Investigation into reportable goat mortality level on sea voyage from Fremantle, Western Australia to Singapore, November/December 2008.

1. Purpose

To report on the investigation into the cause of mortalities in goats exported by sea to Singapore, and to make recommendations with the objective of reducing the likelihood of a recurrence.

2. Summary

Overall for this voyage, there were 18 mortalities of the 350 goats loaded as a single consignment which equates to a mortality rate of 5.14%. There was only one consignment of goats on the vessel. Other classes of livestock (sheep and cattle) were loaded on the vessel and mortality was below the reportable level.

Heat and humidity contributed to the reportable mortality that occurred in the consignment of goats. There is insufficient information available to determine whether the goats were affected by any other disease or disorder that contributed to the reportable mortality.

3. Background

The investigation into the mortality was completed by reviewing the following information:

1. Daily reports from the Australian stockman who accompanied the consignment on board the vessel;
2. End of voyage report from the AQIS accredited veterinarian (AAV) who accompanied the consignment on board the vessel;
3. Report from the exporter;
4. Records from the registered premises;
5. Records from the AAV who prepared the consignment;
6. Report by the master of the vessel.

Table 1 Chronology of Events

Dates	Day of Voyage	Action	Cumulative Voyage Mortality Total	Cumulative% Mortalities
26/11/2008		350 goats loaded in Fremantle		
27/11/2008	1	No Mortality	0	0.00%
28/11/2008	2	No Mortality	0	0.00%
29/11/2008	3	No Mortality	0	0.00%
30/11/2008	4	No Mortality	0	0.00%
1/12/2008	5	No Mortality	0	0.00%
2/12/2008	6	1 Mortality	1	0.29%
3/12/2008	7	2 Mortalities	3	0.86%
4/12/2008	8	2 Mortalities	5	1.43%
5/12/2008	9	6 Mortalities Arrival in Port and commencement of discharge	11	3.14%
6/12/2008 and 7/12/2008		7 Mortalities during discharge	18	5.14%

The reportable mortality trigger for a goat voyage is 2 per cent (or 3 animals whichever is greater). The reportable mortality level was triggered on day 9 of the voyage (5 December 2008).

4. Findings

4.1 Preparation of goats on Property of origin

The goats in this consignment were sourced from two vendors in Western Australia. The documents supplied to AQIS indicate the goats were prepared in accordance with standard 1.20 of the Australian Standards for the Export of Livestock (ASEL) regarding conditioning of goats prior to transfer to the registered premise.

4.2 Mortalities in the Registered Premise

All goats in the consignment were entire male rangeland goats. The goats exported from Fremantle were delivered to the registered premise on 16 November 2008. In addition to the 550 goats received on this day there were 9 goats on hand in the registered premise. The goats were drafted into two lines, 200 of these goats were loaded onto another vessel and did not experience mortality above the reportable level during the voyage. The remaining 350 goats were loaded on the vessel on 26 November 2008.

During the pre-export assembly period one mortality was recorded and three goats were euthanized due to leg injuries, a further 5 small goats were rejected from the consignment. There were no reports of enteritis or any other health problems during the assembly period.

4.3 Loading

The records from the exporter indicate the stocking density of the goats was in accordance with the ASEL. All 350 goats were loaded on deck 5 of the vessel.

4.4 Journey

The climatic conditions for deck 5 were as follows:

Table 2 Climatic Conditions

Day of voyage	Dry bulb (°C)	Wet bulb (°C)	Humidity (%)	Temperature Humidity Index	Daily water consumption (L)	Daily weather conditions from daily reports
1	17	15	81	63.64	1	Cloudy sky, rough seas and moderate swell. Vessel rolling moderately
2	21	19	83	69.4	1	Partly cloudy sky, rough seas and moderate swell. Vessel rolling moderately
3	24	22	84	73.72	1	Partly cloudy sky, rough seas and moderate swell. Vessel rolling easily
4	25	22	77	74.44	1	Cloudy sky, moderate seas and moderate swell. Vessel rolling easily
5	29	25	72	79.48	4	Cloudy sky, moderate seas and moderate swell. Vessel rolling easily
6	29	25	86	79.48	4	Overcast sky with rain, slight seas and low swell. Vessel moving easily.
7	29	27	86	80.92	4.2	Overcast sky with rain, slight seas and low swell. Vessel moving easily.
8	27	25	85	78.04	4.5	Overcast sky with rain, slight seas and low swell. Vessel moving easily.
9	27	25	85	78.04	4.4	Overcast sky with rain, slight seas and low swell. Vessel moving easily.

The veterinarian's end of voyage report indicated that a majority of mortalities occurred in the central pens of deck 5 with mortalities occurring in a dispersed pattern within these pens. No other health problems were noted in the group.

The on board veterinarian attributed the mortalities to heat stress. Clinical signs recorded by the veterinarian included hyperthermia, dehydration, muscular tremors, fitting, lateral recumbency and diarrhoea. Postmortem examinations were performed by the veterinarian and there were no significant postmortem findings to report. The information indicates that heat and humidity played a role in the mortalities.

The veterinarian recorded the property of origin ear tags of all goats that died during the voyage; there was no property of origin information for animals that died during discharge. Based on reports from the exporter there were approximately 100 goats in this group from property 1 and 250 from property 2. 10 of the 11 mortalities that occurred during the voyage were from property 2.

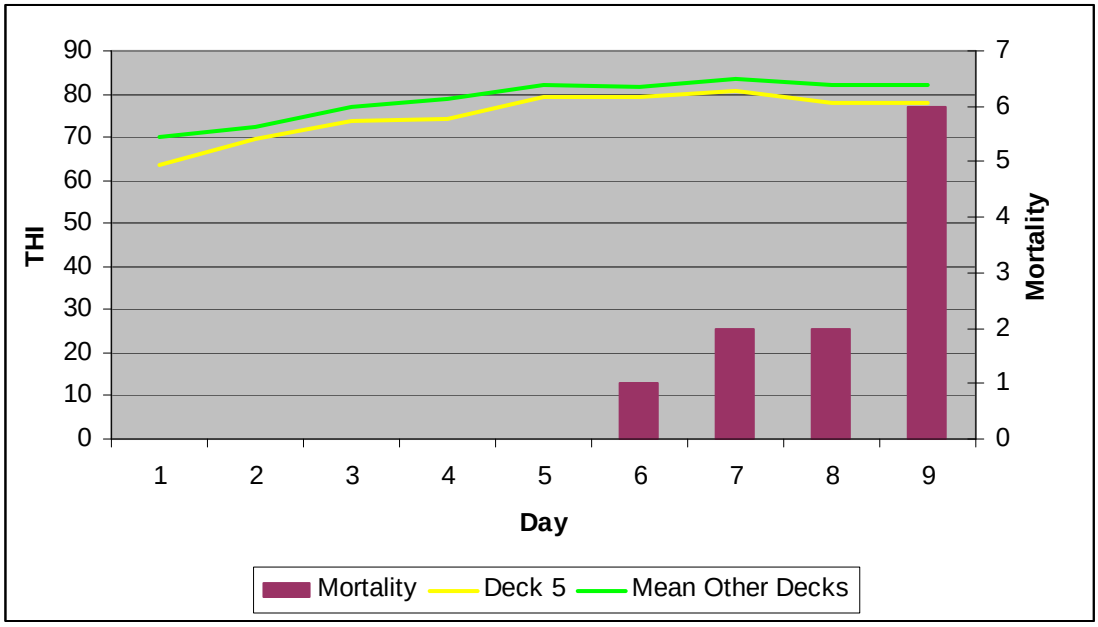

Figure 1 Temperature humidity index for deck 5 and mean THI for all other decks as well as goat mortality; results shown by day

Temperature humidity index (THI) is a good indicator of stressful climatic conditions and is calculated from wet and dry bulb temperatures. THI values of less than 70 are considered comfortable, 75-78 stressful and values greater than 78 can cause extreme distress if maintained for long periods. The veterinarian reported that temperature and humidity at midday and early in the afternoon was significantly higher than that recorded on the daily reports.

Figure 1 shows that all mortality in the goats occurred as THI peaked during the last days of the voyage. However the figure also shows that THI for deck 5 was lower than the average THI for the remainder of the vessel. Sheep and cattle were also loaded on this voyage and can be more severely affected by heat and humidity than goats. Three of 687 cattle died. The veterinarian reported that two died of unrelated causes and one of heat stress. For the sheep, the mortality rate was 0.6% and the veterinarian reported the majority died from heat stress.

It is not clear why the goats were so severely affected by the heat and humidity. There is insufficient information available to determine whether the goats were affected by any underlying disease or disorder that contributed to the mortalities.

The live animal export industry has previously published information titled “LIVE 215 Minimising mortality risks during export of live goats by sea from Australia – May 2003” and “LIVE 209 Physiology of heat stress in cattle and sheep – March 2004”. The reports are available on the Meat and Livestock Australia website at www.mla.com.au. A review of the effects of temperature and humidity on ruminants was published by Nissim Silanikove in Livestock Production Science (Silanikove, N 2000. Effects of heat stress on the welfare of extensively managed domestic ruminants Livestock Production Science 67(2000) 1-18).

5. Conclusion

The available information indicates that heat and humidity contributed to the mortalities.

There is insufficient information available to determine whether the goats were affected by any other disease or disorder that contributed to the reportable mortality.

It is important to note that it is mathematically easier for small consignments of any class of livestock to exceed the reportable mortality threshold. For example, in a consignment of 100 animals only 3 mortalities need to occur for mortality to reach the reportable level.

6. Recommendations

Additional conditions will continue to be considered for consignments of goats exported by sea from ports south of latitude 26 degrees south, on voyages less than 10 days. Additional conditions will be considered until further satisfactory risk management procedures are developed over and above the ASEL to improve the animal welfare aspects on export voyages. Additional conditions will be considered for all exporters.

Industry to consider a program to enable the collection (and processing on return to Australia) of post mortem samples on each voyage to provide definitive information for the diagnosis in the event of a reportable mortality investigation or detection of an animal health issue.

7. Actions

AQIS will consider applying the following conditions to all exports of goats by sea from the southern West Australian ports on voyages of less than 10 days duration (for all exporters):

- The consignment of goats exported live by sea will be required to be accompanied by an AQIS accredited veterinarian until satisfactory results are achieved.
- Goats must be provided with additional space over and above the ASEL requirements.
- Goats to be exported by sea are held at one registered premise for 5 clear days (excluding the day of arrival and departure) before export and
- Goats are fed ad libitum during that period and only on shipboard ration intended to be used during the export journey.
- The shipboard ration must include a minimum of 200 grams of chaff or hay per day per goat.

8. Results

The exporter has not exported any consignments of goats by sea subsequent to the consignment discussed in this report.