

Mortality Investigation Report 65 Sheep exported by sea to Qatar, Kuwait, the United Arab Emirates and Oman in July 2016 (amended January 2018)

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Summary

On 3 July 2016, Emanuel Exports Pty Ltd (Emanuel) exported a consignment of 69 322 slaughter sheep by sea to the Middle East. The shipment departed from Fremantle in Western Australia and travelled to multiple ports, including Qatar, Kuwait, the United Arab Emirates (UAE) and Oman on 17, 20, 23 and 25 July respectively. The voyage was 23 days in total and the final discharge was completed on 26 July 2016.

A mortality rate of 2.51 per cent (1 741 sheep) was recorded for this voyage in the Report to Parliament 1 July to 31 December 2016. This exceeds the reportable mortality level of 2.0 per cent for sheep as prescribed by the *Australian Standards for the Export of Livestock* (ASEL). There were problems with recording daily mortality rates from Day 14 of the voyage due to time pressure, restricted access to pens, extreme weather, delays in collection and disposal of carcasses and discharge logistics. As a result of this 1,286 sheep were unaccounted for. The department considers the majority of these sheep were mortalities and the mortality rate for this voyage is likely to be closer to 4.36 per cent (3,027 sheep).

The AAV reported that heat stress was the cause of this reportable mortality. Extremely hot and humid weather was encountered while travelling through the lower Arabian Gulf to Qatar and these conditions persisted during a lengthy discharge there.

AMSA conducted an independent investigation into this reportable mortality and concluded that all livestock services on the ship were operating satisfactorily during the voyage.

Actions were taken on board the ship to mitigate the heat stress event, including opening gates to provide sheep with access to ramps and alleyways and areas between pens. Livestock was further spread out across the vessel following discharge at each port as more space became available. These actions, however, were insufficient to prevent the reportable mortality incident.

To investigate the incident the department requested information from Emanuel, including a detailed mortality report, clarification on loading dispute numbers and a Heat Stress Risk Assessment (HSRA). The department required Emanuel to comply with a heat stress management plan for their next consignment to the Middle East using the same vessel, which was undertaken in August 2016. This document outlined risk mitigation strategies for all stages of export, including a 19 per cent reduction in stocking density (to that prescribed in ASEL). The voyage recorded a mortality rate 1.13 per cent which was below the reportable level.

The department reviewed the following information in the course of the investigation:

- Email correspondence from the exporter.
- Pre-export documentation, including export permit, health certificate and livestock inspection record.
- HSRA from the exporter.
- Daily voyage reports from the AAV.
- Report from the Master of the vessel.



- End of voyage report from the AAV.
- Email correspondence from AMSA.
- Mortality report from the exporter.
- Bureau of Meteorology climate data.

Background

A review of the department's records show there have been three other reportable mortalities investigated for sheep exported to the Middle East in the past 5 years: Reportable Mortality 46 in August 2013 (published on the department's website), and 66 and 69 in August 2016 and 2017 respectively (both of which are currently under investigation with the department). None of these incidents occurred on the same vessel. These voyages were undertaken during the northern hemisphere summer and heat stress was a contributing factor in all cases.

The department requires exporters to minimise the risks associated with heat stress on voyages to the Middle East during the high risk months of May to October. ASEL specifies sheep must have less than 25 mm of wool and be provided with additional space during travel compared with other times of the year. Importantly, exporters must also complete a HSRA for each consignment.

In the 12 months preceding this reportable mortality (4 July 2015 to 3 July 2016), a total of 1 916 924 breeder, feeder and slaughter sheep were exported by sea to the Middle East in 34 voyages, with an overall mortality rate of 0.66 per cent. During this time, Emanuel exported 880 264 sheep in 15 voyages to the Middle East with an overall mortality rate of 0.75 per cent.

Investigation findings

The livestock

The consignment consisted of lambs, wethers, ewes and rams. There were multiple breeds represented, including Dorper, Van Rooy, Merino and crossbred sheep and all lines were destined for slaughter.

Preparation in the registered premises

Sheep arrived at the registered premises (RP) between 20 and 24 June 2016. There were ten animals recorded as dead on arrival. Sheep had body condition scores of 2 to 3 and gained approximately 1 to 2 kg while at the RP. There were no health or welfare issues identified on daily inspections and mass medications were not administered at any time. Pellets were provided *ad libitum*, in line with the type of fodder used aboard the livestock export ship. Woolly sheep were shorn in preparation for export. There were 91 mortalities at the RP (0.001 per cent). The weather was cool with several days of rain during pre-export preparation. The sheep were inspected by an AAV and DVO on 1 July 2016 and were deemed fit for export, with the exception of the animals that had been rejected (see Table 1 below). A total of 72 900 sheep were held at the RP and, of these, 69 322 were loaded onto the vessel. The remainder were rejects and sheep surplus to requirements that were retained at the RP before being consigned to the next shipment.



Table 1: Rejected sheep at the feedlot

Number of rejected sheep	Time of rejection	Reason
213	On arrival at the feedlot	Various, including pink eye, fly strike, scabby mouth, arthritis and lameness
167	During drafting at the feedlot	Did not meet buyers' specifications
149	Prior to or during loading onto trucks heading to the port	Various (as above)

The vessel

The vessel has ten single tier decks that are fully enclosed. Ventilation is provided mechanically with input and exhaust fans in compliance with AMSA requirements. The fans do not have variable speed capability and consequently it is not possible to increase ventilation. The vessel was inspected and cleared by AMSA on 1 July 2017.

Loading onto the vessel

Loading was conducted on 2 and 3 July 2017 and went smoothly with fine weather and no delays. Both the AAV and DVO inspected the consignment and a further 464 sheep were rejected for a range of conditions including eye problems, scabby mouth and lameness. These animals were drafted out during loading onto the vessel. The total number of sheep loaded was reported as 69 322 head; however, after the voyage Emanuel stated that there were possibly fewer animals on board. The sheep were housed across all ten decks of the vessel.

Conditions during the voyage

Voyages to the Middle East require an AAV and Australian Livestock Export Corporation Limited (LiveCorp) accredited stock person. The AAV is responsible for managing livestock health and welfare and reporting to the department, and works closely with the stock person, Master of the vessel and crew.

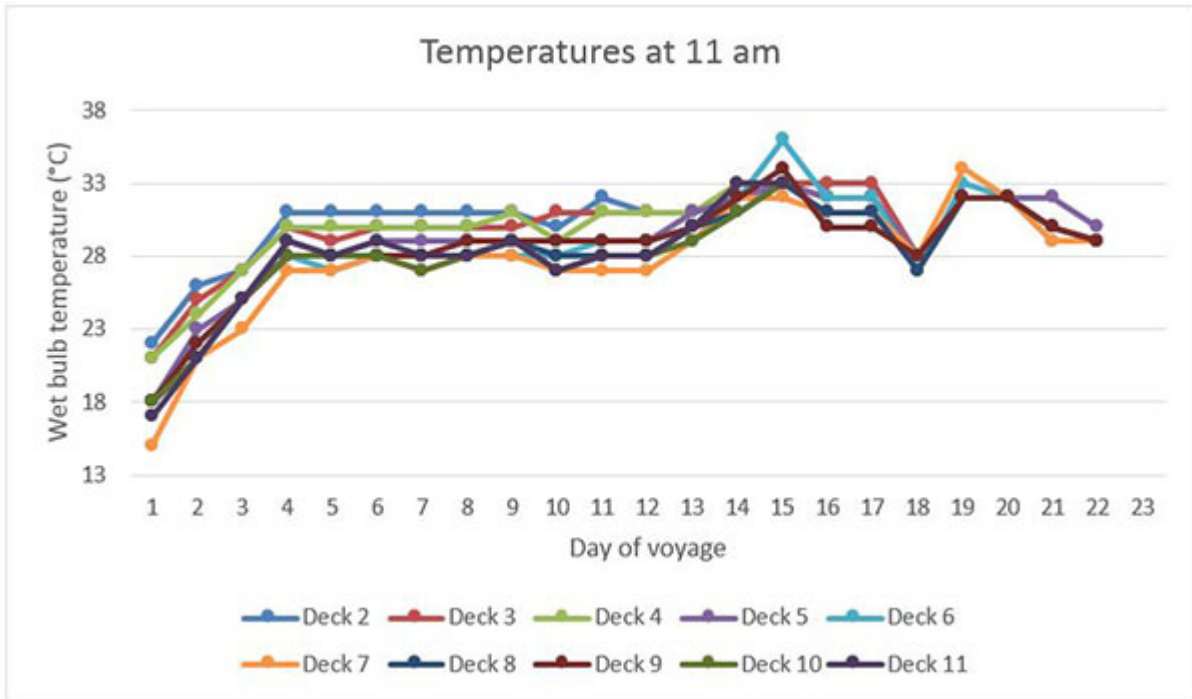
Sheep were provided with pellets twice per day and average daily intakes were above ASEL specifications. Chaff was also supplied to selected pens. There were no restrictions placed on fodder at any time and water was available *ad libitum*. Excess fodder and water was carried on board and a surplus of both remained at the end of the voyage.

The decks became wet and boggy on Day 6 and their condition deteriorated on Day 14 as shown in Graph 3 below. The AAV reported that high humidity and heat affected sheep (with increased water intake, urine output and moisture loss from respiration) produced the saturated flooring. The decks began to dry out after unloading in Qatar and had significantly improved by Day 19 with the drier climate in Kuwait. Following discharge in Kuwait, sheep were moved out of any remaining damp areas.

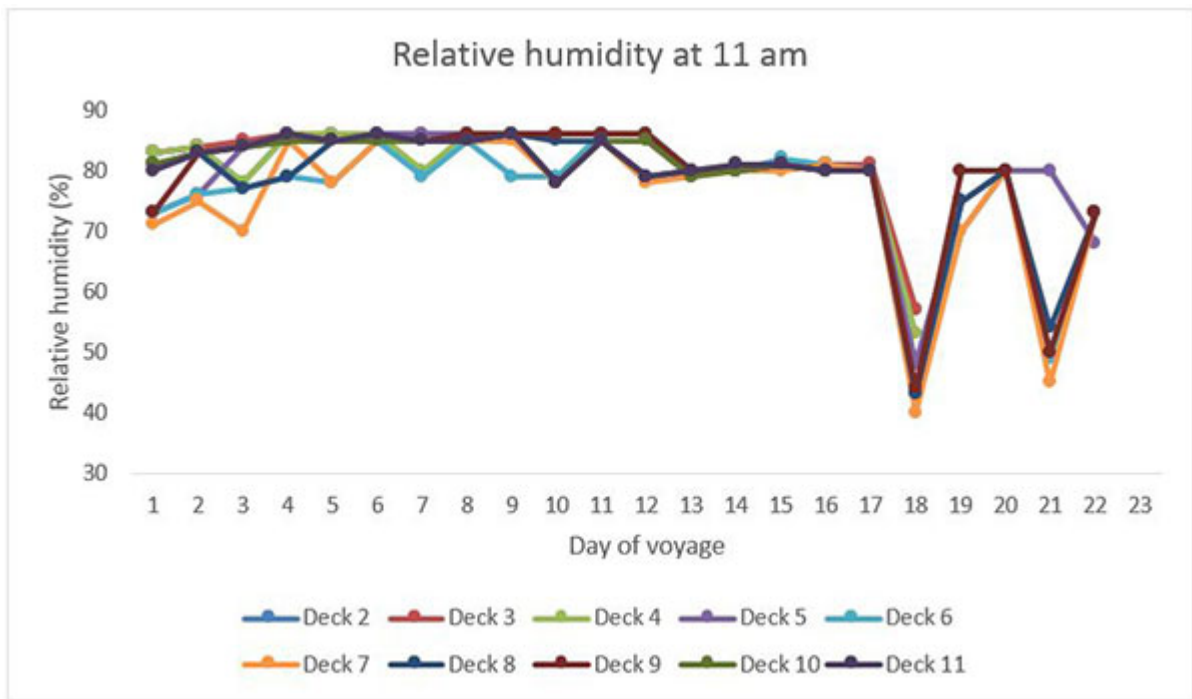
The weather became hot and humid from Day 4 and temperatures peaked over Days 14 to Day 16 as shown in Graphs 1 and 2 below. The AAV reported that humidity was greater at night, however, readings were only recorded at 11 am.



Graph 1: Temperature during voyage

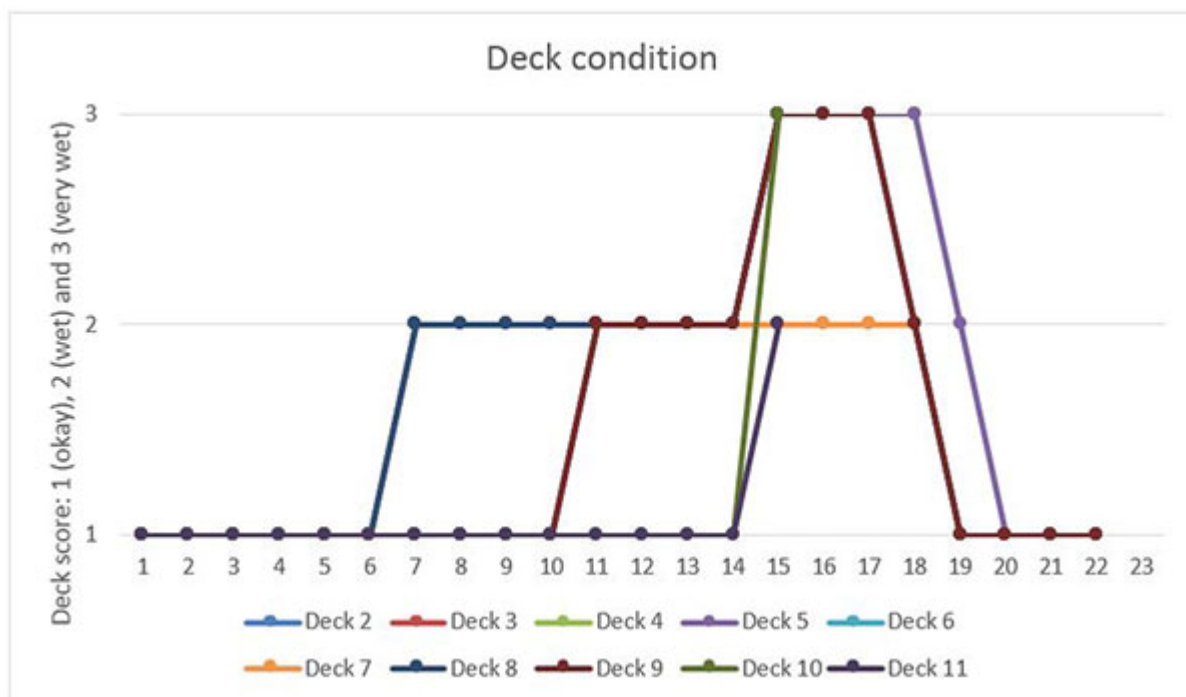


Graph 2: Relative humidity during the voyage



Graph 3: Deck condition during the voyage





Mortalities and treatments ^

Hospital pens were set up and housed approximately 60 sheep during the voyage. Initially they were used for shy feeders and rams with horns that obstructed access to feed and water troughs. Sheep were moved into this accommodation for pre-existing conditions that had not been identified during drafting, including ill-thrift, shearing lesions and flystrike; however, they represented only a small percentage (a total of seven of 69 322 animals were recorded as hospital cases on Day 2). Throughout the journey, sheep were hospitalised for enteritis, injuries and (from Day 11) heat stress. They were provided with chaff and a vitamin and mineral supplement in addition to pellets, and antibiotics were administered as required.

While early mortalities were due to enteritis, pneumonia and septicaemia, heat stress became the overwhelming cause as the voyage progressed (see Table 2 below). The first hot and humid weather was encountered on Day 4. Sheep were visibly affected and began to pant, which is a key indicator of heat stress and represents the primary mechanism of evaporative heat loss in small ruminants. At this time, the cumulative mortality was 68 head (0.098 per cent) and 27 animals were hospitalised but none of these cases were attributed to heat stress. The first heat related death was reported on Day 7 and an increase in heat and humidity on Day 12 precipitated further mortalities. By Day 13, the cumulative mortality had reached 433 head (0.625 per cent).

In the afternoon of Day 13 – prior to travelling through the Arabian Gulf – sheep were provided with additional space, which is standard practice. Gates were opened to a number of pens on the four lower decks (2 to 5), allowing sheep to spread out across alleyways and ramps. Additionally, pens on deck 8 were opened into alleyways between the forward and mid sections and into an available area at the rear. Despite these measures, a peak in heat stress mortalities was seen over Days 14 to 16, which coincided with increased heat and humidity and a slow discharge in Qatar (see Graph 4 below). Unloading was delayed due to vehicle breakdowns, insufficient trucks and road closures. The Daily Voyage Reports for these three days state that sheep were

panting and gasping and the level of heat stress was rated as severe. Following discharge, livestock remaining on board were moved into vacated areas.

The mortality rate became notifiable on Day 19 (22 July 2017) when it reached 2.092 per cent. Although conditions started to ease on Days 17 and 18, there were ongoing mortalities in livestock that had been affected earlier. These animals exhibited signs of heat stress, including inappetance, weakness, a stiff gait and an inability to walk or rise (downers). There were a smaller number of deaths resulting from pneumonia, which were likely induced by the hot and humid conditions. While there was an increase in humidity again on Day 20, sheep were not significantly affected as the vessel was largely destocked at this stage.

Both the AAV and exporter reported there were problems establishing accurate daily mortality data for a number reasons. There was limited time to count and remove bodies on Day 14 before arriving in Qatar. It was then not possible to collect or dispose of carcasses for three days while at the port. Access to lower decks was restricted by livestock blocking alleyways and bodies could not be moved to regular collection points as these were located along discharge routes. Additionally, the ship was fully loaded. Attempts were made to mark dead animals but this proved ineffective due to rapid decomposition in the hot and humid environment and ear tags were not collected. The accounting difficulties were compounded by the significant mortalities that occurred on Days 14 to 16.

Daily mortalities of 222, 245 and 387 head were recorded for Days 14, 15 and 16 respectively, although the AAV indicated the latter figure may have been inflated due to animals being counted twice. A further 454 deaths were documented over Days 17 to 23, yielding a cumulative mortality of 1 741 head for the voyage, which is equivalent to a rate of 2.51 per cent. Of these, a total of 310 were euthanased. The total sheep discharged, however, was only 66 295, which is 3 027 less than the number loaded. Consequently, 1 286 animals remain unaccounted for in these calculations. The exporter assigned this deficit to a loading dispute in which fewer sheep were loaded and more were discharged than what was recorded, with the latter being primarily responsible for the discrepancy.

In the End of Voyage report, the AAV quantified part of the dispute, stating that there were 257 additional sheep loaded; however, a definitive outcome was not provided for the remainder of the deficit. Despite reporting a mortality rate of 2.51 per cent, the AAV writes that a shortfall of sheep became evident following discharge in Dubai on Day 21 and there was a reasonable likelihood that daily mortality figures were understated from Day 14 onwards. The department has recorded a mortality rate of 2.51 per cent as reported by the AAV, exporter and Master of the vessel; however, it is not possible to verify the accuracy of the data provided for this voyage.

In light of the uncertain data, and significant movements of sheep around the vessel during the voyage, the department did not undertake epidemiological analysis of mortalities by deck or class. The AAV did, however, assess the data based on the 2.51 per cent mortality rate. The findings showed that the mortality rate exceeded 2 per cent on each of the lower decks (2 to 5) but not on the top three levels (9 to 11), which were progressively less affected. The middle decks (6 to 8) had greater than 2 per cent mortalities; however, there were compounding factors that acted to raise the mortality rates, including two hospital pens on deck 6 and rams on deck 7.

Of all classes of sheep, the rams had the highest mortality rates, which varied from 2.15 to 23.33 per cent between different lines. Rams are considered more prone to heat stress due to their larger body mass. Despite the horned rams being provided with 10 per cent additional space (as prescribed by ASEL), they were most severely affected, albeit in smaller numbers than the other lines. Ram lambs on deck 8 also had a high mortality

rate of 7.63 per cent (although they averaged only 47.11 kg body weight according to the load plan). The AAV reported that the Van Rooy breed of sheep suffered a relatively higher incidence of septicaemia, enteritis and pneumonia, which was not observed at the RP and may have been triggered by shipping and heat stress.

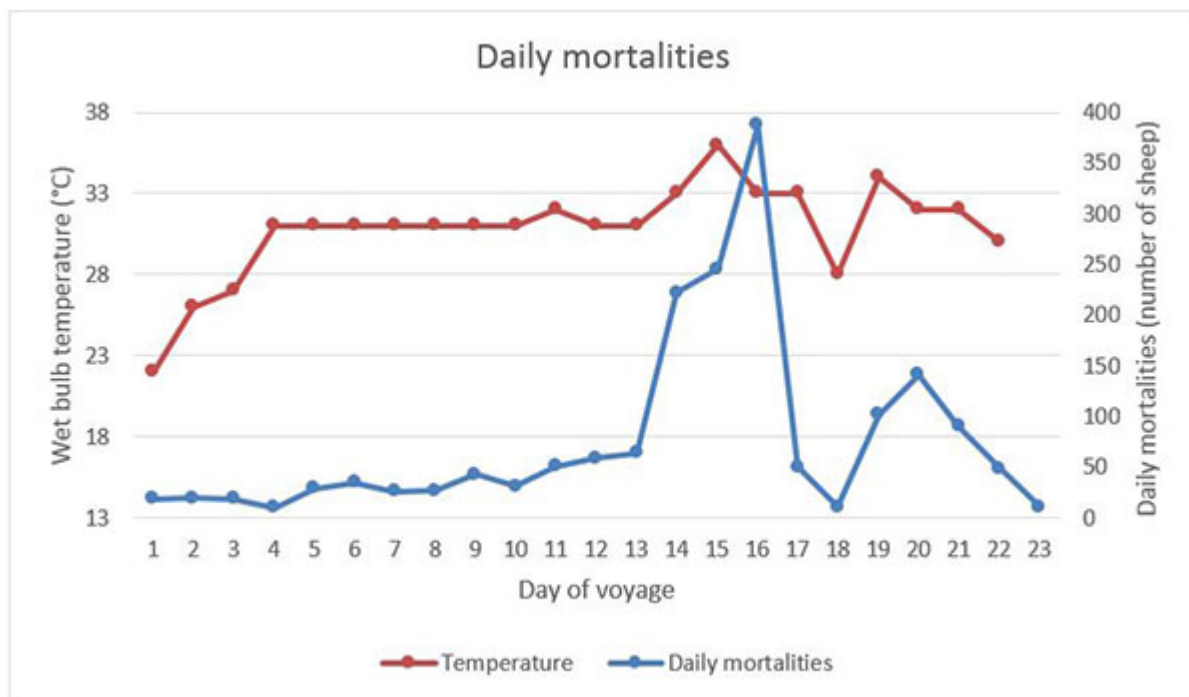
Table 2: Voyage mortalities

Day of voyage	Cumulative mortalities (number of sheep)	Cumulative mortality rate (%)	Daily mortalities (number of sheep)	Cause of daily mortalities recorded by the AAV
1	19	0.027	19	Cause not recorded.
2	39	0.056	20	12 enteritis; 5 septicaemia and enteritis; 1 autolysed; 1 injury; 1 cause not recorded. AAV noted that most losses so far were due to septicaemia and enteritis.
3	58	0.084	19	8 enteritis; 5 septicaemia; 3 autolysed; 1 urethritis; 2 cause not recorded.
4	68	0.0981	10	5 septicaemia; 2 enteritis/ septicaemia; 1 enteritis; 1 pneumonia; 1 pneumonia/ septicaemia.
5	97	0.140	29	15 septicaemia and pneumonia; 5 autolysed; 3 enteritis; 2 inanition; 2 pneumonia; 2 cause not recorded.
6	132	0.190	35	23 enteritis; 9 septicaemia; 3 autolysed.
7	158	0.228	26	12 enteritis; 7 septicaemia; 3 autolysed; 1 heat related ; 1 pneumonia; 1 pneumonia/ septicaemia; 1 cause not recorded.
8	185	0.267	27	16 septicaemia; 10 enteritis; 1 autolysed.
9	228	0.329	43	17 enteritis; 4 autolysed; 3 pneumonia; 19 cause not recorded.
10	259	0.374	31	9 enteritis; 8 pneumonia; 6 septicaemia; 2 autolysed; 1 heat related ; 1 no visible lesions; 4 cause not recorded.
11	310	0.447	51	7 septicaemia; 6 enteritis; 5 pneumonia; 4 heat related ; 3 autolysed; 3 cast; 23 cause not recorded.



Day of voyage	Cumulative mortalities (number of sheep)	Cumulative mortality rate (%)	Daily mortalities (number of sheep)	Cause of daily mortalities recorded by the AAV
12	369	0.532	59	18 pneumonia and septicaemia; 14 enteritis; 9 septicaemia; 7 enteritis/ pneumonia and septicaemia; 1 heat related ; 3 pneumonia; 1 autolysed; 6 cause not recorded. AAV noted heat (humidity) was a major stressor triggering a rise in losses.
13	433	0.625	64	Cause not recorded.
14	655	0.945	222	Cause not recorded. AAV noted increased losses were due to heat stroke and that it was extremely hot and humid on board the previous night.
15	900	1.300	245	All heat related.
16	1 287	1.857	387	All heat related.
17	1 337	1.929	50	All heat related.
18	1 348	1.996	11	Cause not recorded.
19	1 450	2.092	102	AAV noted losses were predominantly heat related downers.
20	1 591	2.295	141	AVV noted 90 heat affected sheep were euthanased.
21	1 681	2.425	90	AAV noted 34 heat affected sheep were euthanased.
22	1 730	2.496	49	AAV noted 32 heat affected sheep were euthanased.
23	1 741	2.511	11	Records not provided.

Graph 4: Daily mortalities



Exporter's Actions ^

Emanuel undertook a review of their practices and procedures and identified strategies to minimise the risk of a future heat stress event. At the department's request, they developed and implemented a comprehensive heat event management plan. This included reducing stocking density (on the next voyage), loading industrial fans to assist with ventilation, changing the port rotation and investigating what other weather forecasting information can be accessed. Emanuel is now operating under an approved arrangement which includes contingency plans for extreme hot weather conditions and is subject to audit by the department.

Australian Maritime Safety Authority Evaluation of the Vessel ^

AMSA began their investigation on 9 August 2016 in Fremantle and provided their findings to the department on 18 August 2016. They verified that all livestock services on the vessel were being maintained in accordance with the prescribed maintenance plan. They concluded that all livestock services were operating satisfactorily during the voyage with no apparent factors associated with Marine Order 43 that may have contributed to the high mortality rate.

Conclusions ^

Both the Master and AAV reported a mortality rate of 2.51 per cent for this consignment of sheep exported to the Middle East. As reported by the AAV there were problems recording daily mortality rates from Day 14 of the voyage due to time pressure, restricted access to pens, extreme weather, delays in collection and disposal of



carcasses and discharge logistics. As a result of this 1,286 sheep were unaccounted for. The exporter assigned this deficit to a loading dispute in which fewer sheep were loaded and more were discharged than what was recorded, with the latter being primarily responsible for the discrepancy.

The department considers the majority of these sheep were mortalities and the mortality rate for this voyage is likely to be closer to 4.36 per cent (3,027 sheep).

The cause of this reportable mortality was heat stress, resulting from hot and humid weather over most of the 23 day voyage. A peak in cases occurred over three days, which corresponded with the most extreme conditions and a delayed discharge in Qatar. The lower decks of the vessel were more severely affected and the highest mortality rates were seen in the rams, which were the largest of the sheep on board the ship. The department required Emanuel to review and comply with a heat event management plan for their next consignment to the Middle East using the same vessel and the corresponding mortality rate was below the reportable level.

Following this mortality event Emanuel had another reportable mortality in sheep exported by sea to the Middle East in August 2017. The department is working with Emanuel's to address the risks associated with consignments exported to the Middle East during the hottest months (July/August). This will be implemented in 2018.

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