that without the live sheep option, alternative buyers will be difficult to find.

**Capacity to adapt**

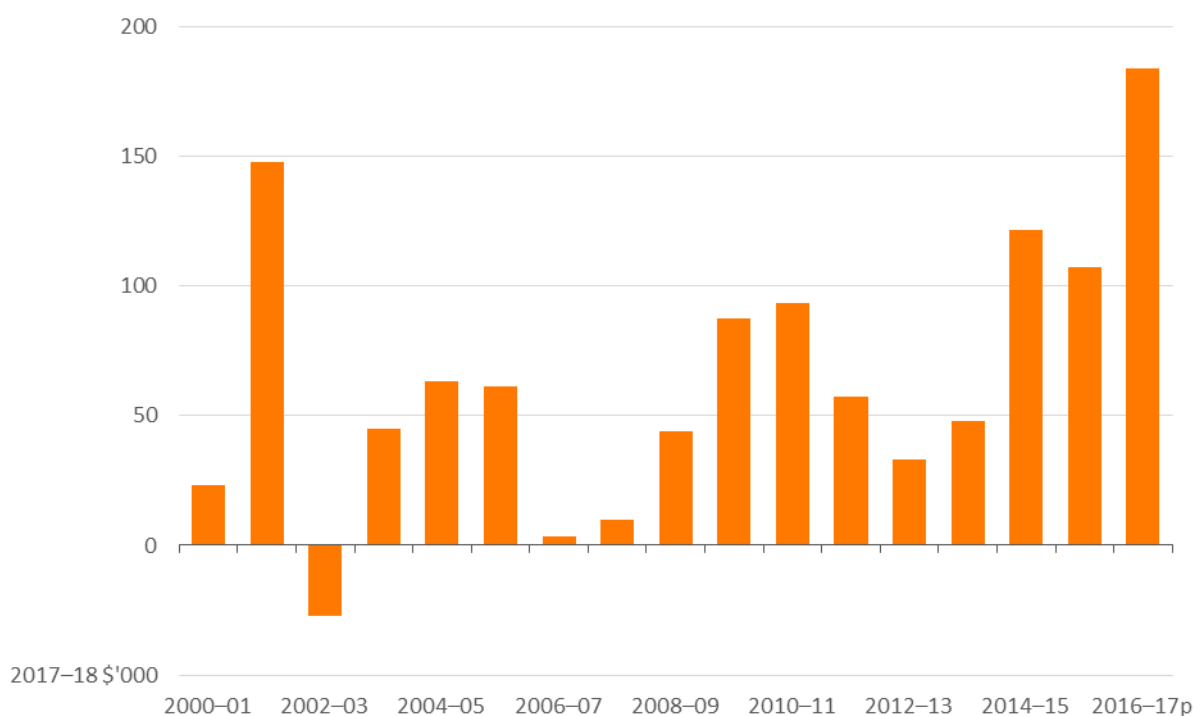
As seen in parts of the supply chain during 2019, compared to 2018, the forward notice of a prohibition period gives stakeholders an opportunity to plan and find alternative markets or sources of income. Both the farming and meat processing sectors of the WA sheep industry are highly responsive to market signals. The sheep farming sector has significantly increased lamb production since the early 2000s, and this trend is ongoing (Figure 14). The industry has shown the ability to adapt to year-to-year income variability, with a mean absolute deviation of 64% between 2000–01 and 2016–17 (Figure 15). The meat processing sector has adapted to a large reduction in the sheep flock since 1990, and has considerable latent capacity.

**Figure 14 Change in farm receipts, WA sheep specialists, 1989–90 to 2017–18**



pPreliminary estimates. yProvisional estimates.  
Source: Australian Agricultural and Grazing Industries Survey (AAGIS)

**Figure 15 Change in farm cash income, WA sheep specialists, 2000–01 to 2016–17**



Provisional estimate.  
Source: Australian Agricultural and Grazing Industries Survey (AAGIS)

### 6.2.2 Regulatory costs

Regulatory costs will be incurred by some of the conditions applied to exporters under option 2. No regulatory burden arises from the prohibition period due to the absence of trade, or from the requirement for a single discharge port for voyages arriving in the Persian Gulf after 1 June and departing between 15 and 30 September. Exporters and vessel operators will still go through the same regulatory processes for an export voyage to one destination as they would to several.

The removal of the requirement for a HSRA for live sheep voyages to, or through, the Middle East would be a cost saving. Exporters spend time filling out a HSRA for each voyage. The estimated cost savings would be 2 hours per voyage. Across the last 5 years, the average number of voyages conducted outside the proposed prohibition period was 23. We assume 2 voyages that may have previously been conducted during the prohibition period may still occur in the non-prohibition period taking total voyages to 25. A 2hr saving of administrative time for 25 voyages equates to a reduction in regulatory burden of \$3,824 each year compared to option 1.

All sheep must have a wool length less than 15mm and a maximum body condition score of 3.5. It is already a requirement of the ASEL that sheep must not be exported with a fleece length of greater than 25mm. This requirement means that all sheep must be shorn before export.

According to HSRAs submitted to the department for Northern Hemisphere summer voyages over the past 3 years, all consignments are prepared with a fleece length of 10mm. This is because a shorter fleece length affords a greater stocking density according to the existing HSRA model. Exporters are incentivised to shear sheep close to the time of departure. Therefore, it is common practice already, although not a requirement. Consequently, this condition is not expected to impose an additional regulatory burden.

All sheep voyages to the Middle East during the Northern Hemisphere summer during 2019 were monitored using automated environmental measurements and targeted behavioural observations and this monitoring was reported to the department. Exports of live sheep during 2019 were required by a section 17 Direction under the *Australian Meat and Live-stock Industry Act 1997* to equip vessels with environmental data loggers, to measure deck-side environmental WBTs and report these back to the department. The targeted observations were taken by IOs and therefore not a regulatory burden on the part of the exporter or vessel operator.

The requirement to equip vessels with data loggers is the responsibility of the exporter. Therefore the regulatory burden will be borne by the exporter.

The analysis assumes loggers will be replaced once during the next 10 year period (expected lifetime of 5–10 years). The average cost of purchasing loggers is calculated by:

$$[(\text{average number of decks}) \times (\text{loggers per deck}) \times (\text{cost per logger})]$$

The assumptions include an average of 10 decks for vessels used to the Middle East, requirement for 3 loggers per deck and cost per logger of \$350. There are 32 exporters licensed to sell sheep to the Middle East. Therefore the cumulative value would be approximately \$784,000. Some exporters have already invested in environmental data loggers as they were required for trade in May 2019 however this investment has not been considered.

**Table 1 Option 2: Average annual regulatory costs**

<b>Option 2. Prohibition from 1 June to 14 September to all ports with additional prohibited periods for Qatar and Oman</b>	<b>Business (\$)</b>
Remove requirement to submit a HSRA using HotStuff version 4	-3,824 (per year)
Requirement to equip voyages during the Northern Hemisphere summer with data loggers	78,400 (per year)
Requirement to equip voyages during the Northern Hemisphere summer with data loggers	784,000 (total cost)
Time requirement to place loggers on vessels for each voyage	1,530 (per year)
<b>Yearly average over 10 years<sup>a</sup></b>	<b>76,106</b>

<sup>a</sup>assumes loggers are purchased and replaced once in a 10 years period.

### 6.3 Option 2 net benefits

Conditions under option 2 address the problems identified in [section 2](#) and represent the minimum regulation necessary to meet the objective of reduced risk of heat stress in live exported sheep and improved animal welfare outcomes.

Animal welfare benefits for business, individuals and community will be derived from increased confidence that welfare risks associated with heat stress will be managed. In addition, a range of other flow on benefits could be experienced such as support for industry sustainability, strategic business benefits and human and community social benefits.

Regulatory costs under option 2 mainly result from the requirement to equip vessels with data loggers, outlined in Table 1. There will also be a small reduction in the regulatory burden for businesses by the removal of the requirement to conduct a HSRA for sheep voyages to, or through, the Middle East. The net regulatory impact is not considered significant.

Economic impacts of option 2 will vary depending on the stakeholder. For example, exporters will be impacted by a reduction in volumes of sheep exported. Sheep producers, particularly in Western Australia, will feel the impact of lower prices and the need to seek less profitable outlets for sheep turn-off.

The net benefit of option 2 must weigh up qualitative animal welfare benefits with the quantitative impacts. The department has assessed, on the basis of available climatological and historical data, that a 3.5 month prohibition is the appropriate duration to ensure sheep are not subjected to climatological conditions where the risk of heat stress would be 5% or greater. The risk mitigated by the prohibition is not managed under the status quo regulatory position of option 1.

While the prohibition will have some impacts to industry, feedback from consultation on the discussion paper confirmed that stakeholders accept that not acting to lower the likelihood of heat stress in sheep could threaten the viability of the live export industry ([section 8.3](#)). These additional regulatory measures are considered to be reasonable and justified.

Option 2 meets the stated regulatory objective of reducing heat stress risk while maintaining a viable live sheep export trade.

## 7 Benefits and impacts of option 3

Option 3 aligns with recommendations from the HSRA Review and proposes an approach to managing the risk of heat stress in sheep using a revised HSRA model which replaces risk settings based on mortality thresholds with welfare thresholds ([Appendix F](#)). The recommended welfare thresholds align with heat stress thresholds (HSTs) already embedded within the existing HSRA model (but not currently used). The revised model will use alternative risk settings to determine the appropriate stocking density for voyages to, or through, the Middle East. If heat stress according to the revised risk settings cannot be managed by altering stocking density then a voyage would not be permitted.

### 7.1 Revised model impacts

The revised HSRA model for this option does not yet exist. Determining its actual impact is not straightforward. However, industry research papers provide some guidance on the underlying calculations and assumptions (Maunsell 2003, Stacey 2017). Using these resources, the department has modelled the impact of the revised model on permitted stocking densities for 3 different classes of sheep (Figure 16). The impacts on expected stocking rate, defined by the model, are shown as a proportion of space requirements under ASEL (version 2.3).

This analysis shows that the revised HSRA model would have the impact of effectively stopping live sheep exports for the Northern Hemisphere summer period. The revised HSRA model would destock voyages entirely or permit stocking rates that are too low to be economical, which effectively prohibits trade for 6 months.

**Figure 16 Expected stocking rates for 3 classes of sheep, under the revised HSRA model as a percentage of ASEL (version 2.3) requirements**

Sheep class	Destination	May	Jun	Jul	Aug	Sep	Oct
40kg merino adult, shorn, zone 3	Kuwait	0%	0%	0%	0%	0%	40%
	Qatar	0%	0%	0%	0%	0%	20%
	UAE	0%	0%	0%	0%	0%	40%
	Turkey	0%	0%	0%	0%	0%	20%
	Jordan	0%	0%	0%	0%	0%	20%
52kg merino adult, shorn, zone 3	Kuwait	0%	0%	0%	0%	0%	20%
	Qatar	0%	0%	0%	0%	0%	0%
	UAE	0%	0%	0%	0%	0%	20%
	Turkey	0%	0%	0%	0%	0%	0%
	Jordan	0%	0%	0%	0%	0%	0%
40kg awassi, zone 3	Kuwait	20%	0%	0%	0%	0%	80%
	Qatar	20%	0%	0%	0%	0%	70%
	UAE	50%	0%	0%	0%	0%	85%
	Turkey	40%	0%	0%	0%	0%	60%
	Jordan	40%	0%	0%	0%	0%	60%

81-100%
61-80%
41-60%
21-40%
1-20%
0%

The analysis includes consideration of heat tolerant breeds of sheep (such as awassi breed) as a comparison to the more commonly shipped merino breed. The revised model would permit greater stocking of these breeds in May and October. Heat tolerant breeds are raised in Australia in small numbers. Historical data on voyages that departed Australia in June, July and August for

2016 and 2017 showed that of almost 1 million sheep exported in total on 25 voyages during this period, only 2,850 sheep were identified as un-crossed heat tolerant breeds (0.3%). It is very unlikely that sufficient numbers would be available to justify operation of an entire voyage.

## 7.2 Option 3 benefits

As explained in [section 7.3](#), the revised HSRA, based on the HSRA Review's recommendations is likely to effectively prevent trade for the entire Northern Hemisphere summer.

Under this option, the risk of poor animal welfare outcomes due to heat stress on voyages to, or through, the Middle East during the Northern Hemisphere summer period is significantly decreased compared to option 1 and also decreased, though less significantly compared to option 2. Consequently the stepped animal welfare benefits compared to options 1 and 2 relate to the lowering of risk, but the direct and indirect welfare benefits themselves ([Section 5.1](#)) are not materially different. The exception to this is the benefits in option 2 that could be derived from the additional conditions proposed for any exports permitted under that option ([Section 6.1](#)). These would not be relevant for option 3.

## 7.3 Option 3 impacts

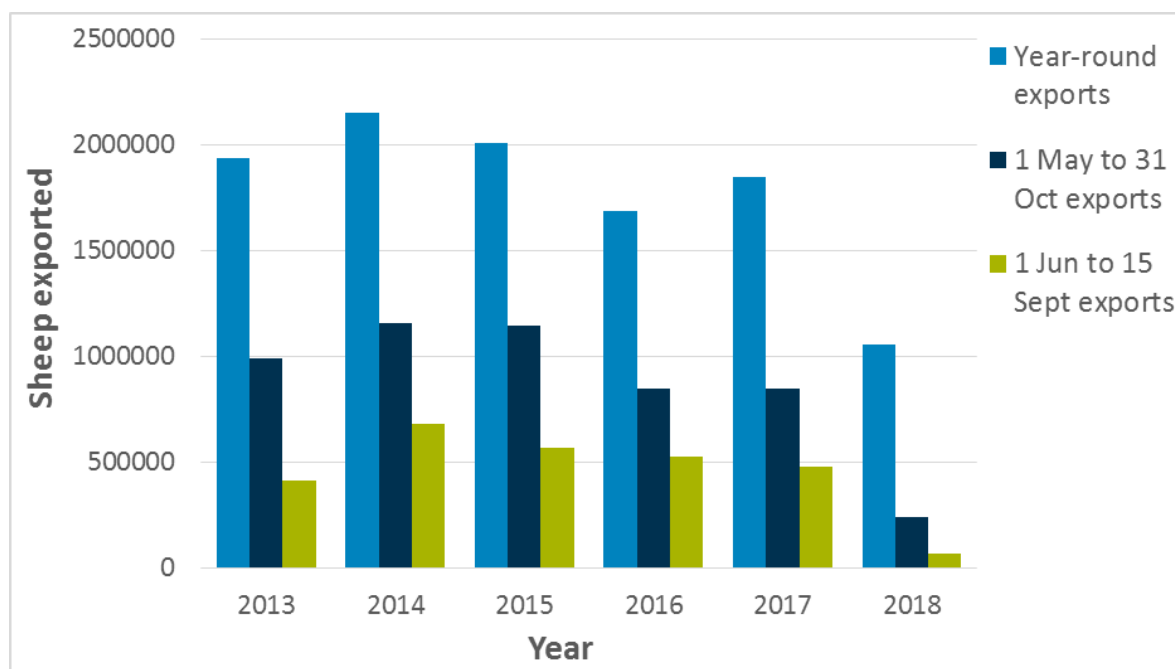
### 7.3.1 Non-regulatory impacts

An extended prohibition period (anticipated to be 6 months over option 2's prohibition of 3.5 months) would have impacts on world and domestic sheep markets. If sheep that would otherwise have been exported live during the Northern Hemisphere summer were processed domestically, the increase in sheep meat supply out of Australia could have <1% impact on world prices. However, domestic WA prices would also be expected to decline by a maximum of around 20% due to the floor provided by the option to deliver stock to the eastern states for approximately this amount. Further discussion on price impacts is in [section 6.2.1](#). It is expected that these price impacts would last for almost twice as long as the impact under option 2.

It is uncertain how quickly world and domestic prices would recover following a longer prohibition period. In 2018, there was rapid recovery once live exports resumed although this was for a shorter cessation of trade (approximately 3 months). As the market evolves and adjusts over time, the impact is expected to lessen as members of the supply chain re-orient their operations with the expectation of no exports for the Northern Hemisphere summer. This may have been demonstrated by the lesser impact of the 2019 interim prohibition compared to the unexpected shipping standstill in 2018. Alternatively, greater notice of the prohibition could have provided more time to plan (without requiring more permanent re-orientation of production systems). Some sustained price impact is expected during subsequent prohibition periods due to the removal of one competitor from the market of purchasing sheep.

In addition to price impacts, the number of sheep that could not be exported in option 3 is almost double those historically exported during the prohibition period of option 2. From 2013 to 2017, an average of 51.6% of total annual exports to, or through, the Middle East were exported during the prohibition period of option 3, the whole Northern Hemisphere summer period (Figure 17 **Error! Reference source not found.**). This compares to an average of 27.7% of total exports during the prohibition of option 2 (3.5 months). In reality, some sheep that would have been exported during the 6 months of option 3's prohibition, would be expected to be exported outside the prohibition.

**Figure 17 Sheep exported throughout the year 2013–18**



**Stakeholder impacts—producers**

As outlined in option 2, if the live export trade were prohibited during the Northern Hemisphere summer months, Australian farmers wishing to turn off sheep to live exports would be required to switch to alternative markets or farming approaches.

The 6 month prohibition of option 3 would create additional challenges for producers, especially in the early part of the Northern Hemisphere summer season. Through consultation, producers have advised that April to June is a particularly critical decision-making period in the sheep production calendar—when sheep producers decide whether to sell or retain non-breeding stock over winter based on timing of the break in the season (around May) and expected quality of winter pasture growth. Decisions at this time can have material flow on impact for the remainder of the winter season. A 6 month prohibition would require early, less-informed decision-making ahead of the usual timing of the break, which may limit farmers’ ability to seek the most profitable option for that year. A decision to hold stock on the expectation of rain that never came, could mean longer dependance on costly supplementary feeding or selling stock earlier than desired to processors at reduced prices. This could impact on producers’ ability to undertake natural resource management, according the Live Export Reference Group’s (LERG) submission to the discussion paper. If sheep are retained into winter months, paddocks risk being overgrazed and this, in turn increases the risk of erosion.

While feedback from producers to the discussion paper indicated a shorter 3.5 month prohibition (option 2) was a viable option, a longer prohibition means almost double period to manage retained livestock. Producers electing to hold sheep over the 6 month prohibition of option 3 could be required to supplementary feed this stock for the entire prohibition. The financial cost of this is likely to be substantial for some farmers (a greater proportion than for option 2) who, as a consequence, may choose to alter farming practices or exit sheep farming altogether. This could have some detrimental flow on effects.

A report prepared by Pritchett (2019) modelled a range of flock scenarios that could result from different farming practices in the event of a total ban on live sheep exports. Possible changes to the size and structure of the WA sheep flock were analysed. Scenarios ranged from retaining wethers for wool production at the expense of ewes, selling sheep and lambs to eastern states and reducing sheep numbers in favour of increasing cropping. Analysis of the scenarios predicted reductions in the WA sheep flock ranging from 8% to 33%, depending on management decision taken by producers. Although the analysis modelled a total ban on live sheep exports, it provides some idea of the possible impact of a 6 month prohibition on the size and structure of the WA sheep flock.

If sufficient numbers of producers exit the industry, there is a risk to WA's flock size. This could impact the state's wool and sheep meat production potential as well as retention of breeding genetics. A survey of WA sheep producers in 2018 noted that just over half of the producers surveyed had no intentions of increasing their flock size, while approximately one third did have interests in increasing size (WA Sheep Producer Survey 2018). It's not apparent from the survey how the shipping standstill and regulatory uncertainty that arose following the *Awassi* incident may have influenced responses but the results do highlight that most existing producers do not wish to increase their own production systems.

A reduced sheep flock could have a negative impact on weed control in mixed farming enterprises. In their submission to the discussion paper, the LERG stated that:

Livestock are complimentary in the broad acre cropping system through providing a profitable pasture break phase in continuous cropping to combat weeds and contribution of nitrogen. The increased prevalence of herbicide resistance means that grazing sheep in the lead up to the cropping season provides an effective alternative to knockdown chemicals. Sheep grazing stubbles in the summer are a key component not just in the sheep enterprise but they help to recycle nutrients, reduce dry matter build up and minimise summer weeds that utilise water in the soil profile prior to winter planting.

Thus without this symbiotic relationship, an increase in the use of chemical weed killers could result, which may be detrimental to the environment.

For those producers who are particularly dependent on live exports as a regular avenue to sell their sheep, a longer period of disruption to usual practices may require consideration of farming practices to support their most profitable alternative choices. In the short term, this could increase the demand for services of local agrarian consultants and sheep farming experts. However this would be at the expense of the producer.

#### **Stakeholder impacts—meat processors**

As explained in option 2, sheep meat processing capacity within Western Australia is significantly underutilised. The department estimates the spare processing capacity within Western Australia to be around 2 million head per year, which is more than enough to absorb additional sheep redirected to domestic production due to a prohibition in live exports.

Option 3 would mean an extended period of increased supply of sheep for domestic slaughter. This could work in the favour of meat processors. Under the regulatory status quo, the Australian winter and early spring months are a low season for WA processors. A more stable supply of sheep over this period could provide a more stable environment to retain workers.



Some choose this period to close operations for maintenance works. Therefore a longer period of additional supply may provide processors with more incentive to adjust to increased capacity requirements.

Once processing readjustments have occurred, it's difficult to predict the final impact on saleyard prices and whether option 3 will have a different impact to the shorter prohibition period in option 2. Lower processing costs due to greater numbers of sheep for domestic slaughter could result in small increases in saleyard prices, or greater profits for processors if these savings are not passed on. Even if price rises are realised, the profitability of sheep farming is still likely to fall due to additional costs of finishing lambs for domestic slaughter.

#### **Stakeholder impacts—other supply chain participants**

The impact of option 3, a 6 month cessation in trade, would mean a longer period of interruption to business activities. The impact could crudely be estimated, compared to option 2, to be double the sheep numbers or almost double the timeframe (a multiple of 1.7). Some exports may be rescheduled to occur in the shoulder periods of the prohibition so the actual impact is not expected to be linear.

Without operational adjustments, this would place a much greater burden on the financial viability of these businesses. Those stakeholders with greater dependence on live exports would either no longer be able to operate or be forced to re-orient their operations, under a transition period of lower income and profitability. In all cases, a longer prohibition is expected to require further education, capital expenditure and marketing efforts, which would initially reduce profitability.

Exporters' commercial relationships and reputations could be more seriously damaged by the inability to service demand for half the year. Importers may seek to build relationships with other parties if their preference is for certainty of supply. During the prohibition of 2019, Middle Eastern importers sourced sheep from other countries.

Exporters who engage in forward contracts for sheep will be required to take on a greater margin of risk by potentially having to lock in contracts of longer time-frames across a longer prohibition.

Road transporters will be faced with a longer period of reduced demand for their services. As explained in option 2, road transporters advise that sheep destined for export on average undergo 2 additional land transport voyages.

Feed producers highly dependent on live export would be expected to widen their product offering to earn income during the prohibition. This might include producing a wider range of feed choices, or increased focus on domestic supplementary feeding solutions.

Registered premises are likely to seek alternative income sources such as from feed lotting or different livestock. The latter will require capital expenditures if existing infrastructure is only suitable for sheep.

AAVs may need to upskill in other areas of expertise. A longer period of cessation could encourage them to move away from live export work altogether due to instability of reduced availability of live export work for half the year.

### 7.3.2 Regulatory costs

This option requires industry to use a revised HSRA model. The main regulatory impact is the indirect regulatory cost of undertaking this technical revision. Given the impact of this model is expected to prohibit all voyages for the full Northern Hemisphere summer period, there are no additional regulatory costs to be considered. There are no regulatory costs to be borne by individuals or community.

The data necessary for the revision is already embedded in the model but not currently accessible to users. Therefore revision is not expected to be especially burdensome with an estimated cost to industry of \$100,000 (Table 2). This cost would include updating operating manuals.

Distribution of the model and associated re-training are likely to be free to users, effectively paid for by existing funding mechanisms including industry levies. However time required to re-train would generate a regulatory cost. The regulatory assessment structure of HSRAs for Middle East voyages is already in place and is not anticipated to change.

**Table 2 Option 3: Average annual regulatory costs**

<b>Option 3. Revise the HSRA model based on recommendations in the HSRA Review</b>	<b>Business (\$)</b>
Total cost <sup>a</sup> of model revision including operating manual	100,000
Yearly average over 10 years (including training staff)	<b>10,028</b>

<sup>a</sup>assumes this model is not revised in the next 10 years.

## 7.4 Option 3 net benefits

Option 3 manages the risk of heat stress on Northern Hemisphere summer voyages through the implementation of a HSRA model with revised risk settings. The expected impact of this revised model would be to exclude sheep exports for the entire Northern Hemisphere summer period. This introduces a 'zero risk' approach to heat stress risk management on Northern Hemisphere summer voyages. The actual welfare benefits to be derived from option 3 do not materially differ from option 2. The biggest difference relates to the incremental certainty of a 'zero risk' setting over a very low risk setting.

The analysis indicates that option 3 includes a burdensome intervention on industry by the exclusion of half a year of sheep exports that could occur in option 1. A 6 month prohibition in option 3 will have a significant impact on industry by approximately doubling the disrupted timeframe and export numbers compared to option 2. Option 3 therefore challenges the viability of live exports to a greater extent than option 1 or 2. The exception to this is the possible consequences that could arise from an adverse welfare event, which could jeopardise the sustainability of the trade. The greatest risk of this lies in option 1.

Option 3 supports the stated regulatory objective of a sustainable live sheep export trade by the least amount.

## 8 Consultation

Reform of Australia's live sheep export framework will affect a range of stakeholders throughout the live export supply chain. The department has undertaken extensive and inclusive stakeholder consultation during the RIS process as outlined in [section 8.2](#). Stakeholder feedback during public consultation has informed the development of proposed options in this consultation RIS to both improve animal welfare outcomes and support a sustainable live sheep export trade. Feedback has also provided the department with a better understanding of the potential benefits and impacts of proposed regulatory options.

The RIS will be used to inform the Australian Government when making a final policy decision.

### 8.1 Key stakeholders

Throughout the department's consultation processes these stakeholders have, and will continue to be consulted:

- animal welfare organisations
- Australian Maritime Safety Authority
- exporters
- general public
- international trading partners
- live export related industry personnel such as road transporters, stockpersons
- peak industry and industry related bodies
- producers
- research organisations and academics
- state and territory governments
- veterinarians, including Australian Government Accredited Veterinarians (AAVs).

### 8.2 Consultation process

The department has undertaken a wide variety of consultation to inform the development of options presented in the RIS, including RIS-specific consultation and previous related consultation processes. Full public consultation and targeted consultation approaches have been used to elicit feedback from a wide range of stakeholders, including those listed in the key stakeholders [section 8.1](#). During the RIS-specific consultation, these forms of consultation ensured a wide-reaching, transparent and efficient process:

- The formal written submission process on this RIS and a formal written submission process on the Middle East sheep exports policy options discussion paper.
- Industry roundtables with peak bodies/industry groups such as Live Export Reference Group, exporter meetings in Perth and Townsville.

- Targeted face-to-face or teleconference meetings with stakeholders such as Australian Live Exporters' Council, LiveCorp, Western Australian Livestock Exporters' Association (WALEA), Livestock Export Animal Welfare Advisory Group and state and territory governments.

### **8.2.1 Consultation on the Middle East sheep exports policy options discussion paper**

On 27 September 2019, the department released a discussion paper on the department's Have Your Say webpage as the first stage of the RIS-specific formal written submission process. The discussion paper proposed 4 policy options, inviting submissions on:

- the benefits and impacts of each option on individuals, businesses, organisations and the community
- whether there was an alternative policy option that would both support a sustainable live sheep export trade and meet the high animal welfare standards expected by the Australian public
- suggestions for data that should be collected to support ongoing analysis and improvements to the regulation of live export voyages to the Middle East.

Consultation on the discussion paper concluded on 4 November 2019 and the department received 66 submissions.

### **8.2.2 Stakeholder meetings**

The department met with stakeholders including industry, peak bodies, producers and animal welfare organisations on a number of occasions in relation to the RIS process.

During the Australian Veterinary Association conference in Perth from 6 May to 10 May 2019, the department held a teleconference with the Live Export Reference Group to undertake preliminary discussions on possible impacts of changes to the regulation of the live sheep export industry.

For the RIS consultation, the department undertook a learning tour of Western Australia from 1 October to 3 October 2019 to view processes within the supply chain and discuss the RIS process with producers from Woodanilling and Kojonup, and representatives from the Western Australian Live Export Reference Group, Western Australian Farmers' Federation, Pastoralists and Graziers Association of Western Australia, Western Australian Live Exporters' Association, and exporter Rural Export & Trading Western Australia.

The RIS process has also been discussed in targeted face-to-face and teleconference meetings such as the LIVEXchange conference and related industry meetings held in Townsville 29 October to 31 October 2019, the Livestock Export Animal Welfare Advisory Group meeting held 15 October 2019 and a teleconference discussion of the RIS with Independent Observers held 25 October 2019.

### **8.2.3 Related consultations**

The department has undertaken a number of public consultation processes for reviews relating to the issue of live sheep exports to the Middle East during the Northern Hemisphere summer. Submissions to these consultation processes have contributed to the development of proposed

options for the RIS. Consultation included, but is not limited to interim measures for Northern Hemisphere summer 2019 consultation, the September and October 2019 prohibition extension consultation, HSRA Review, Moss Review, McCarthy Review, Livestock Export Animal Welfare Advisory Group meetings, and other stakeholder meetings. A summary of previous related formal written submission processes is contained in Table 3.

**Table 3 Previous related formal written submission processes**

Consultation	Opening date	Closing date	Number of submissions received
September and October 2019 prohibition extension consultation	12 July 2019	22 July 2019	220
Interim measures for Northern Hemisphere summer 2019 consultation	15 March 2019	21 March 2019	11
HSRA Review draft report	13 December 2018	1 March 2019	315
HSRA Review issues paper	13 September 2018	19 October 2018	19
Moss Review	16 May 2018	27 September 2018	43
McCarthy Review	10 April 2018	11 May 2018	52

### 8.3 Outcomes of consultation

Through consultation and engagement to date, the department has observed significant community concerns regarding animal welfare, as well as widely divergent views on the live sheep export trade.

The majority of submissions to the discussion paper supported some form of prohibition, with support coming from industry and welfare groups alike. There was varied opinion on the most appropriate duration for a prohibition. Some welfare groups and members of the public hold the view that positive animal welfare can only be safeguarded by a total ban or a prolonged ban during the entire Northern Hemisphere summer, May to October inclusive. A small number of producers supported no prohibition.

In the absence of a total ban, a revised HSRA model based on welfare, such as that proposed by the panel during the HSRA Review, has also been called for to supplement a prohibition period.

Producers and industry groups generally stated that Australia's livestock export industry is already highly regulated, with Australia demonstrating the highest animal welfare export standards in the world.

Industries such as transporters, feed millers and AAVs have expressed concern for the viability of their business or practice if live exports were to be prohibited for extended periods of time or banned altogether. The major topics of discussion that were raised through the Middle East sheep exports policy options discussion paper consultation included, but are not limited to:

- **revision of the HSRA model**
  - 58% of submissions were supportive of some form of revised HSRA model.
  - The Australian Veterinary Association (AVA), Department of Primary Industries and Regional Development and welfare groups such and Sentient, Animals Australia and the

RSPCA were supportive of using a revised HSRA based on HSTs, in accordance with the panel's recommendations.

- Industry groups such as ALEC and LiveCorp did not support the panel's recommended revised HSRA model, stating that the HST distribution has not been adequately tested and that HSTs fail to reliably indicate poor welfare. As an alternative option ALEC and LiveCorp proposed a revised HSRA model that incorporated animal welfare outcomes, however, they acknowledged this approach remains a long way from practical implementation.
- **alternative total live sheep trade prohibition and or phase-out option proposed**
  - 60% of submissions stated their first preference was for a total ban on live animal exports. Many of these submissions acknowledged this proposal may not be in line with government policy, so, as a second preference, supported adopting other prohibition periods proposed under options 1 and 2.
- **the inclusion of a 'status quo' option of no prohibition**
  - The public consultation process showed limited support for the status quo, with only 3 submissions (4.5%) supportive of this approach.
  - Many submissions were critical of the inclusion of this option in the discussion paper. The AVA did not support this option as it represented an unacceptably high risk to sheep welfare. The RSPCA stated concern that adopting option 4 of the discussion paper, or the 'status quo', would undermine many of the improvements made over the last 18 months.
- **varying length of time of a prohibition**
  - Much of the discussion in submissions focused on the most appropriate duration for a prohibition. The majority of submissions (91%) supported some form of prohibition, with support coming from industry groups as well as welfare groups. Generally, welfare groups were in favour of longer prohibition periods.
- **animal welfare indicators**
  - Submissions showed broad support from industry and welfare groups for moving to a HSRA based on animal welfare measures. LiveCorp is currently undertaking a research project to develop and trial animal welfare indicators to inform a revised HSRA model. The department understands that significant research is still required before this approach can be used as an effective and appropriate regulatory measure.
- **alternative interim measures proposed**
  - Industry groups including ALEC, LiveCorp and Sheep Producers Australia (SPA) proposed a prohibition as an interim measure only, pending revision of the HSRA model or an alternative solution.
- **future review of policy**
  - Some industry groups including SPA identified the need for ongoing refinement of the HSRA model as additional science and data analysis becomes available. SPA stated the need for review of export conditions as data sets for animal welfare indicators are developed and as new technology becomes available.



## Appendix B: Regulatory framework

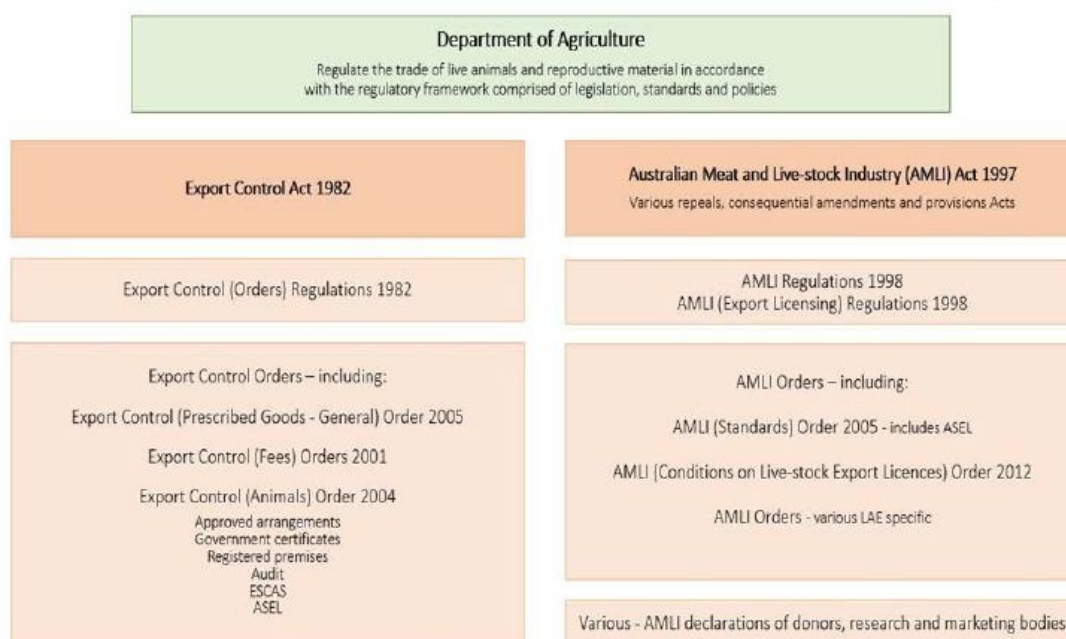
The department is responsible for regulating the livestock export industry including Australian Government livestock export legislation, animal welfare standards, control and traceability requirements, and importing country requirements. The regulatory framework for the export of livestock is governed by the *Export Control Act 1982*, the *Australian Meat and Live-stock Industry Act 1997* (AMLI Act) and associated orders, regulations and standards (Figure 19). The Australian Standards for the Export of Livestock (ASEL) and the Exporter Supply Chain Assurance System (ESCAS) promote animal welfare from sourcing of livestock for export through to slaughter in the importing country. Livestock is defined as cattle, calves, buffalo, sheep, lambs, goats, camelids and deer.

The issuing of a livestock export licence is governed by the *Australian Meat and Live-stock Industry Act 1997* (AMLI Act), the Australian Meat and Live-stock Industry (Export Licensing) Regulations 1998 (Export Licensing Regulations) and the Australian Meat and Live-stock Industry Regulations 1998 (AMLI Regulations).

The Australian Meat and Live-stock Industry (Standards) Order 2005 and subsection 17(5) of the AMLI Act, requires livestock export licence holders to comply with the ASEL (version 2.3) as a condition of the livestock export licence. The ASEL represents the minimum animal health and welfare requirements for the conduct of the livestock export industry that the Australian Government expects industry to meet.

In late 2018, conditions were introduced for exports during the northern winter under the Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East – Northern Winter) Order 2018 (Northern Winter Order). This applies to voyages of sheep to, or through the Middle East departing between the months of November to April. The Northern Winter Order gives sheep 17.5% additional space compared to the ASEL version 2.3.

**Figure 19 Regulatory framework summary—export of livestock**





## 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 ASEL was 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, the ASEL version 2.3, 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
- onboard management of livestock
- air transport of livestock.

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

The ASEL requires compliance with Australian Government livestock export legislation, state and territory legislation, including animal welfare legislation, and animal codes of practice.

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 a draft version of the standard with several unresolved issues. The draft standard was not implemented.

The most recent review of the ASEL (for exports by sea) concluded in March 2019. The ASEL technical advisory committee was appointed to conduct the review to ensure the standards remain fit for purpose and continue to be supported by the latest scientific research.

The review made 49 recommendations, including some that addressed HSRA. The recommendations propose a number of conditions until such time as a revised HSRA has been developed. Excluding the expectation of a revised model, there are no changes to HSRA requirements for live sheep voyages. Recommendations specific to sheep include:

Recommendation 21: That, for sheep voyages between 1 May and 31 October, the standards require the space allowance to be calculated using a k-value of 0.033 until a new HSRA model is

in place based on heat stress welfare indicators rather than mortality (noting that this is subject to a separate review process). Once such a HSRA model is in place, the standard should be revised to adopt the default space allowance for sheep using a k-value of 0.030.

Recommendation 27: That the standards be revised over time to require the application of an agreed HSRA to all livestock voyages that cross the equator, at all times of the year, from all Australian ports. This requirement will require significant model development and a staged implementation approach.

Recommendation 28: That once the (separate) review of the HSRA model for sheep exports to the Middle East is completed, the testing criteria in the standards should be revised to support the new model.

The department supported all recommendations in full or in principle, and the next version of the ASEL (version 3) will be implemented in 2020.

## **Exporter Supply Chain Assurance System (ESCAS)**

ESCAS is an assurance program under the Export Control (Animals Order) 2004. It applies to live export of feeder and slaughter animals to all markets. ESCAS is used to monitor and ensure:

- animal handling and slaughter in the importing country conforms to World Organisation for Animal Health (OIE) animal welfare recommendations
- the exporter has control of all supply chain arrangements for livestock transport, management and slaughter, with all livestock remaining in the supply chain
- the exporter can trace all livestock through the supply chain
- the supply chain in the importing country is independently audited.

Through these principles, improved animal welfare outcomes are achieved in-market.

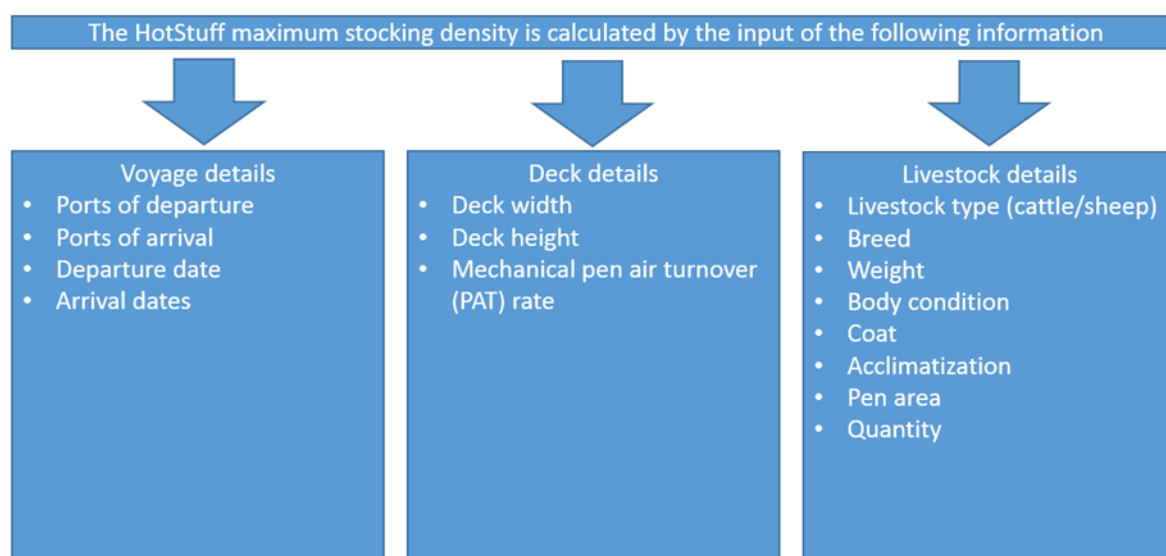
## Appendix C: Heat stress risk assessment

In early 2000, after a series of voyages with high levels of heat stress and mortality in livestock, industry moved to develop a scientific method to determine the risk of mortality for export voyages to, or through, the Middle East. A predictive heat stress model was developed to assist in risk management planning, named HotStuff.

Version 4 of HotStuff combines naval and land-based weather data from 2002 to 2010 inclusive, vessel configuration (including ventilation parameters), voyage and livestock data (Figure 20). HotStuff is designed based on the principle of altering stocking densities and adjusting for the time of year in order to allow sufficient space for airflow and heat removal from livestock vessels, factoring in the heat generated by animals themselves. These adjustments limit conditions experienced by livestock to agreed risk parameters.

Deck conditions are determined by the ambient temperature, the metabolic heat produced by the livestock on deck and the ship's ventilation rate for that deck. Adjustments to stocking densities by the model limit metabolic heat production to ensure deck conditions experienced by livestock remain within agreed risk parameters.

**Figure 20 HotStuff inputs**



Source: Maunsell 2003

The HSRA model uses the environmental measure WBT to indicate the capacity of livestock to shed heat. The WBT is the temperature read by a thermometer covered in a water-soaked cloth. It takes into account air temperature and humidity, but also varies with air pressure and elevation. The evaporation of water from the thermometer has a cooling effect, so the WBT is usually lower than the air temperature. When the air is full of water vapour (100% humidity) there will be no evaporation and no cooling effect, so the WBT will be equal to the air temperature.

WBT has been shown to be the most useful measure related to heat stress in a shipboard environment as it most closely influences the physiological impacts of heat load on the animal. If

there is effective ventilation, hot and humid air is blown away from the animals, providing capacity for both convective and evaporative cooling (Barnes et al 2019).

The probability of animal mortality is described statistically as a function of WBT by a distribution that is a function of the animal's characteristics. The acceptable level of risk, as calculated by HotStuff, was agreed with industry in 2003 as a 2% risk that adverse weather conditions would cause a 5% mortality event.

Export Advisory Notice 2012-08 identifies HotStuff (version 4) as the current agreed model for conducting HSRAs.

The McCarthy Review noted it is time for the industry to place the focus on animal welfare and move away from measures that use mortality as a benchmark. Reportable levels, voyage success and risk parameters have all been based around mortality. It was envisaged by the McCarthy Review that a new operating model will replace mortality with a raft of welfare measures and involve a quantum shift in attitude and behaviour (McCarthy, 2018). Work to develop this model is underway.

# Appendix D: Middle East climate risk analysis for live sheep voyages

## Science and evidence

The department considered the best available science and evidence including:

- analysis undertaken by the Bureau (2019) of historic temperatures and regional climatological analysis
- the HSRA Review and academic research that informed this review
- science and data provided in submissions to the HSRA draft report
- industry research
- independent observer reports
- voyage reports, and
- on board observations during May 2019 voyages.

## Heat stress thresholds and acclimatisation

Based on the parameters in the industry HSRA model (HotStuff), the heat stress threshold (HST) for a 40kg merino adult, acclimatised to May in southern Australia is 30°C WBT. Larger, heavier sheep will be less heat tolerant than this. The HST is the heat tolerance level for sheep on a deck and, according to the panel, represents the animal welfare threshold that should not be breached on live export vessels.

A submission to the draft HSRA report stated that, based on measures taken during live export voyages, in winter-acclimatised sheep, there is an escalation of physiological heat loss mechanisms when the daily mean deck temperature reaches 30°C WBT. These comments did not reference a class of sheep.

Industry research that is embedded in HotStuff, observations by IOs and anecdotal reporting describes that certain classes and breeds of sheep are more heat tolerant than others. This variability was also acknowledged by the panel. For example, for sheep acclimatised to May conditions, a 40kg merino adult's HST is 30°C WBT, a 56kg merino adult's HST is 29.3°C WBT and a 90kg merino ram's HST is 28.2°C WBT.

The HotStuff model also defines mortality thresholds (the WBTs when sheep die). For a 40kg merino adult acclimatised to an Australian winter, the HotStuff model indicates the most susceptible sheep will begin to die at approximately 33.5°C WBT while this model indicates that around 50% of sheep will have died by 35.2°C WBT.

The LiveCorp & MLA (2019) Veterinary Handbook for the Live Export Industry (version 4) also defines important heat stress levels. It notes that WBTs above 29°C are considered the 'danger' zone for sheep.

Sheep loaded during winter will be acclimatised to cool temperatures and therefore will have a lower tolerance for heat than sheep prepared for export in warmer months. The panel noted that an animal's heat tolerance changes over the course of the year depending on seasonal temperature exposure. The panel also noted that it is not known how long sheep take to acclimatise but that other species have demonstrated some acclimatisation over 2–3 weeks.

The McCarthy Review noted that acclimatisation plays a significant role in adjustments to sheep metabolism. This review report states that there is a lag in the way sheep adjust their metabolic rate in response to local weather, with winter-acclimatised sheep the least able to adapt to hotter temperatures, increasing the risk of inanition and salmonellosis.

## **Climatology**

The Bureau analysed WBT statistics for each day of the year from April through to November for the period 1990 to 2018 (Bureau of Meteorology 2019).

Deck WBTs on board live sheep export vessels are higher than ambient temperatures typically by 1–3°C due to the metabolic heat created by the animals. The rise in WBT on the decks depends on the stocking density, class of sheep and the rate and effectiveness of ventilation on the vessel. This means when the ambient temperature is 29°C WBT, deck temperatures experienced by the livestock will be around 30–32°C WBT.

According to data analysed by the Bureau, for the main routes into the Persian Gulf (Straits of Hormuz), and the Red Sea (Bab al Mandab Strait), 95th percentile WBTs exceed 29°C WBT from late May and fall below 29°C WBT in early October (Bureau of Meteorology 2019; Figures 3–9, page 21 and Figure 3–21, page 29). Most WBTs for the duration of September in the Persian Gulf and the Red Sea remain as high as, or higher than, average WBTs in June. These findings are consistent with industry research (Stacey 2017).

The 95th percentile WBTs in the Persian Gulf exceed 29°C WBT around mid June and fall below 29°C WBT in the last week of September (Bureau of Meteorology 2019; Figure 3–16, page 25). However there are destination specifics to note:

- The offshore area and international airport of Doha, Qatar reach 29°C WBT earlier, at the start of June. WBTs at these locations fall below 29°C WBT at the end of September and first week of October respectively (Bureau of Meteorology 2019; Figure 3–12, page 23).
- The 95th percentile WBTs in Muscat, Oman exceed 29°C WBT from the middle of May and remain hot until the end of September (Bureau of Meteorology 2019; Figure 3–7, page 20).

Based on this analysis, the department determined that if 95th percentile ambient temperatures were at 29°C WBT or above (which leads to deck temperatures of 30–32°C WBT), there was an elevated risk of heat stress and adverse animal welfare outcomes.

## **Risk analysis based on mortality data 2013–2017**

The department undertook an analysis of relative monthly mortality data from voyages to and through the Middle East from 2013 to 2017. Data from 2018 and 2019 were analysed separately to keep the trend analysis consistent with underlying regulatory conditions such as pen space allowances. Noting that different stocking densities are now in use, this was not considered

indicative of likely mortalities in 2019, but rather considered indicative of relative risk of poor animal welfare outcomes in different months.

Average historical monthly mortality levels for Middle East voyages from 2013 to 2017, prior to regulatory changes in 2018, demonstrate (Figure 5):

- a 5 year average mortality rate of 0.71%
- the months of June to September (inclusive) have higher averages than the 5 year average.

This analysis suggests the riskiest months based on historical mortality are June to September (inclusive).

There was a significant reduction in the mortality rate per voyage from the 5 year average January 2013–December 2017 (0.72%) to the average over the period 1 July 2018 to 31 October 2019 (0.3%). This improvement reflects the introduction in 2018 of increased pen space allowances, the prohibition in 2019 and other measures. This was also influenced by very few Middle East voyages from June to November 2018 and the prohibition in 2019.

## **Data and voyage reports from May 2019 sheep export voyages to the Middle East**

In his review of heat stress, Dr McCarthy recommended that a revised model to assess heat stress should adopt the view that subjecting sheep to open mouth panting is unacceptable. This was supported by the panel's explanation that when an animal is panting with its mouth open, it is having "to work much harder to try and lose heat from the body, and this is considered to be beyond what is acceptable [welfare]".

The panel and others noted that in the absence of taking an animal's body temperature, panting is the best available behavioural observation to indicate heat load.

The panel acknowledged that here is a duration component to heat stress. Based on the limited research on duration of exposure, it is arguable whether short periods of open mouth panting constitute compromised welfare.

Interim analysis of May voyages with regards to sheep heat stress:

- Reports from the IOs and AAVs on board the 3 vessels varied widely in their recording of panting scores and their assessment of heat stress. Above 31.0°C WBT video footage from the May 2019 voyages show all sheep with increased respiratory effort including periods of panting with open mouths.
- Environmental data recorded on each deck for the 3 vessels indicates that high WBTs (30–33°C WBT) were reached for relatively short periods at a time (1 to 6 hours) before temperatures dropped (often quite quickly). While there is little data about a sheep's ability to withstand extended periods of hot conditions, the available science indicates that extended hot conditions may contribute to adverse animal welfare outcomes.

Interim analysis of May voyages with regards to sheep mortalities:

- There were no reported mortalities related to high temperatures recorded on any of the voyages.

- The mortality rates were exceptionally low compared to historic averages.
- The small sample size of 3 voyages is not large enough to have strong statistical significance. However, the fact that their average mortality rate per voyage was much lower than the longer term average, implies that the conditions under the Northern Summer Order contributed to improved animal welfare outcomes.

## **Conclusion**

Using a risk-based analysis of the best available science and evidence, the department came to the view that voyages to, or through, the Middle East should be avoided if the risk of heat stress (ambient WBTs exceeding 29°C WBT) was 5% or more. This provided the basis for the prohibition parameters.



# Appendix E: Independent reviews

The airing of the *Awassi* incident footage in 2018 prompted 3 independent review processes.

## **Review of the Regulatory Capability and Culture of the Department of Agriculture (Moss Review)**

This review examined the regulatory capability and culture of the department as the regulator of live animal exports, and made recommendations aiming to ensure adherence to animal welfare standards, compliance with the regulatory framework and to enhance the regulatory model. The review made 31 recommendations that were supported, or supported in principle, by the department. Of note were that:

- the ASEL are reviewed on a regular basis to reflect industry, scientific and regulatory developments and community expectations concerning live animal exports
- the department re-establish an Animal Welfare Branch and place animal welfare at the centre of its live animal export regulatory activities
- an independent external entity, the Inspector-General of Live Animal Exports, oversee the department in its role as the regulator of live animal export
- the position of Principal Regulatory Officer be established to enable staff engaged in the regulation of live animal exports to develop a culture of being professional regulators.

## **Independent Review of Conditions for the Export of Sheep to the Middle East during the Northern Hemisphere Summer (McCarthy Review)**

This review was commissioned to advise on conditions and any changes to the administration of the ASEL and/or 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 review made 23 recommendations that were supported by the department. Of note were that:

- industry focuses on measures that reflect animal welfare over mortality alone, and that the risk assessment model replaces the mortality limit with a heat tolerance level
- the risk settings of the HSRA are adjusted to better reflect community expectations
- space allocation should be based on allometric principles and adopt a k-value of 0.033, and this be utilised between May to October (unless overridden by the HSRA model's assessment)
- a vessel's pen air turnover (PAT) be independently verified for sheep exports to the Middle East during the Northern Hemisphere summer
- the reportable level for sheep travelling from Australia to the Middle East be reduced from 2% to 1% effective immediately.

## **Heat Stress Risk Assessment Review (HSRA Review)**

The department sought advice from an independent Technical Reference Panel (panel) on moving from a HSRA based on mortality, to one based on welfare and the animal's physiological signs of excessive heat load. The panel reviewed available science and evidence regarding heat stress in sheep and recommended development of a new HSRA framework. This included the use of a WBT welfare threshold as the criterion to limit the risk that exported sheep are exposed to excessive heat load. The panel also identified the need for future refinements of the HSRA model to examine diurnal and day-to-day variations in deck WBT data to determine the influence of duration of exposure and further work to define appropriate heat stress thresholds for lambs.

# Appendix F: Notes regarding the development of the options

## Feedback from consultation

The discussion paper, released for public consultation on 27 September 2019, proposed 4 policy option ideas. A summary of the feedback received from 66 submissions is outlined in [section 8.2.1](#) of this document. Of these, 63 submissions from a range of stakeholders including industry representatives, animal welfare non-government organisations and members of the public, in some form supported the implementation of a prohibition period for sheep exports. Three submissions supported the option for no prohibition period. These 3 submissions provided some information about the importance of allowing trade for the entire 12 months of the year but did not address the issue of managing heat stress in sheep.

## Requirement for a HSRA

Most submissions to the discussion paper supported the continued use of a HSRA. The discussion paper raised the idea of a HSRA using animal welfare indicators. This idea received some support but no scientifically justified and fully formed approaches were presented that could be analysed in this RIS for implementation in the 2020 Northern Hemisphere summer period. LiveCorp suggested that a revised HSRA model be developed where the risk assessment replace mortality with a welfare indicator. While in principle this seems practical, the science is lacking on the most appropriate welfare indicator or indicators and suitable risk parameters.

Option 2 proposes the removal of a requirement to use the existing HSRA model. Analysis by the department has shown that outside the proposed prohibition period of option 2, the HSRA would not require more pen space than that required under the allometric principles of the regulatory status quo (option 1).

As described in [section 4.2](#), the department is interested in alternative proposals for a revised HSRA, which would provide equivalent risk management to that provided by all conditions under option 2. These alternative proposals will be considered at the time of reviews following this RIS process.

## Post-implementation review

A growing body of research is being conducted into more targeted methods to address heat stress risk in sheep. This includes further work into animal welfare indicators and ship conditions experienced by the sheep under different climatic conditions. As such this RIS will be followed by a post-implementation review, commencing after 2 Northern Hemisphere summer periods (end of 2021). The review will consider whether the stated objective has been achieved and also whether new science has been uncovered.

# Appendix G: Comparison of space allocations under HotStuff (version 4) and allometric requirements

**Table 4 Pen space allowance comparison of HSRA, ASEL and allometric space**

Departure month	Year	Vessel average PAT quality	HSRA space over ASEL <sup>a</sup>	Allometric space over HSRA <sup>b</sup>	Destination
May	2016	100–150	0%	+32%	Persian Gulf
	2017	150–200	0%	+36%	Persian Gulf
		<100	-4%	+26%	Persian Gulf
June	2016	>200*	0%	+30%	Red Sea
		<100	-3%	+27%	Persian Gulf
	2017	150–200	0%	+32%	Persian Gulf
		100–150*	-1%	+31%	Red Sea
July	2016	100–150	-4%	+27%	Red Sea
		<100	-24%	+1%	Persian Gulf
	2017	100–150	0%	+33%	Persian Gulf
		<100	-22%	+2%	Persian Gulf
August	2016	150–200	0%	+33%	Persian Gulf
		100–150	-1%	+24%	Persian Gulf
		<100	-32%	-10%	Persian Gulf
	2017	>200	-9%	+26%	Gulf of Oman
		150–200	-9%	+25%	Red Sea
		<100	-32%	-6%	Persian Gulf
September	2016	150–200	0%	+31%	Red Sea
		100–150	0%	+33%	Persian Gulf
	2017	150–200	0%	+32%	Persian Gulf
		<100	-1%	+31%	Persian Gulf
October	2016	100–150	0%	+34%	Persian Gulf
		<100	0%	+30%	Persian Gulf
	2017	>200*	0%	+26%	Persian Gulf
		100–150	0%	+34%	Red Sea

Note: \*unaudited Pen Air Turnover (PAT) scores. <sup>a</sup>This percentage displays the space allowance that the heat stress risk assessment (HSRA) has allocated, compared to the baseline Australian standards for the Export of Livestock (ASEL) requirements. A negative percentage means that HSRA would require more space than the ASEL. <sup>b</sup>This percentage displays the allometric space allowance compared to the space allocated by the HSRA. A positive percentage means that the allometric formula would have provided more space than the HSRA, while a negative percentage means that the HSRA model would have given more space than the allometric formula.

# Glossary

Term	Definition
allometry	The relationship of body size to shape, anatomy, physiology and behaviour.
<i>Awassi Express</i>	The livestock export vessel on which 2400 sheep perished due to heat stress whilst en route to the Middle East in August 2017.
<i>Awassi incident</i>	In April 2018, video footage obtained by Animals Australia showed Australian sheep in severe heat stress while being transported to the Middle East on 5 consecutive voyages on the MV <i>Awassi Express</i> , with most footage taken during a voyage in August 2017.
heat load	Exposure of livestock to hot environmental conditions likely to require physiological changes to allow them to maintain homeostatic body temperature.
heat stress	Excessive heat load.
homeostasis	The state of steady internal conditions maintained by living things.
HotStuff version 4	Software program for the assessment of heat stress risk for live export voyages.
k-value	k-values are used in allometric calculations for pen space allowances as a determinant of the threshold for all sheep to be able to either stand, sit or lie down at the same time.
Middle East Order	Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East) Order 2018. This is legislation that applies to voyages of sheep to, or through the Middle East departing between the months of May to October.
McCarthy Review	Independent review into conditions for sheep being transported to the Middle East during the Northern Hemisphere summer published May 2018.
mortality limit	The WBT at which the animal will die.
Northern Hemisphere summer	Refers to the months of May to October, inclusive.
Northern Winter Order	Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East – Northern Winter) Order 2018. This is legislation that applies to voyages of sheep to, or through the Middle East departing between the months of November to April.
Office of Best Practice Regulation	The body that is responsible for governance of the Australian Government’s Regulatory Impact Analysis work, which summarises the expected outcomes of regulatory initiatives.
panting score	Characterises the panting of livestock; considers more than respiratory rate (for example open mouth, protruding tongue).
PAT	Pen air turnover
pen air turnover	A vessel’s ventilation flow rate divided by the pen area ( $\text{m}^3/\text{hr}/\text{m}^2$ )
pen space allowance	The pen area ( $\text{m}^2/\text{head}$ ) provided to livestock on a live export vessel.
registered premises	Premises registered for holding and assembling livestock for export in accordance with the Export Control (Animals) Order 2004.
reportable level	The mortality level of a voyage at which exporters are required to notify the department, as soon as possible. For live sheep exports to, or through, the Middle East, this level is 1%.
social license	Exists when a project has broad social acceptance or ongoing approval in the community.
stocking density	Number of stock per unit area in a high-density housing situation.

<b>Term</b>	<b>Definition</b>
summer months	Referring to Northern Hemisphere: May to October, inclusive.
the department	Department of Agriculture.
the model	Heat stress risk assessment model (HotStuff version 4).
the panel	Heat Stress Risk Assessment Review Technical Reference Panel.
thermoregulation	Process that allows the body to maintain its core internal temperature within a normal range.
Wet bulb temperature	The WBT is the temperature read by a thermometer covered in a water-soaked cloth
WBT welfare threshold	The WBT above which there will be a challenge to the thermal homeostasis of an animal.
winter months	Referring to Northern Hemisphere: November to April, inclusive.

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