



**Australian Government**

**Australian Quarantine and Inspection Service**

**Investigation into reportable mortality level for sheep on board an export vessel traveling from Portland, Adelaide to Kuwait, Bahrain, Jebel Ali (UAE) in August- September 2007.**

**1. Purpose**

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

**2. Summary**

The cause of the reportable level of mortalities on board the vessel was investigated. There were 1,251 mortalities of the 59,865 sheep loaded which equates to a mortality rate of 2.09%.

There were two consignments of sheep exported on the voyage. The other consignment did not have a reportable level of mortalities. Overall for the vessel, there were 1,498 mortalities of the 92,398 sheep loaded on the vessel which equates to a mortality rate of 1.62%.

The likely causes of the mortalities were enteritis (consistent with salmonellosis).

**3. Background**

The investigation into the cause of the mortalities was completed by reviewing the following information:

1. AQIS accredited veterinarian's (AAV) end of voyage report.
2. AAV daily reports
3. Report from the exporter.
4. Records from the registered premises.
5. Report by the master of the vessel.
6. Report from the AQIS certifying veterinarian.

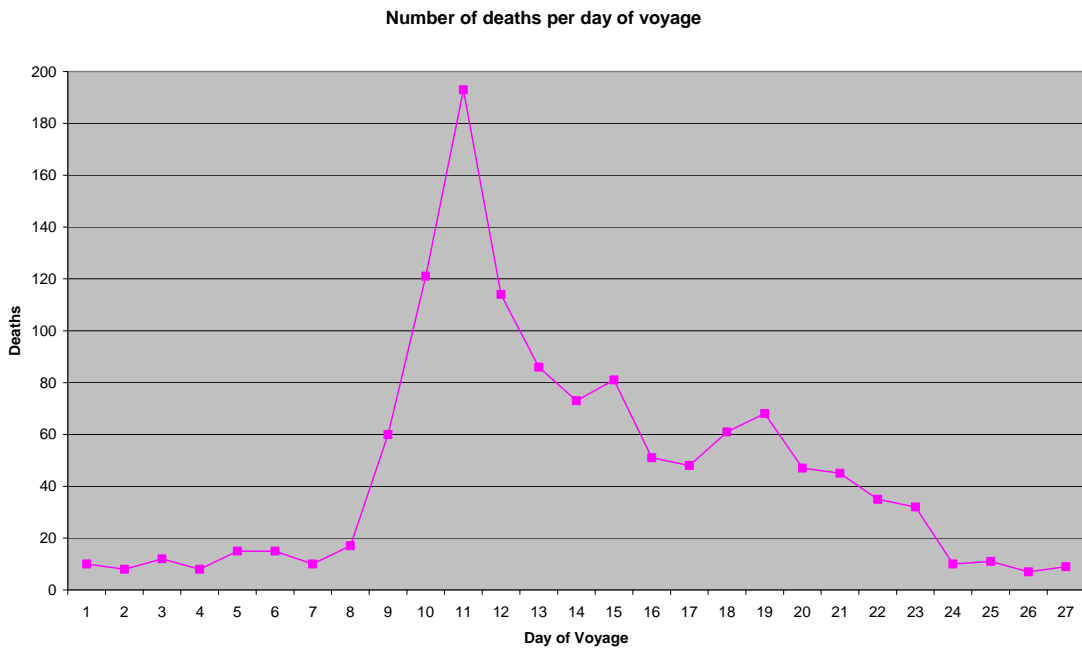
**Table 1: Summary of chronology of events**

<b>Action</b>	<b>Date</b>
sheep loaded in Adelaide	27 & 28 August 2007
sheep unloaded in Kuwait	19 September 2007
sheep unloaded in Bahrain	20 September 2007
sheep unloaded in Jebel Ali	24 September 2007

**Table 2: Chronology of Events**

<b>Dates</b>	<b>Day of Voyage</b>	<b>Action</b>	<b>Cumulative Voyage Mortality Total</b>	<b>Cumulative% Mortalities</b>
25/7/07		NOI/CRMP submitted		
8/8/07		NOI/CRMP approved		
28/8/07		59, 865 sheep loaded in Port Adelaide		
29/8/07	1	10 mortalities	11	0.02%
30/8/07	2	8 mortalities	19	0.03%
31/8/07	3	12 mortalities	31	0.05%
1/9/07	4	8 mortalities	39	0.07%
2/9/07	5	15 mortalities	54	0.09%
3/9/07	6	15 mortalities	69	0.12%
4/9/07	7	10 mortalities	79	0.13%
5/9/07	8	17 mortalities	96	0.16%
6/9/07	9	60 mortalities	156	0.3%
7/9/07	10	121 mortalities	277	0.46%
8/9/07	11	193 mortalities	470	0.79%
9/9/07	12	114 mortalities	554	0.92%
10/9/07	13	86 mortalities	670	1.12%
11/9/07	14	73 mortalities	743	1.24%
12/9/07	15	81 mortalities	824	1.38%
13/9/07	16	51 mortalities	875	1.46%
14/9/07	17	48 mortalities	923	1.54%
15/9/07	18	61 mortalities	984	1.6%
16/9/07	19	68 mortalities	1052	1.76%
17/9/07	20	47 mortalities	1099	1.84%
18/9/07	21	45 mortalities	1147	1.9%
19/9/07	22	35 mortalities	1182	1.97%
20/9/07	23	32 mortalities	1214	2.03%
21/9/07	24	10 mortalities	1224	2.04%
22/9/07	25	11 mortalities	1235	2.06%
23/9/07	26	7 mortalities	1242	2.07%
24/9/07	27	9 mortalities	1251	2.09%
<b>TOTALS</b>			<b>1251</b>	<b>2.09%</b>

**Chart 1: Number of mortalities per day of voyage**



**Table 3: Mortality by deck**

DECK	11U	11 L	10 U	10L	9U	9L	8U	8L	7	6	5	4	Total
DAY													
1	1	0	0	0	3	2	0	0	2	1	1	0	10
2	1	3	1	0	0	1	1	0	0	1	1	0	9
3	1	2	1	2	0	0	2	1	1	1	1	0	12
4	2	1	0	0	0	0	0	0	2	0	0	0	5
5	2	0	4	1	3	0	0	0	2	3	2	1	18
6	2	3	1	0	0	2	0	0	4	2	1	0	15
7	0	7	0	0	1	0	0	0	0	2	0	0	10
8	0	4	3	0	4	1	0	0	4	1	0	0	17
9	8	5	7	2	17	12	0	0	3	3	3	0	60
10	7	10	32	5	49	6	1	0	3	2	6	0	121
11	15	10	54	3	83	1	4	1	5	8	4	5	193
12	5	1	37	0	46	2	0	1	6	7	4	5	114
13	9	2	18	3	39	2	1	0	1	3	5	3	86
14	5	7	17	1	26	0	0	0	6	2	3	6	73
15	7	6	9	0	26	5	0	0	5	5	6	2	71
16	3	5	15	0	24	2	2	0	4	1	5	0	61
17	6	4	8	1	18	0	0	2	4	1	0	4	48
18	3	1	11	0	27	3	1	2	7	1	4	1	61
19	7	5	18	0	16	5	2	1	5	2	3	4	68
20	2	2	7	0	17	3	0	7	4	2	2	1	47
21	6	2	6	0	8	4	1	2	10	4	1	4	48
22	3	6	5	4	2	3	1	1	1	3	2	4	35
23	5	0	13	1	1	3	0	4	5	0	0	0	32
24	2	0	0	0	0	2	1	1	3	0	0	1	10
25	0	0	0	1	0	4	2	0	2	0	0	2	11
26	0	0	0	0	0	3	0	0	4	0	0	0	7
27	0	0	0	0	0	9	0	0	0	0	0	0	9
<b>TOTALS</b>	<b>102</b>	<b>86</b>	<b>267</b>	<b>24</b>	<b>410</b>	<b>66</b>	<b>19</b>	<b>23</b>	<b>93</b>	<b>55</b>	<b>54</b>	<b>43</b>	<b>1251</b>

**Table 4: Mortalities by Cause**

Cause	Enteritis	Enteritis/Inanition	Heat Stress	Down	Trauma	Other	Unknown	Autolysed	TOTAL
#	828	155	3	15	4	9	62	165	1251

## 4. Findings

### 4.1 Registered Premises

The sheep exported were assembled for approximately 8 days at the two registered premises north of Adelaide, from 19 August 2007. The records of the registered premises indicated low mortalities over the preparation period.

The record of rejects indicated that 593 sheep were rejected. The main reasons for rejection were lameness or pinkeye or scouring.

### 4.2 Journey

The overall voyage appeared to travel through the usual range of climatic conditions with mild weather in the southern hemisphere and warm to hot weather in the equatorial and northern regions.

The humidity range was typical for this time of year with no particularly outstanding weather events occurring. Only 3 mortalities being attributed to heat stress out of the 1,251 recorded.

The climatic conditions were as follows:

**Table 5: Climatic conditions**

Date	Dry bulb (°C)	Wet bulb (°C)	Humidity (%)	Daily water consumption (L)	Daily weather conditions from daily reports
29/8/07	17	14	76%	3L	Moderate seas, N wind, 4
30/8/07	14	11	75%	3L	Rough seas, SW wind, 7
31/8/07	17	14	70%	3L	Rough seas, NW wind, 5
1/9/07	19	16	76%	3.5L	Moderate- Rough seas, W wind, 5
2/9/07	21	19	73%	3.5L	Moderate seas, SE wind, 5
3/9/07	24	21	78%	3L	Smooth seas, light air
4/9/07	26	23	76%	3.5L	Slight Seas, SE wind, 2
5/9/07	28	25	77%	3.5L	Moderate seas, SE wind, 4
6/9/07	30	27	80%	3,5L	Moderate seas, SE, 4
7/9/07	30	28	78%	4L	Slight seas, Light breeze
8/9/07	31	29	85%	4.2L	Slight seas, Light air
9/9/07	30	28	84%	3.6L	Moderate seas, W wind, 4
10/9/07	31	29	86%	3.8L	Slight seas, NW wind, 3
11/9/07	31	29	86%	4L	Smooth seas, NW wind, 2
12/9/07	30	28	84%	3.5L	Smooth seas, light air
13/9/07	30	28	84%	3.5L	Slight seas, NW wind, 3
14/9/07	31	29	88%	3.5L	Calm seas, Light air
15/9/07	34	31	81%	4L	Calm seas, Light air
16/9/07	34	27	57%	3.5L	Calm seas, Light air
17/9/07	35	26	45%	3.5L	Calm air, Light air
18/9/07	34	25	47%	3L	Calm seas, Light air
19/9/07	33	27	61%	3.5L	Slight seas, NW wind, 2
20/9/07	36	30	61%	3.5L	Slight seas, light breeze

21/9/07	31	29	86%	3.5L	Slight seas, light breeze
22/9/07	35	28.5	60%	3.5L	Slight seas, light breeze
23/9/07	34	29	68%	3.5L	Smooth seas, Light air

The figures reported are averages across the decks.

The reportable mortality trigger for a long haul sheep voyage is 2 per cent. The reportable mortality level was triggered on 20 September 2007. Enteritis (consistent with salmonellosis) and enteritis combined with inanition was the cause of the mortalities

A shortage of fodder was apparent from day 15 of the voyage. Additional fodder was consumed during the first 14 days because of the automatic feeding equipment. Fodder restrictions were implemented in the latter part of the voyage. Additional fodder (120 tonnes) was loaded after arrival in Kuwait from days 19-21.

A significant proportion of the mortalities were experienced in pastoral sheep that were sourced from the pastoral zone around Broken Hill. These sheep formed part of a LESAC agreed trial to determine whether sheep sourced from pastoral zones are more susceptible to on-board illness and mortality. The current standards do not permit sheep sourced from pastoral zones to be exported between May and October unless the sheep have been prepared in sheds.

#### **5. AMSA evaluation of the vessel upon return to Australia**

As the overall ship board mortality did not exceed 2%, this was not a reportable mortality for the purpose of an AMSA investigation. However, as the mortality was high, AMSA did follow it up with the vessel's Master who confirmed the high mortality level was due to an enteritis (consistent with salmonella) outbreak. As there were no issues relating to Marine Order 43, no further action was taken at this time. The vessel was subsequently inspected on 8 October 2007 and no issues with the livestock service were noted that would have contributed to the event.

#### **6. Conclusion**

The likely cause of the mortalities was primarily due to enteritis (consistent with salmonellosis) with a secondary complication of inadequate daily fodder allowance after day 15 of the voyage.

The shortage of fodder was partially addressed in Kuwait with the loading of a further 120T of fodder. However the additional fodder was not obtained early enough to prevent rationing of feed. Feed restriction compromises immunity to salmonellosis.

The sheep sourced from the pastoral area had a significantly higher mortality rate than from non pastoral areas.

#### **7. Recommendations**

LESAC to consider whether ASEL fodder contingency is adequate for multi port loading and discharges.

Research and Development is undertaken into the appropriate on board management of an outbreak of enteritis (consistent with salmonellosis).

The livestock export standards advisory committee consider if the mandatory time in the registered premises is:

- . adequate for adaption to shipboard ration
- . adequate to detect a potential outbreak of enteritis (consistent with salmonellosis).

## 8. Actions

The investigation report was forwarded to the Livestock Export Standards Advisory Committee.

The following consignments had additional conditions for the exporter:

- An extra 10% of space on board the vessel is provided for the sheep above the ASEL or heat stress risk assessment

The outcome of the voyages with additional conditions is as follows:

Number loaded	Number mortalities	Mortality rate
55,842	335	0.6%
20,080	150	0.75%
67,987	849	1.25%