



Investigation into the reportable sheep mortality level on an aircraft voyage from Perth to Kuala Lumpur, Malaysia, November 2009.

1. Purpose

To report on the investigation into the cause of mortalities in a consignment of sheep exported by air to Malaysia and to make recommendations with the objective of reducing the likelihood of recurrence.

2. Summary

There were 138 mortalities of the 1873 sheep loaded on the flight, equating to a mortality rate of 7.36%. The aircraft had two operating air conditioning packs and one air conditioning pack deactivated. Inadequate ventilation in the main cargo hold causing increased temperature, humidity and ammonia levels is suspected as the most likely cause of the mortalities.

3. Background

The investigation into this mortality event was carried out by reviewing the following information:

1. End of journey report by the exporter;
2. Consignment report from the exporter;
3. Documents provided by the AQIS accredited veterinarian;
4. Report from the AQIS certifying veterinary officer;
5. Reports by the airline;
6. Post-mortem report.

4. Findings

4.1 Reportable mortality level

The reportable mortality level for sheep is two per cent.

4.2 Review of records of the premises where sheep were held prior to export

The sheep exported from Perth arrived at the premises from 1-4 November 2009 and were transported in trucks to Perth airport on 10 November 2009. The records from the premises where the animals were held before export indicated no mortalities occurred over the preparation period. The records indicated there were nine animals rejected by the AQIS accredited veterinarian during the final inspection for the consignment. Seven sheep were rejected for lameness, one sheep was rejected for being fly-blown and one sheep was not commercially suitable for the consignment.

4.3 Loading and Journey

The records show that the sheep were loaded on the aircraft in accordance with the Australian Standards for the Export of Livestock version 2.2. The sheep were loaded onto the main deck of the aircraft in aircraft pallet positions P3 to P13 and P16 to P28 (see Attachment 1). The remaining main deck pallet positions and all lower hold compartments were empty. The sheep were loaded into seven double tier crates located at aircraft pallet positions P3 to P6 and P16 to P18; and 17

triple tier crates located at aircraft pallet positions P7 to P13 and P19 to P28. Loading time was approximately 2 hours and 20 minutes. The flight route was direct from Perth to Kuala Lumpur.

The aircraft used in this consignment had two functional air-conditioning packs for aircraft ventilation and one deactivated air-conditioning pack. The flight crew reported that the two air conditioning packs were functioning normally and that maximum cooling was applied to the main cabin during the five hour flight. The aircraft journey and technical log provided by the airline stated that during the last hour of the flight two main deck fire detectors illuminated intermittently. In response to the warning lights, a member of the flight crew inspected the main deck. The technical log indicated that there was no fire but the livestock were suspected to be triggering the fire detector system. Airline representatives subsequently confirmed that fire detector illumination can be caused by an increase in humidity in the main deck cargo hold. On arrival and unloading in Kuala Lumpur the main deck cabin was reported by the ground staff as being warm and humid with a strong smell of ammonia and that 'visibility was bad due to condensation and moisture'.

The total number of mortalities on this flight was 138 with the majority of the mortalities occurring in the middle tier of the triple tiered crates. The mortality percentage for double crates was 5.71% on the top tier and 1.79% on the bottom tier. The mortality percentage for triple crates was 0.43% on the top tier; 16.6% on the middle tier; and 6.32% on the bottom tier. A large number of mortalities occurred in crates at pallet positions P10 to P12 (see Attachment 2). It is unclear why large numbers of mortalities occurred in pallet positions P10 to P12 or why the average mortality rate in the middle tier of the triple crates was significantly higher than for the upper or lower tiers.

The post-mortem report provided by the airline found changes to the lung tissue which may have been due to the stress of transportation or other respiratory disease.

5. Conclusion

Inadequate ventilation in the main cargo hold causing increased temperature, humidity and ammonia levels is suspected as the most likely cause of the mortalities. Triple tiered crates are routinely used by exporters to load sheep and goats without incident.

6. Recommendations

AQIS recommends that the Livestock Export Industry and the Livestock Export Standards Advisory Group (LESAG) review the risks associated with ventilation and loading configuration of livestock in aircraft.

7. Actions

1. The airline has taken voluntary action to only carry livestock from Australia on an aircraft with three functional air-conditioning packs.
2. The airline has developed/amended instructional material relevant to the transport of livestock and implemented verification procedures.
3. In consultation with industry, AQIS developed the 'Carriers Maindeck Ventilation Declaration' (see Attachment 3) that must be completed for all consignments of livestock exported by air.
4. The livestock industry is currently developing enhanced air ventilation software to improve risk management for export of livestock by air.
5. AQIS applied conditions to the exporter involved in this mortality incident. The exporter's first air consignment of livestock following the mortality incident included the following conditions:
 - Sheep are bare shorn.

- All livestock are supplied with 10 per cent space over and above the Australian Standards for the Export of Livestock table A6.1.2 and A6.1.3.
 - The exporter must provide AQIS WA with a completed 'Carriers Maindeck Ventilation Declaration' prior to the livestock departing from the airport. If the declaration is not completed the animals are not permitted to depart for the airport.
 - Air craft is pre-cooled before the livestock are loaded.
6. Following this consignment, AQIS modified the conditions for the exporter to the following:
- Air craft is pre-cooled before the livestock are loaded.
 - The exporter must provide AQIS WA with a completed 'Carriers Maindeck Ventilation Declaration' prior to issuing of the export permit.

8. Results

The exporter has exported three consignments by air following the mortality event with acceptable results (see Table 1).

TABLE 1: Species, number of livestock, mortality count and mortality rate by consignment and destination.

Consignment	Destination	Species	Livestock Exported	Mortality Count	Mortality Rate (%)
1	Singapore	Sheep	1428	2	0.14
		Goats	428	0	0
2	Malaysia	Cattle	211	0	0
		Goats	349	0	0
3	Malaysia	Cattle	169	0	0
		Sheep	198	1	0.5

ATTACHMENT 2: Livestock loaded, mortality count and percentage by pallet position and crate tier.

Pallet Position	Tier	Livestock Loaded	Mortality Count	Mortality (%)
P1	N/A	None	N/A	N/A
P2	N/A	None	N/A	N/A
P3	1	19	0	0.00
	2	19	0	0.00
P4	1	20	3	15.00
	2	19	0	0.00
P5	1	27	4	14.80
	2	27	0	0.00
P6	1	27	1	3.70
	2	27	0	0.00
P7	1	29	0	0.00
	2	33	1	3.03
	3	25	0	0.00
P8	1	28	0	0.00
	2	31	5	16.10
	3	31	0	0.00
P9	1	28	0	0.00
	2	31	0	0.00
	3	31	0	0.00
P10	1	30	0	0.00
	2	32	32	100.00
	3	33	8	24.24
P11	1	28	2	7.14
	2	34	31	91.18
	3	34	18	52.94
P12	1	21	0	0.00
	2	26	16	61.54
	3	26	5	19.23
P13	1	27	0	0.00
	2	31	0	0.00
	3	31	0	0.00
P14	N/A	None	N/A	N/A
P15	N/A	None	N/A	N/A
P16	1	27	0	0.00
	2	20	0	0.00
P17	1	26	0	0.00
	2	26	1	3.85
P18	1	29	2	6.90
	2	30	2	6.67
P19	1	26	0	0.00
	2	31	0	0.00
	3	32	0	0.00
P20	1	28	0	0.00
	2	32	0	0.00
	3	32	0	0.00
P21	1	28	0	0.00
	2	31	1	3.23
	3	31	0	0.00

ATTACHMENT 2: Continued.

Pallet Position	Tier	Livestock Loaded	Mortality Count	Mortality (%)
P22	1	28	0	0.00
	2	35	3	8.60
	3	34	1	2.94
P23	1	29	0	0.00
	2	33	0	0.00
	3	34	0	0.00
P24	1	23	0	0.00
	2	27	0	0.00
	3	26	0	0.00
P25	1	29	0	0.00
	2	33	0	0.00
	3	33	2	6.06
P26	1	27	0	0.00
	2	31	0	0.00
	3	31	0	0.00
P27	1	29	0	0.00
	2	33	0	0.00
	3	33	0	0.00
P28	1	25	0	0.00
	2	31	0	0.00
	3	31	0	0.00
P29	N/A	None	N/A	N/A

ATTACHMENT 3:

CARRIERS MAINDECK VENTILATION DECLARATION

LNC NO:

EXPORTER:

DEPARTURE PORT:

FLIGHT DETAILS:

TYPE OF LIVESTOCK:

NUMBER OF LIVESTOCK:

DATE OF EXPORT:

I,..... being the authorized representative

of..... (Carrier)

1. **Aircraft Operator:** Is the airline approved as per the list below?

Yes/No

Approved Airlines: Qantas Airways, Cathay Pacific, British Airways, Korean Airlines, Air New Zealand, Air Mauritius, Malaysian Airlines, Philippine Airlines, Japan Airlines, EVA, United Airlines, Lufthansa, Singapore Airlines, Martinair, Atlas, Polar Air, Fedex, Air Canada, Garuda, Cargolux, Emirates, Asiana, China Eastern, China Southern, Air China, ANA, Thai Airways, Vietnam Airlines, Virgin Atlantic, Air Bridge Cargo, Air Calin Intl.

2. **Aircraft Type:** (Circle the Aircraft type)

Boeing 737-300, Boeing 747-100, Boeing 747-200, Boeing 747-300, Boeing 747-400, Boeing 757-200, Boeing 767-200, Boeing 767-300, Boeing 777-200, Boeing 777-300, Airbus -A330-200, A330-300, A340-200, A340-300, A340-600, McDonnell Douglas MD11.

3. **Aircraft ECS (Environmental Control System) capability:**

At the estimated time of departure is the ventilation suitable to sustain the animals tendered for carriage, and all packs serviceable for full flow ?

Yes/No

.....

Signature