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THE AUSTRALIAN LIVESTOCK EXPORT CORPORATION

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RESEARCH SUMMARY

Shipboard Animal Welfare Surveillance

The collection of animal welfare indicators on livestock export vessels

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THE LIVESTOCK EXPORT PROGRAM

The livestock export supply chain directly impacts both producers and licensed exporters. Meat & Livestock Australia and LiveCorp, as the relevant research and development corporations, run a joint program known as the Livestock Export Program (LEP) to ensure that all stakeholders benefit from industry research.

The LEP RD&E Program focuses on strategic investment to:

- Improve animal health and welfare outcomes across the supply chain
- Improve supply chain efficiency and regulatory performance
- Enhance market access conditions for existing and new markets

LiveCorp and MLA acknowledge the contribution from the Commonwealth of Australia to research and development undertaken in the LEP RD&E Program.

EXECUTIVE SUMMARY

Since 2013, the livestock export industry has progressed the development of meaningful and comprehensive indicators to monitor animal welfare outcomes on livestock export vessels. The Shipboard Animal Welfare Surveillance (SAWS) Committee was established in 2020, to advise industry on the most relevant animal welfare indicators and their collection methods. The purpose of the committee was to address the reporting requirements of the updated Australian Standards for the Export of Livestock (ASEL 3.0) and recommendations from the *Animal welfare indicators (AWI) pilot program for the livestock export industry.*

The AWI project was set up in recognition of the need for the industry to move beyond mortality as a measure of performance. It identified almost 100 measures applicable to the live sheep and cattle export supply chains which provide information on animal responses to the main factors known to have the potential to significantly impact animal welfare – being the environment, the provision of critical resources and the class of animal.

In assessing the ASEL 3.0 reporting requirements and AWI recommendations, the SAWS Committee developed an agreed and refined list of measures that could be practically applied on vessels to demonstrate the welfare status of exported animals. The SAWS report provides extensive detail on each animal welfare indicator including the type of indicator, the level at which measurement occurs, the frequency of measurement, the research justification, and the measurement process.

The greatest contribution of the SAWS Committee was in the development and refinement of measurements, data collection and analysis processes into an industry protocol. By designing a structured, viable animal welfare indicator protocol, the outcomes from this work should ease the data collection task and increase the value of the data gathered by reducing inconsistencies.

Most of the elements in the protocol have been included in the ASEL 3.0 reporting standards and, as a result, automatically adopted by industry. The use of standardised animal welfare measures throughout the supply chain will not only facilitate transparency but allow for continuous improvement by contributing to timely and enhanced management decisions which will improve animal welfare outcomes over time.

BACKGROUND

The livestock export industry used to primarily measure and collect animal welfare performance data based on shipboard mortalities and compliance with ASEL requirements. However, it has long since recognised the need to move away from mortality as the primary shipboard measure and, since 2013, has progressed the development of meaningful and comprehensive indicators to monitor animal welfare outcomes. The use of standardised animal welfare measures throughout the supply chain will facilitate transparency and create confidence about continuous improvement and positive outcomes being achieved by industry.

The animal welfare indicators (AWI) pilot project, initiated in 2017 and completed in early 2021 by Murdoch University, was a significant step in developing a comprehensive welfare monitoring protocol for the livestock export industry. The project aimed to identify important considerations for the monitoring and collection of animal welfare indicator data for sheep and cattle throughout the livestock export supply chain. The protocol developed measures to capture different environmental, resource and management conditions, and the animal responses to these conditions.

Meanwhile, a review of ASEL was undertaken – the regulations applying to the care of animals during selection, pre-export quarantine and on livestock export vessels – and ASEL version 3.0 was implemented by the Australian Government. ASEL requirements for on-board reporting formed a baseline for the selection of animal welfare measures to be implemented, with scope for industry to collect additional welfare information as desired.

To coincide with the release of recommendations from the AWI project and the review of ASEL regulations, the Shipboard Animal Welfare Surveillance (SAWS) Committee was established in 2020 by the Livestock Export Program (LEP), operated jointly by LiveCorp and Meat & Livestock Australia (MLA). This multi-disciplinary team comprised animal welfare experts, veterinary epidemiologists, statistical experts, industry participants and those with practical knowledge of the on-board environment.

The role of the SAWS Committee was to advise industry on relevant animal welfare indicators to address the recommended ASEL 3.0 reporting requirements, using the outcomes of the AWI project to inform their report. The aim was to develop an agreed list of measures that could be practically and immediately applied on vessels and adopted by all exporters to demonstrate the welfare status of exported animals. A key outcome from this process was the development of recommendations for standardisation of procedures for data collection, as historically a range of non-standardised procedures had been used across the industry.

Through an extensive literature review, the AWI project identified almost 100 measures applicable to the sheep and cattle export supply chains, which were categorised under the principles and criteria from Welfare Quality® (good feeding, good housing, good health and appropriate behaviour). The measures were tested on farms, in pre-export registered establishments, on vessels and in destination market feedlots. They provide information on animal responses to different environmental, resource and management conditions.

The SAWS committee reviewed the results of the AWI project and the requirements of ASEL 3.0 and provided industry with a report detailing the type and method of collection for a refined list of indicators now required under regulatory reporting, and some proposed by the AWI project.

It identified a data collection system for on-board animal welfare indicators should:

- facilitate investigation of any serious adverse animal health or welfare incident.
- identify, and allow analyses to be undertaken on, systemic conditions and management practices that impact on the on-board animal welfare outcomes, but do not fall into the category of causing "*a serious adverse effect on animal health or welfare*".
- create a body of evidence of satisfactory animal welfare outcomes on livestock voyages.

Criteria used by the SAWS Committee to guide the selection of indicators

In assessing the indicators implemented in ASEL 3.0, and to identify additional indicators to recommend industry should collect, the SAWS Committee decisions were based on several considerations:

- **Credible research:** This included the use of the five domains model (nutrition, environment, health, behaviour and mental state). This definition of welfare was adapted by the internationally recognised Welfare Quality® project to produce a framework from which to measure and assess animal welfare, which in turn was taken into consideration by the SAWS Committee.
- **ASEL review recommendations:** After consideration, the SAWS Committee accepted all but three of the indicators recommended by the ASEL Review.
- **Appropriate measures:** A preference for 1) animal-based measures that are direct measures of animal health and behavioural outcomes, 2) resource-based measures that describe details about resources available to livestock that can influence welfare outcomes, and 3) measures of the environmental conditions that impact animal welfare outcomes.
- **Inter- and intra- rater repeatability:** Inter-rater repeatability is the closeness of agreement of measurements taken by different people. Intra-rater repeatability is the closeness of agreement of measurements taken by the same person at different times and/or in different conditions.
- **Communicability of indicators**: indicators must be intelligible and easily interpreted – ideally, indicators should be simple to interpret in practice and intuitive in the sense that it is obvious what the indicator is measuring.
- **Cost:** Selection of an indicator should be influenced by an understanding of the resources needed to both collect and analyse the data.
- **Coherence/balance:** Balance is the mix of resource and environmental indicators and those directly measuring some aspect of animal behaviour.
- **Field testing and ongoing review:** The frequency of both false negative and false positive indicator alarms and the timeliness of detection should be considered when refining, removing or replacing an indicator.

SAWS COMMITTEE RECOMMENDATIONS

Standardisation of livestock classes

The SAWS Committee concluded that, for welfare indicators to be of substantial use, more detailed livestock class information is required than ASEL 3.0 categories of 'slaughter', 'feeder', 'breeder' and 'productive (breeder)'.

This standardisation is recommended to be used by industry to assist with data comparison not mandated by the regulator.

Table 1 outlines the SAWS Committee recommendations for classification systems for sheep and cattle in defining classes of animals. They have been designed to allow industry to better meet its objective of industry monitoring and improvement.

TABLE 1. SAWS Committee recommendation for classification systems for sheep and cattle

SHEEP		CATTLE/BUFFALO	
Wethers – wool sheep	Hoggets – wool sheep	Steers – *Bos taurus*	Cows – beef – low *Bos indicus* content (25%-50% *Bos indicus*)
Wethers – hair sheep	Hoggets – hair sheep	Steers – low *Bos indicus* content (25%-50% *Bos indicus*)	Cows – beef – high *Bos indicus* content (> 50% *Bos indicus*)
Ewes – wool sheep	Lambs – wool sheep	Steers – high *Bos indicus* content (> 50% *Bos indicus*)	Cows – beef – *Bos taurus*
Ewes – hair sheep	Lambs – hair sheep	Heifers – dairy	Cows – dairy
Rams – wool sheep		Heifers – beef – *Bos taurus*	Bulls – beef – *Bos taurus*
Rams – hair sheep		Heifers – beef – low *Bos indicus content* (25%-50% *Bos indicus*)	Bulls – beef – low *Bos indicus* content (25%-50% *Bos indicus*)
		Heifers – beef – high *Bos indicus content* (> 50% *Bos indicus*)	Bulls – beef – high *Bos indicus* content (> 50% *Bos indicus*)
			Buffalo

The measurement of indicators using decks as the sample unit

The SAWS Committee noted that, for many animal welfare indicators, measurement in ASEL 3.0 involves recording a single value (or a small number of values) for each deck of the vessel at each assessment time (e.g. a measurement taken at a single point on the deck aiming to represent the deck as a whole).

There are advantages and disadvantages in using a single indicator value to represent an entire deck at each assessment time point. The SAWS Committee recommended that evaluation using two values, one from each of two sample pens per deck, should form part of a review of the new data collection standards. In addressing this question, the SAWS Committee noted that it would be beneficial to collect some data using multiple sample pens on each deck at the same time as assessments are recorded using the ASEL 3.0 single value per deck.

However, the main factors known to have the potential to significantly impact on animal welfare are those related to the environment (e.g. wet bulb temperature), the provision of critical resources (e.g. feed and water) and the class of the animal (due to varying levels of susceptibility to unfavourable environmental conditions or resource access). Given these factors are known, it may be preferable to develop a stratification scheme (a method for selection of pens or groups of pens) using these factors directly, rather than using 'deck' as a proxy for these factors. More tailored stratification procedures may be worthy of investigation – with environmental, resource provision and livestock class factors used directly to define the strata for on-board animal indicator welfare data collection.

Animal welfare indicators recommended by the SAWS Committee

The recommendations from the SAWS Committee have resulted in industry fast tracking the adoption of many of the proposed animal welfare indicators.

Table 2 outlines the set of indicators recommended by the SAWS Committee, categorised by welfare principles and criteria (the same set of indicators are recommended for cattle and sheep). The SAWS report provides extensive detail on each indicator including the type of indicator, the level at which measurement occurs, the frequency

TABLE 2. Animal welfare indicators recommended by the SAWS Committee for sheep and cattle

WELFARE PRINCIPLE	WELFARE CRITERIA	WELFARE INDICATOR
Good feeding	Appropriate nutrition	Feed remaining on board
		Fed to ASEL requirements
		Feed quality
		Feeding behaviour
	Absence of prolonged thirst	Water consumption
		Water quality/supply issues
Good housing	Comfort around resting	Manure pad score
		Fleece/coat cleanliness*
	Ease of movement	Sailing conditions
	Thermal comfort	Panting score/hot spots
		Wet bulb temperature
		Dry bulb temperature
		Relative humidity^
		Ventilation monitoring
Appropriate behaviour	Expression of social behaviour/positive emotional state	General demeanour
	Expression of other behaviours	Posture*
Good health	Absence of injuries	Mortalities/morbidities reports (various indicators)
	Absence of disease	Mortalities/morbidities reports (various indicators)
		Incidence of scabby mouth~
		Cattle faeces type^
	Other	Births/abortions report

* denotes indicators recommended by the SAWS Committee additional to those required by the regulator.

^ denotes indicators required by the regulator but questioned by the SAWS Committee.

~ denotes that the indicator has only a minor relationship with animal welfare and its inclusion appears to be for other reasons and is not covered in this report.

of measurement, the research justification, and the measurement process.

It should be noted that several of the indicators are multidimensional (i.e. they involve recording values for multiple variables at the same assessment time point, as distinct from recording a single value at that time point).

These measures provide insight into livestock behaviour and demeanour, enabling industry to address stakeholder and societal concerns around positive and negative welfare states. Piloting of these measures has established a protocol that consists of measures and data collection methods that are considerate of industry conditions, and therefore believed to be viable. Adoption of the protocol will enable the livestock export industry to further improve animal welfare monitoring, with the protocol having the potential to be extended throughout the supply chain to facilitate timely management decisions and permit improved animal welfare outcomes over time.

The SAWS Committee report also outlines protocols for collecting administrative data at the beginning of each voyage, shipboard daily assessments, and bridge temperature/humidity information.

All indicator data is being stored in the LIVEXCollect database. LIVEXCollect is an industry owned data collection and management system developed to support reporting against ASEL. This was developed by LiveCorp in consultation with the regulator, and has been adopted as the mandatory reporting tool for animal welfare information required by ASEL 3.0.

All data required under regulation must be provided to the department. However, the SAWS Committee recommended that any additional data collected by the industry should be stored in LIVEXCollect and only made available for authorised industry purposes (including to the exporter). It further recommended that the LIVEXCollect data collection software continue to be refined.

The time/s of day to measure each indicator and the order of measurement

The SAWS Committee supported the continuation of the collection of data in the morning. This is typically so it can be reviewed and validated, discussed at the daily briefing with the captain and corrective actions put in place if required to maintain the welfare of livestock. It also allows for inclusion in the daily report, if the regulator requires it for that voyage.

Measuring indicators only in the morning, however, is limiting. More frequent assessments would better capture how animal behaviour varies across the day due to normal diurnal patterns and in response to changing environmental conditions.

Once the LIVEXCollect data collection tools have been further developed (e.g. into a digital application), twice daily data collection should be trialled for a select number of indicators.

The advantages of twice daily measurement include:

- Animal behaviours have been shown to vary by time of day, including for some of the animal welfare indicators to be measured under ASEL 3.0 requirements.
- Environmental factors that represent known risks to animal welfare outcomes also vary by time of day.

Measurement procedures and order of measurement

Animal behaviour will be affected by the presence of the Australian Government Accredited Veterinarians (AAVs) and LiveCorp Accredited Stockpersons doing the data collection. Therefore, to obtain consistent data, it will be important for each AAV/stockperson to adopt the same procedures for measurement.

The order of indicator measurement is particularly important as some indicators may be influenced by the collection of others. Anything that may require walking into pens (e.g. to check for feed and water contamination or possibly manure pad conditions) should be done toward the end of the process.

Reporting burden and the value of data collected

Reporting burden will be influenced by the amount and type of data collected, and the tools applied to collect this data. An AAV or stockperson is employed on every vessel to care for the livestock and complete regulatory reporting. The collection of more animal welfare data represents an expansion of that part of their role and as such, the costs of collecting additional welfare indicator data are unlikely to be financial, but more related to time (i.e. the split between an AAV or stockperson recording data, compared with completing animal care activities).

The formal data collection system provides value through provision of information for use in the investigation of an adverse animal welfare event, enabling systematic analyses to occur and creating a body of evidence of satisfactory animal welfare outcomes on livestock voyages.

Training for further development of the animal welfare indicators

For animal welfare indicator information to be useful, comparability in measurements between operators monitoring the indicators (inter-rater repeatability), and repeatability by the same operator (intra-rater repeatability) is essential. To assist in achieving repeatability, the SAWS Committee defined measurement scales that are clear and easy to apply and have subsequently been incorporated into the ASEL 3.0 reporting standards. Furthermore, the SAWS Committee gathered photographs and videos to demonstrate points along a number of these scales.

To achieve high levels of inter- and intra-rater repeatability, it will be critical that all those collecting animal welfare indicator information (AAVs, stockpersons and Independent Observers – IOs) receive uniform training. The SAWS Committee is of the view that:

- Training should be undertaken by a single organisation; or
- The training courses should be very closely coordinated so that they contain the same material and teaching elements.

It is recommended that the LEP develop an on-board animal welfare indicator measurement training program, including reference materials and either face-to-face or video instruction, for stockpersons. Furthermore, it is recommended that the LEP liaise with the department on extension of this program to AAVs and IOs.

CONCLUSION

The SAWS Committee successfully refined the criteria for livestock export animal welfare indicators that were first identified in the AWI project. This takes the industry further along its path of using animal welfare measures beyond mortality alone, to include reporting on indicators related to health, behaviour and adverse conditions, with applicability across the supply chain.

The SAWS Committee:

- defined a set of practical, consistent and standardised procedures for industry and the regulator for the collection of animal welfare indicator data
- categorised each indicator by welfare principle and criteria
- mapped ASEL 3.0 indicators against the defined objectives and welfare principles and criteria to determine whether gaps existed.

Development and refinement of measurements, data collection and analysis processes into an industry protocol represents the greatest contribution made by the SAWS Committee.

By designing a well-structured and viable animal welfare indicator protocol, the outcomes from this work should ease the reporting task and also increase the value of the data gathered by reducing inconsistencies.

To date, most of the elements in the protocol have been included in ASEL 3.0 reporting requirements and, as a result, have automatically been adopted by industry. The outcomes of the SAWS Committee demonstrate a progressive and scientific approach to animal welfare in the livestock export industry.

References

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