**Mortality Investigation Report 73 Cattle exported by sea to China in May 2018**

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**Summary**

On 31 May 2018, Phoenix Exports Pty Ltd (Phoenix) exported a consignment of slaughter cattle from Fremantle to China.

There were 46 mortalities in the consignment of 3,180 cattle, which resulted in a mortality rate of 1.45 per cent. This exceeds the reportable mortality level of 1 per cent for cattle on voyages of ten days or greater duration as prescribed by the *Australian Standards for the Export of Livestock* (ASEL*) V2.3.*

After investigation by the department, pneumonia and heat stress were found to be the main cause of the mortalities.

**Information reviewed**

The department investigated the mortalities by reviewing the following information:

* mortality report from the exporter
* daily voyage reports (DVR), the end of voyage report  and additional information from the Australian Government Accredited Veterinarian (AAV) who accompanied the consignment on board the vessel
* load plan, mortality data, Registered Premises (RP) treatment records, cattle line weights, voyage data, treatments on vessel data and heavy cattle management plan provided by the exporter
* documents from the land-based Australian Government Accredited Veterinarian (AAV) who prepared the consignment
* report from the Master of the vessel
* documents from the regional department veterinary officer (DVO)
* records from the registered premises
* department records from previous and subsequent voyages.

**Background**

Exports of slaughter cattle to China commenced in February 2017. Ten consignments of slaughter cattle have been exported between February 2017 and this mortality event, carrying 18,591 head with 54 mortalities in total, resulting in an overall mortality rate of 0.29 per cent. Two of the 10 consignments were sent by Phoenix, both voyages had approximately 2,400 head and had an average mortality rate of 0.21 per cent. Prior to this event, Phoenix had no other reportable mortality events involving cattle.

This reportable mortality incident is the first recorded in a consignment of cattle exported by sea to China since 2014. The previous incident (Report 52) occurred in February 2014, however it involved a different class of cattle (breeder), discharge port, vessel and exporter.

**Investigation Findings**

**The Livestock**

3,033 of the cattle in the consignment were Bos Taurus, predominantly Angus with an average weight of 588 kilograms. There were also 147 heavy cattle (both steers and heifers) included in the consignment which had an average weight of 704 kilograms. Cattle were sourced from 222 vendors before entering a 120-day grain fed feedlot program at three feedlots in Western Australia.

Phoenix noted the Bovine Respiratory Disease (BRD) preventative regime was inconsistent across the feedlots prior to entering the RP as some animals were not treated for Infectious Bovine Rhinotracheitis (IBR) and were only given a Mannheimia Haemolytica (MH) vaccine.

**Preparation in the registered premises**

The cattle were assembled at one RP in Lake Preston, Western Australia. The RP has previously been used for two consignments to prepare breeder cattle to China. The cattle were held at the RP for at least 11 days, before they left for loading between 30 and 31 May 2018. This is above the ASEL requirements for a minimum of two clear days in an RP for long haul voyages with one port loading and one port discharge.

For most of the time that the cattle were in the RP, the average daily temperature was around 24°C. During the last four days of quarantine however, the temperature range dropped from 24-26.5°C to 17.5-20°C (Bureau of Meteorology, 2018). During the last four days there was considerable rainfall (83.8mm) which caused pen conditions to become very wet. The wind increased considerably towards the end of quarantine from 20km/h up to 59km/h, which contributed to the cooler conditions.

An AAV was present when the cattle were inducted into the RP between 16 and 18 May 2018 and inspected the cattle at the RP between 19 and 25 May 2018. A DVO inspected the cattle on 29 May 2018 and reported poor conditions in the yards. Due to poor yard conditions, all cattle were viewed but the DVO was unable to assess their mobility, as cattle were knee deep in mud with no areas available for the cattle to get out of the mud and rest. The DVO noted in their livestock inspection record the yards were concerning.  While all cattle appeared in good condition, there were a few head noted with eye issues however none were rejected at the time. The majority of treatments in the RP were for mild lameness post trucking from the property of origin and crush handling events. Lame animals were later rejected from the consignment by the exporter prior to leaving the RP.

**The vessel**

This was the first time Phoenix has used the vessel involved and the first time the vessel has been used for slaughter cattle to China. It has previously been used for 11 breeder cattle consignments to China and has not been involved in any other reportable mortality events. The vessel was previously a cargo ship before being converted into a livestock carrier.

**Loading onto the vessel**

The exporter advised the DVO that there were no issues during loading and no cattle rejected. The cattle were given adequate space as required by ASEL based on their average weight of 588 kilograms. In addition to the area required by ASEL the 147 head of heavy cattle were each allocated an extra 15 percent space.

The vessel left Fremantle on 31 May 2018 and discharge was completed on 17 June 2018, making this a 17 day voyage. Phoenix exported four slaughter cattle consignments to China during the 2017-18 financial year with an average voyage length between 16-19 days.

Phoenix provided the vessel stowage plan to the department to demonstrate that the cattle were loaded at the rates specified in ASEL for voyages greater than 10 days. 790 MT of fodder was loaded which was sufficient for an 18 day voyage plus three days contingency, which was above the ASEL requirements.

**Conditions during the voyage**

On this voyage, the AAV was responsible for reporting to the department and working with the master of the vessel and the crew to maintain the health and welfare of the livestock on board.

The cattle consumed an average of 15 kilograms of fodder per head per day which was recorded as an average for all cattle on board, and was not broken down by deck, species or class. The average was above the ASEL requirement for a minimum feed allowance of 2 per cent of live weight per animal per day (11.76 kilograms for 588 kilogram cattle). The AAV reported that cattle were settling and doing well up until day eight when increased temperatures were experienced passing through the equator.

The wet bulb temperatures on the decks that animals were most affected ranged from 17⁰C on day one up to 30⁰C on day nine. The relative humidity ranged between 73 and 80 per cent. The AAV reported there was a spike in temperature passing through the equator which affected all decks, particularly the enclosed decks (4, 4A, and 5). During this time the majority of cattle on decks 1-5A had a pant score of 2 (mild panting) with 1 per cent of cattle reaching a pant score of 4 (open mouth panting with tongue out).

The AAV’s daily voyage reports (DVR) noted additional actions to try to reduce the implications of heat stress in particular crossing the equator were implemented and these are outlined in the mortalities and treatments section below.

**Mortalities and treatments**

There were a total of 46 cattle mortalities in the consignment of 3,180, leading to a final mortality rate of 1.45 per cent. The mortalities were spread quite evenly across all three properties of origin, and as a result, the mortalities could not be attributed to issues at a particular property of origin.

The first mortality was recorded on day four and 42 mortalities occurred during the voyage, of these 40 were attributed to pneumonia and/or heat stress. The other four cattle mortalities were the result of euthanasia in port as they were determined to be unfit for discharge. The majority of the mortalities were Angus steers of the same weights and fat score. Details of the mortalities are presented in Table 1.

**Table 1: Break up of cattle mortalities by day and deck.**

| **Day** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **Total** | **No. Loaded** | **%** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Deck 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 493 | 0.41 |
| Deck 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 532 | 0.56 |
| Deck 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 490 | 0.20 |
| Deck 6 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 227 | 1.32 |
| Deck 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 8 | 256 | 3.13 |
| Deck 5A | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 93 | 3.23 |
| Deck 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 248 | 1.21 |
| Deck 4A | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 77 | 9.09 |
| Deck 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 257 | 1.95 |
| Deck 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 253 | 1.58 |
| Deck 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 7 | 254 | 2.76 |
| **Total**  | **0** | **0** | **0** | **2** | **2** | **2** | **4** | **12** | **8** | **4** | **3** | **2** | **0** | **3** | **1** | **0** | **3** | **46** | **3180** | **1.45** |

Graph 1: Mortalities by day showing corresponding average wet bulb temperatures and pant scores.


The AAV described the hot conditions experienced whilst crossing the equator and additional actions they undertook to ensure the risk of heat stress was reduced. The AAV reported feeding of pellets was decreased and chaff increased when passing over the equator to reduce metabolic heat production and the risk of heat stress. Handling and disturbance of animals was reduced to limit unnecessary physical exertion that may have increased stress levels. The AAV noted it felt more humid on closed decks where the deck conditions were wetter compared to the open decks and the AAV moved some of the cattle from these decks to alleviate their discomfort. The DVRs detailed additional fans were installed, in particular on deck 4, as well as additional bedding being applied to reduce humidity. As cattle were not coping with the conditions, the AAV reported that they started washing down earlier than planned to assess whether this increased the comfort of the cattle. The AAV assessed their pant score before and after the wash down and concluded there was a small improvement but that it was not worthwhile to alter the standard wash down schedule.

In excess of 50 head were treated for signs of BRD and in excess of 20 head for lameness. There were no lameness issues noted with the heavy cattle which could be attributed to the additional space and bedding.
The AAV conducted post mortem inspections on all mortalities that occurred during the voyage. The AAV reported all mortalities showed lung pathology consistent with BRD, exacerbated by heat stress. Two of these mortalities were from the heavy cattle group.

The highest number of mortalities occurred on the days when the temperature and pant scores peaked. It was noted closed decks experienced more humid conditions which was reflected in the temperature readings and pant scores on those decks. The AAV noted that Bos Taurus slaughter-weight cattle are at higher risk of mortality in intensive situations and they have a reduced ability to cope with heat challenges.

Phoenix noted the majority of the animals treated for lameness at the RP were rejected from the consignment and none of the animals treated in the RP died on the vessel. Phoenix attributed the cause of the mortality event to be multifactorial and related to changes in weather during quarantine leading to BRD, the class/type of livestock and vessel factors such as ventilation.

**Exporter’s Actions**

To address future risk of BRD and heat stress incidents, Phoenix implemented an Animal Welfare Risk Assessment (AWRA).  The AWRA was developed by Phoenix to identify the various activities that would need to be undertaken to mitigate the risks associated with similar China slaughter consignments. The AWRA was implemented for their following consignment which departed in July 2018.

Phoenix identified the main risks to be addressed were vaccination for BRD prior to entry into quarantine, weather conditions during the quarantine period and vessel ventilation.

Phoenix addressed the risk of BRD by ensuring all cattle being prepared for consignments to China receive the same BRD prevention regime at their property of origin as well as an additional booster vaccination at their property of origin prior to entry into the RP.

Phoenix also advised they will analyse predictive weather information both in the RP and throughout the voyage. The outcome of the analysis would determine any additional arrangements required to ensure the welfare of the cattle.

Phoenix advised they will have the pen air turnover of the vessel independently verified prior to loading future consignments on this vessel, to ensure the Heat Stress Risk Assessment can be implemented. As the AAV noted most readings were taken in areas where there was good ventilation, Phoenix will provide an anemometer to the shipboard AAV so they can verify temperatures and humidity readings throughout the voyage.

**Australian Maritime and Safety Authority Evaluation of the Vessel**

The Australian Maritime Safety Authority (AMSA) conducted their investigation when the vessel returned to Australia in July 2018. They concluded that all livestock services were operating satisfactorily during the voyage and was compliant with [Marine Order 43 (MO43)](https://www.amsa.gov.au/vessels/standards-regulations/marine-orders/%22%20%5Ct%20%22_blank).

**Conclusions**

The department’s review found that the type and class of cattle were not suited to the conditions they experienced on this voyage. Bos Taurus cattle are known to have a higher risk of experiencing heat stress and the combination of this type of cattle and the fact that they had been grain fed prior to loading increased this risk. The additional factor was that these cattle were sent from cold wet conditions in Australia across the equator to a Northern Chinese summer. This would have contributed to the cattle experiencing heat stress. The cold and wet conditions occurring during the final few days in the RP prior to loading lead to BRD which was then exacerbated by the additional heat stress experienced by the cattle throughout the voyage but in particular over the equator.

The department assessed the findings provided by Phoenix, with Phoenix describing the mortality incident as multifactorial and related to changes in weather during quarantine, BRD, class/type of livestock and vessel factors.

The department determined the combination of cold and wet weather during quarantine, BRD, unsuitable class and type of livestock, and potential vessel factors such as ventilation—as suggested by Phoenix—are thought to have led to the cattle mortalities.

The department accepted at the time that the AWRA would address future multifactorial issues as it provided for cattle selection criteria such as body condition score, additional BRD vaccinations, predictive weather both in the RP and throughout the voyage and independent reviews of vessel ventilation.

The department required that an Independent Observer accompany Phoenix’s next consignment of slaughter cattle to China to ensure Phoenix’s management practices were implemented on board the vessel.

Note: Following the subsequent voyage which also reached a reportable level for mortalities (see [Report 74](http://www.agriculture.gov.au/export/controlled-goods/live-animals/livestock/regulatory-framework/compliance-investigations/investigations-mortalities/cattle-china-report-74)), the department determined the actions taken by Phoenix were not adequate to address the risks.