



Submission to:
Heat Stress Risk Assessment

Draft Report by the Independent Heat Stress Risk
Assessment Technical Reference Panel

December 2018

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Background

WAFarmers is the state's largest and most influential rural advocacy and service organisation, boasting a membership of over 3,500 primary production businesses and individual farmers including grain growers, meat and wool producers, horticulturalists, dairy farmers, commercial egg producers and beekeepers. Collectively our members are major contributors to the \$9 billion gross value of agricultural production in Western Australia, which was 15 per cent of the total gross value of agricultural production in Australia (\$61 billion) in 2017.

Additionally, through differing forms of land tenure, our members own, control and sustainably manage many millions of hectares of the State's land mass and as such are responsible for maintaining the productive capacity and environmental wellbeing of that land and its animals. Agriculture is the largest contributor to national GDP growth and is the fastest growing industry, particularly driven by the grains and livestock industries. As such, our members are key stakeholders in the present debate on heat stress risk assessments.

Executive Summary

This submission is made in response to the release of the Draft Report by the Independent Heat Stress Risk Assessment (HSRA) Technical Reference Panel (TRP) of December 2018.

Livestock producers and exporters are united in their goal of working cooperatively with the Federal Government to provide long-term certainty for the live export industry and for upholding Australia's reputation as a reliable trading partner and exemplar of world's best practice in animal welfare. Open-door communication between industry, the regulator and the Minister are always in the best interests of producers, exporters, our overseas customers and livestock welfare.

The 2018 summer impasse to the live sheep export trade to the Middle East was a significant threat to Australia's \$250 million sheep export industry, which is a cornerstone of Western Australia's rural economy and farming systems.

WAFarmers, along with all livestock industry operators, categorically support the application of welfare assessment refinements and standards for live export and livestock production systems. Animal welfare is our long-term, highest priority. Therefore, it must be recognised that due to the massive complexities of developing and using scientifically-rigorous animal welfare indicators across a range of animal types on-board ships of varying structures, time is needed to test and implement suggested methodologies appropriately. Hence, the development of animal welfare indicators must supplement mortality measures.

This point was also recognised in the McCarthy Review Report as, during this review, only two per cent of the available research in this area was considered. Our aim is for reliable and valid measures to be implemented that will not compromise animal welfare yet complement the disparate needs of vessels and livestock and take account of new research when it becomes available .

The implications of further regulatory requirements at this point prior to the completion of a comprehensive regulatory impact statement (RIS) would have significant implications on the sustainability of the trade. Therefore, WAFarmers is opposed to the introduction of any new interim measures prior to the completion of the RIS, and secondly, the objective evaluation and verification of data for draft welfare indicators during voyages and in-market.

It must be acknowledged that the regulatory refinements imposed in May 2018, matched with the industry's initiative not to export sheep to the Middle East during the hottest months of June, July and August has reduced the heat stress risk.

As Mercado's (2018) data clearly indicates the risk of increased on-board mortalities are caused by heat stress during these hot northern hemisphere months.

In an unprecedented situation, the WA sheep industry was very fortunate and sufficiently agile during the stoppage of the live sheep trade in 2018, to manage conditions because of a number of unforeseen factors, which certainly does not reflect the norm. Western Australia experienced unusual rain events in months when rain doesn't normally fall. This resulted in record breaking crop yields and tonnage. Consequently, sheep producers were able to source feed, albeit to great expense, to maintain the wellbeing of the additional sheep that had to be held on-farm that should have gone for export.

WA's Mediterranean climate leaves sheep feed very short come late May, which is generally when the first rains of the season occur. Western Australia has a four to five month pasture growing season and livestock producers align their breeding production systems with the season to avoid any animal welfare issues with the birth of lambs and the management of ewes. In any dry, cold, or late season sheep producers must have the ability to sell fat score two wethers or scanned dry ewes quickly to the live sheep trade, without the need to finish sheep for slaughter given the lack of pasture or access to expensive stored hay and grain. Large numbers of store sheep can be moved quickly, during WA's winter months to meet the demand during religious festivals by our trading partners.

Any further restrictions that impede the trade beyond the agreed three-month moratorium will have negative implications for the Western Australia sheep industry as flock numbers will decrease exponentially, resulting in the closure of some saleyards and meat processors and the collapse of some rural businesses like transport and feed companies. All this will have a direct economic impact on all rural and urban communities.

WAFarmers does not support the recommendation for a set 28 degrees Celsius wet bulb temperature (WBT) limit to be applied as a vertical line to intersect with the 98 per cent point on the distribution of deck WBT probabilities throughout the voyage. The draft recommendation is based on outcomes established during a lab based research trial involving a small number of selected sheep and certainly does not reflect the types of sheep, conditions and climatic variables encountered on board a variety of ships in a 24 hour plus period.

We believe this recommendation to be impractical and would have detrimental consequences for all livestock exports and production systems in the country. A more appropriate and realistic solution would be the development of a matrix of measurements that took into consideration various sheep categories, ship structures, climatic conditions during day and night, seasonal voyage times, shipping routes, departures and destination points. This complex solution will take time to test and develop. The proposed 28 degrees WBT if adopted will prevent a large proportion of sheep categories from being exported.

It must be acknowledged that a number of new research projects are well underway. These include innovative monitoring of on-board and in-market sheep welfare systems, bedding and ammonia management, practical predictive tools and interventions, new apps and calculators to monitor fodder, water and stocking densities, new innovative animal welfare indicators including the expressions of social behaviour, body condition scores and respiration rate/panting, space allowances and ventilation, and improved auditing, compliance and operating procedures. All these new research projects are ongoing and will improve welfare standards that will complement the outcomes from the ASEL reviews and ESCAS, particularly the expansion of welfare protection measures to manage heat stress post discharge.

Over the last ten months the sheep export industry has accepted and commenced a raft of significant changes at the request of the Federal Government, to ensure the trade operates effectively, particularly to

ensure the welfare of the sheep, which we consider to be of the highest priority. But, this is an ongoing proactive process as these new requirements need time to be implemented, monitored, validated, refined and modified according to outcomes.

Paradoxically, as yet many of the new requirements have not been implemented due to the trade stoppage during 2018. In December, the industry also took the initiative to endorse a three-month trade moratorium on shipping sheep to the Middle East during the northern hemisphere summer to take effect from 1st June 2019. The industry is moving through a rapid transition of change and must be allowed to adjust and monitor these systems before any further changes are demanded. Regulation plays an important role in setting the standards for the industry, but above this supply chain participants must hold each other to account and continue to push the bar forward for best practice live sheep exports.

WAFarmers also recommend the timely release of Independent Observer reports after each voyage. These reports should not be held back or released in batches to prevent misrepresentation of the data the reports contain.

A side issue given recent disturbing reports insinuating that activist groups and individuals were paying people to cause and report on animal welfare issues and/or compromise agreed integrity systems, and given the time and effort the industry is dedicating to this initiative. The industry would like to know how it can be assured the investment that has already been made in improving systems will not be sabotaged or tampered with in the future.

In short, WAFarmers propose that no further decisions are made on any additional regulations until there is agreement on a more reasoned and balanced review of current research. WAFarmers request current live export regulations must remain in place for 2019, particularly during the shoulder months of May and September, to ensure further research, data collection and analysis on the HSRA model in this period. This includes maintaining a 17.5 per cent reduction in the stocking density required by the ASEL for sheep consignments to the Middle East and independent auditing of vessel pen air turnover readings to confirm the data entered into the industry heat stress risk assessment model is accurate.

The 28 per cent blanket reduction stocking density recommended by McCarthy for the full summer period was a catch-all for extremes. This no longer applies, as the industry will not export sheep to the Middle East during the hottest months.

WAFarmers is supporting the Australian Livestock Exporters' Council (ALEC) position on the HSRA Draft Report recommendations and endorses the ALEC and Sheep Producers Australia (SPA) submissions to the HSRA Draft Report December 2018.

Discussion

Since 2000, Dr Conrad Stacey (Stacey Agnew) led a series of research and implementation projects to address the risk of heat stress in the livestock export trade between Australia and the Middle East. This was carried out in direct response to an industry need. Dr Stacey developed a multi-disciplinary investigation to a) define the problems quantifiably and b) provide a platform of scientific observation from which solutions could be synthesised and assessed.

Ventilation, thermodynamics, data reduction and statistics were core issues of the work. The team had an engineering bias but were supported by livestock veterinarians, veterinary epidemiologists, biometricians, statisticians, a meteorologist, software engineers and of course the industry steering committee. With a diverse group of interested industry and government parties involved, clear explanation of the science and method were the key to the acceptance and success of the overall project. The success of the project was recognised in 2004 with an Engineering Excellence Award and written acknowledgements from the industry

body and government.

This development work has been complemented by a series of MLA funded projects, which led to a better understanding of ventilation on board export vessels and recommendations about vessel design to improve ventilation and reduce heat stress risk. In addition, a software program was developed for heat risk assessment, which was distributed to licensed livestock operators for use in assessing and managing heat stress risk on long haul voyages.

The HSRA software incorporates a range of inputs about expected climatic conditions on a proposed voyage that allow prediction of ambient wet bulb temperatures on the route at the time of year, and about the animals such as species, breed, level of acclimatisation and weight, etc. In addition, vessel specific parameters describe factors such as pen and deck area, and performance of mechanical ventilation on each deck (measured as pen air turnover or PAT). These parameters form the inputs into the model that predicts wet bulb temperature rise (the rise in temperature within a deck that may be attributed to the combination of ambient conditions, PAT values for specific vessels, and heat produced by the animals on that deck).

The model also incorporates current knowledge concerning the ambient wet bulb temperature and risk of animal stress for different types of animals. The program then allows adjustment to the stocking density as a method of lowering the wet bulb temperature rise for the proposed voyage such that there is a less than 2% probability of a 5% mortality event occurring. The use of the HSRA software is incorporated into the formal risk management process for long haul voyages and has been for some time. Alternative and more complex measures or indices of heat load have also been developed for livestock that incorporate effects due to air flow and in some cases solar radiation.

Furthermore, it has been a recommendation for some time that independent PAT audits be conducted and following the Awassi Express incident, ALEC, McCarthy and the Federal Department all agreed to implement this as a requirement for ships using the HSRA model for sheep exports.

As an example, Barnes et al, (2004), found the core temperatures of the sheep rose with continued exposure to the hot conditions, but did not rise as much as the cattle in the trial. There was continued elevation of core temperature of the Merino wethers once the rooms were at 30 °C wet bulb, which would correspond to their heat stress threshold. Evidence suggests that the core temperatures of the Awassi rams did not rise above 39.5 °C until the end of the second hottest period, when the temperature was nearing 32 °C wet bulb, indicating a higher heat stress threshold for this breed.

The sheep did not appear as affected by the hot and humid conditions as cattle did. However, even those animals that exhibited stressed behaviours (i.e. very fast panting with open mouths) did not have as rapid or high a rise in core temperature as the Bos Taurus cattle, nor did they experience perturbations in blood gas measurements to the same extent as the cattle.

This indicated a different degree of dead space ventilation in the sheep, where very rapid shallow panting does not result in blowing off of carbon dioxide to the same extent as happened in the cattle. It was not until the end of the second hot period that there were marked decreases in blood carbon dioxide and bicarbonate. Of interest was the diurnal pattern in respiratory rate shown by all sheep, which followed diurnal changes in core temperature, whether the animals were exposed to heat or not. The animals were cooler and early in the morning, panted less than in the afternoon. There were no large alterations in blood electrolyte concentrations attributable to the effects of the heat. We present this example to illustrate the huge complexities involved in determining WBT measurements for sheep categories standing on a range of ships.

Furthermore, the McCarthy Review (2018) recommended that industry transition to an approach that estimates the risk of heat stress to promote better animal welfare, which is supported by industry. A revised model (Hot Stuff) would assess heat stress through a holistic approach, by considering animal welfare indicators such as; panting scores, respiratory rates and appearance. These changes would have the potential to include subjective data and measurements into the tool, as the assessment is dependent on each individual assessor’s interpretation.

To ensure the HSRA remains an effective regulatory tool capable of producing consistent results, no changes should be adopted until they are supported by clear scientific evidence and assessments can be undertaken objectively. To date, there is insufficient scientific evidence to support any changes to the HSRA model in terms of WBT thresholds.

McCarthy (2018) went on to conclude, that this means an appropriate HSRA model may not be developed prior to the 2019 northern hemisphere summer. However, it is essential that changes are not made without clear and objective evidence.

Mecardo (2018) analysis of the seasonal mortality ratio across the entire industry shows that it is not uncommon to see an increase in mortality during the third quarter of the season as shown by the black dotted line in the animation of Figure 3.

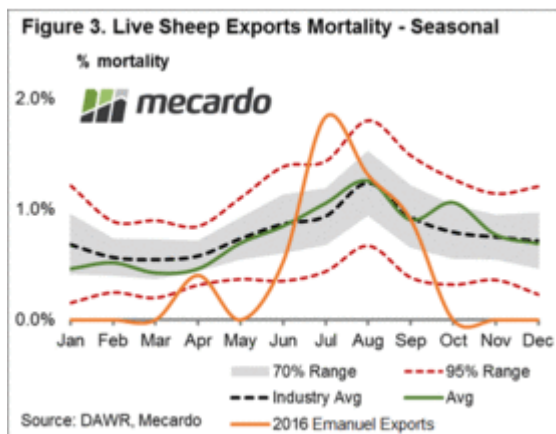
Overlaid on the Figure 3 animation below, is the normal range in mortality across the season (grey shaded zone) and a measure of the extreme ranges in mortality levels, as denoted by the upper and lower red dotted lines. The average long term seasonal mortality rate for Emanuel Exports Pty Ltd exports is also highlighted on the chart (green line) and it shows that for most of the time their mortality rate falls within industry norms.

However, during the last two seasons (when 60 minutes claim the footage was being taken) there were incidents during the third quarter of each year (orange and blue trend lines) when the mortality rate was extremely high for Emanuel Exports Pty Ltd shipments of live sheep.

What does this mean?

The increase in mortality rates into the third quarter of the season and the relative widening of the normal and extreme ranges during this time suggests that it is a riskier time to be exporting live sheep, compared to the February through to May period.

However, the data seems to suggest that the spike in mortality that Emanuel Exports Pty Ltd experienced, particularly during July 2016 and August 2017, were outliers compared to their long run seasonal average mortality levels. That being said, the industry is committed to preventing such events in the future.



Impacts on Western Australian Livestock Industry

Western Australia's south west is home to 95% of the WA sheep flock.

It is a highly seasonal production system reliant on its Mediterranean type climate with a mild wet winter for feed production with limited summer feed production. There is no significant irrigation and very limited perennial pasture production over summer due to the dry summer and soil types with low retention of moisture.

WA has a production model based on breeding/lambing through winter months and turn-off over the remainder of year. This has given WA an ability to run a higher ewe-based Merino flock than in other states of Australia.

In Western Australia where feed is scarce in the late summer/early autumn, seasonal conditions dictate the turn-off of sheep for processing. If early rains are not enjoyed in April/May, producers must have a diversity of outlets which can be used to dispose of livestock as supplementary feeding is less efficient and on-farm stores of grain begin to deplete.

Turn-off is reliant on the ability to supply stock into the live sheep trade as well as the processing sector, although there are considerable price differences between the values offered for "boat wethers" compared to values offered for lambs processed domestically. The processing of older sheep (hoggets and mutton) is the domain of only one specific abattoir with the majority of Merinos not meeting the required slaughter specification and is therefore heavily discounted. Seasonality and transition from autumn feed shortages to winter to spring feed flush requires quick turn-off and flexibility that is offered through having the live trade in addition to processing.

All else being equal, this production system has allowed WA to run more sheep and have consequently a larger sheep industry relative to other states. However, all forecasts predict there will be a net reduction of the WA sheep flock without the live export trade, which has the potential to impact the critical mass required for processing and other parts of the sheep industry.

In April 2018, WAFarmers and Sheep Producers Australia commissioned Mecardo to complete an impact statement on the consequences of a live export ban to the WA sheep industry. It was concluded, after reviewing over thirty years of data, that the loss of revenue to WA producers would be \$80 to \$150 million per annum, and for some of the larger sheep producers in WA, this figure can be in excess of \$100,000 per business. These figures do not include the losses for associated businesses and rural communities within WA. Further, a proposed increase in the domestic sale and processing of WA sheep and lamb as a result of a ban on live exports could see price declines of around 18 to 35 per cent for WA producers.

(Refer attached report '*Live Sheep Export - Brief Report*', Mercado April 2018).

Western Australia are the largest exporter of live sheep due to the relatively small domestic market and are therefore dependent on the live sheep export trade to manage production systems and to maintain flock numbers.

WAFarmers Comments on the Recommendations

WAFarmers believes the use of WBT measurements has a role to play in animal welfare standards, however applying a set WBT limit of 28 degrees is impractical and would subject unwarranted restrictions on the trade rendering the trade unviable by stealth.

WAFarmers is of the opinion that a proposed set 28 degrees Celsius WBT would not only jeopardise the sustainability of the live export trade, but will have significant and detrimental impacts for all livestock

production systems in Australia. It is also unclear how the proposed set 28 degrees celsius WBT would be implemented. It is for this reason that we cannot support the recommendations.

WAFarmers believes the TRP has unintentionally confused the use of a mortality measure as the only indicator for a voyage's success or failure without understanding or considering the existing multitude of welfare parameters employed to protect an animal's welfare.

WAFarmers is opting for a solution that establishes a matrix/index containing a series of practical WBT measurements to alleviate, remediate, or reduce heat stress implications that lead to welfare compromises and mortality incidences. Alternatively, a range of WBT measurements could be established at set trigger points that would initiate intervention to rectify the management of heat stress 'morbidity'. We acknowledge that time is needed to establish such a complex but nonetheless realistic matrix or index and decisions on WBT adjustments cannot be rushed onto the industry. Above all, the outcome must be reliable, valid and scientifically rigorous.

The above proposal would also support the intent of the McCarthy heat stress recommendations to prevent mortality incidents, rather than the intent of the HSRA Report, this being to prevent the whole voyage. If the HSRA model is to be changed from measuring mortality to morbidity, it should not be a pre-shipment tool; it should be an on-board tool. With weather forecasting only accurate for about 24 hours in advance despite longer term predictions, it is entirely possible that the meteorological conditions predicted in the HSRA model in Australia will never come to pass.

WAFarmers also questions the single specific focus on diurnal ammonia or CO₂ variations and the impacts on WBT given there are other variables involved in the management of heat stress including dietary changes, pad/pen management, stock density changes, shipping route changes, ventilation changes, etc.

It must also be recognised that Australia is the only country that has policies in place to manage the welfare of sheep and cattle post-dispatch in-market through the requirements of ESCAS and LGAP protocols once implemented. It is also common practice to review assessment frequently and modify data and methodologies on an ongoing basis.

Other solutions

Consideration could be given to the use of innovation smart tags or collars on selected animals per deck, and the use of cost-effective on-board temperature/humidity sensors to monitor heat stress loads in animals, rather than the use of an inflexible WBT measurement or threshold. New technologies such as biometric tags¹, sensor collars, and environmental (thermal) sensors are available for example the cost effective AcuRite Environment System to monitor temperature and humidity data on a frequent basis.

Consideration could also be given to the allocation of research funding to investigate dehumidifier/air conditioner ventilation systems that can be turned on when a ship is caught in an unforeseen situation as part of good contingency planning.

Conclusion

Since April 2017, the Federal Government has reacted strongly by imposing a raft of new regulations to which the industry is currently adapting. Complementing these changes, the industry has voluntarily collectively imposed a three-month moratorium on sheep shipments to the Middle East during its summer, the highest heat stress risk period. This is to clearly indicate how important welfare is to those involved in the trade. In addition to the moratorium, sheep exporters have agreed to initiate a program of transparency and on-board monitoring based on credible welfare indicators developed, monitored and assessed by credible and well-respected scientific experts who have a wealth of expertise in live export

practices.

Fundamental to this process is the appointment of Independent Observers (IOs) who, since the resumption of the live sheep trade to the Middle East in October 2017, have clearly and publicly reported no breeches of welfare conditions with a mortality rate of 0.24, a statistically significant outcome well below that recorded on properties affected by the recent drought in the east.

In July 2011, Australia imposed the Exporter Supply Chain Assurance System (ESCAS) on the rest of the world. ESCAS is an assurance system based on four principles:

1. Animal welfare: animal handling and slaughter in the importing country conforms to World Organisation for Animal Health (OIE) [animal welfare recommendations](#)
2. Control through the supply chain: the exporter has control of all supply chain arrangements for livestock transport, management and slaughter. All livestock remain in the supply chain
3. Traceability through the supply chain: the exporter can trace all livestock through the supply chain
4. Independent audit: the supply chain in the importing country is independently audited.

Despite the possibility of losing lucrative markets for live sheep in the Middle East, the industry supported and funded this innovative concept to improve and protect the welfare of sheep pre, during and post-delivery. No other country has taken such a forthright position to protect the welfare of its animals and work with customers to take genuinely, innovative responsibility for its supply chain.

The standards enforced under ESCAS have raised the standards for ALL live sheep traded across the world, and have also dramatically improved welfare standards in domestic processing facilities in the countries to which we deliver. If Australia vacates this space, these well-established principles will almost certainly diminish.

It is difficult to fathom why this foresight has not being recognised by the Technical Review Panel members, and others with the perceived intent to drive the demise of a viable trade in the very country (Australia) known for its leadership in progressing animal welfare parameters.

Since the introduction of the ESCAS, Australia has exported approximately 10 million head of livestock to 18 countries with very few compromises to animal welfare. We also understand that our customers value the continuity of supply, and as such the industry with the Government has worked exhaustively to build our international reputation as a reliable supplier of safe, high quality, nutritious livestock.

Since ESCAS's inception we have collaborated with our trading partners to enhance animal handling and husbandry skills and improve animal welfare outcomes—training more than 8,000 people to date. Industry is continually helping to upgrade facilities in-country to meet international animal welfare standards and our shared commitment to this work is ongoing.

WAFarmers, on behalf of its members, will not be rushed into adopting any further regulations on the trade. The issue of heat risk assessment is highly technical requiring the joint expertise of statisticians, engineers, veterinarians, specialist researchers and industry technicians and others to be involved during the development stages. It should be noted that a number of matters raised in the previous Issues Papers have been the subject of considerable levels of past research without clear solutions being identified.

Radical changes to the heat risk assessment model and procedures must be rejected until a high level of scientific support and certainty is established, especially if being used for the basis of regulation. It should also be acknowledged that similar levels of endeavour are certainly not evident in the work of other live exporting countries and have rarely been, if ever, matched in other areas of livestock production.

The livestock export trade is critical to the long-term sustainability of the Western Australian livestock industry. WAFarmers encourages the use of new science-based technologies to define average welfare indicator benchmarks. Complexities such as heat stress versus distress definitions must be carefully investigated using sound scientific principles if we are to determine accurately at what point an animal's welfare is compromised.

The McCarthy Review (2018) established a set of thresholds that now needs time for further analysis. We must allow science to evolve prior to moving to complex animal welfare indicators to replace mortality-based measures.

In Summary:

The live export sector needs time to develop the current model to incorporate key welfare indicators. The whole industry supports this transition to ensure the long term preservation of the live sheep export trade pre and post-dispatch and during voyages.

Regulation must be based on sound best practice standards that starts on the farm and ends at the point of slaughter. The shoulder periods of the northern summer are of great importance to WA as they allow farmers to destock in no-break, false-break or failed spring regional scenarios. Live export provides a unique and well suited risk management tool to farmers in this situation.

For this reason we ask that the current settings remain until HSRA draft recommendations have been calibrated and validated on ships and in-market over the shoulder periods.

WAFarmers also recommend the timely release of Independent Observer reports after each voyage. These reports should not be held back or released in batches to prevent misrepresentation of the data the reports contain.

All participants in the WA sheep industry and its global customers rely on the live sheep export trade for reasons we have stated in this submission, also to assist food security requirements in the countries we export to. The concept of purchasing chilled or frozen product from the retail sector is alien to the majority of consumers who rely on the live sheep trade in the Middle East. However, the industry must ensure this trade operates under the best welfare standards expected by the public. Sound progress has been achieved and will continue to improve if the industry is given the time to do so.

References

Mercardo (2018) report

Barnes et al. (2004)

McCarthy Review (2018)

¹The Quantified Ag Biometric tag dubbed the 'smart cattle ear tag' was developed in the US and is targeted for feedlot use to identify unwell animals before their condition advances and animals begin to display visual and physical symptoms which would be identified by pen riders. The ground breaking tag monitors body temperature with a laser pointing down the ear canal along with the behaviour of the animal and range of motion for decreased movement to primarily identify conditions such as BRD. Upon detection an alert with the tag number is sent to the online cloud platform and a LED light in the tag glows on the sick animal (visible even in daylight!) to enable pen riders to quickly identify the animal. Provenance4 is the exclusive Australian distributor and the tags are set for release in early 2019 with the cost estimated at about \$20.00 + per animal. Following US testing, trials conducted on 600 head in 3 feedlots in Victoria, southern NSW and south west QLD have just concluded and early indications show the QA Tags identify sick animals on average at least 7 days earlier than visual observations.

<https://www.youtube.com/watch?v=BDiYkMVgWqc&feature=youtu.be>