Attachment B

MORTALITY INVESTIGATION REPORT 42: INVESTIGATION INTO REPORTABLE BUFFALO DEATHS IN A SEA VOYAGE FROM DARWIN TO INDONESIA, 25 OCTOBER–1 NOVEMBER 2011

1. SUMMARY

Eight buffalo died in a consignment of 452 buffalo exported via sea from Darwin to Indonesia on 25 October–1 November 2011, which equates to a mortality percentage of 1.77%. In the same consignment, 2,533 cattle were also exported from Darwin to Indonesia. There were 3 deaths in the cattle, which equates to a mortality rate of 0.12%.

This investigation reports only on the deaths in the buffalo, which exceeded the reportable mortality rate of 0.5% for short-haul voyages prescribed by the *Australian Standards for the Export of Livestock* (ASEL). The cattle did not exceed the reportable mortality rate.

The investigation could not definitively establish causes of the deaths because of a lack of information. The exporter suggested Bovine Ephemeral Fever (BEF) as the cause of the deaths; however, there is not enough evidence to confirm this suggestion.

The exporter did not report the mortality incident to DAFF within the timeframe of 12 hours prescribed in Standard 5.11 of the *Australian Standards for the Export of Livestock v 2.3* (ASEL).

The report makes three recommendations including:

A minor non compliance be recorded against the exporter, for failing to notify DAFF of a reportable mortality incident within 12 hours of it occurring.

The exporter's procedures for instructing accredited stockmen in record-keeping, and on the exporter's procedures for informing DAFF of a reportable level of mortalities be audited.

The end of voyage report template should be amended to require the individual identification of cattle and buffalo, the treatments received and the deaths that occurred.

2. INFORMATION REVIEWED

DAFF investigated the deaths by reviewing the following information:

1. Report and correspondence from the exporter
2. End-of-voyage and daily reports from the accredited stockman on board the vessel
3. Records from the AQIS Accredited Veterinarian (AAV) who prepared the consignment
4. End-of –voyage report from the master of the vessel
5. Correspondence from the registered premises
6. Reports from the DAFF Biosecurity regional certifying officers
7. Correspondence from the Australian Maritime Safety Authority.

3. INFORMATION FINDINGS

Since late 2005, 56 consignments totalling 16,767 buffalo have been exported to Indonesia. All consignments departed from Darwin. A total of 38 deaths have occurred during these export events, which equates to an overall mortality rate of 0.23%. No reportable mortality incidents had occurred before the incident being examined in this report.

The exporter had previously exported 1,291 buffalo in four consignments from Australia to Indonesia with no deaths.

3.1. Pre-export preparation in the registered premises

The buffalo were prepared in a single registered premises near Darwin. The buffalo were assembled in the premises between 30 and 3 days before export. There were no buffalo deaths during the assembly period.

Cattle in the consignment were prepared in the same premises. One cattle death occurred during pre-export preparation. The registered premises operator suggested BEF as the cause but there is no evidence to support this.

The exporter informed DAFF that no rain was recorded at the premises in the pre-export preparation period. A weather station in the same region reported that rain occurred on 7 days during the 30 day preparation period, totalling 35mm (Bureau of Meteorology 2012).

The AAV inspected the buffalo the day before loading. The AAV was satisfied with the general health and welfare of the buffalo; they were free from signs of disease and external parasites and fit to travel. The DAFF officer who attended the property did not find any issues at the time of inspection.

The Indonesian import requirements for feeder buffalo require vaccination against clostridial disease, leptospirosis, botulism, and treatment for internal and external parasites. The buffalo in this consignment were vaccinated and treated for internal and external parasites under supervision of the AAV on the day of export.

3.2. Loading onto the vessel

The report from the DAFF officer present indicated that loading was uneventful. No buffalo were removed from the consignment for health or welfare reasons.

3.3. Conditions during the voyage

Temperature, humidity and heat stress

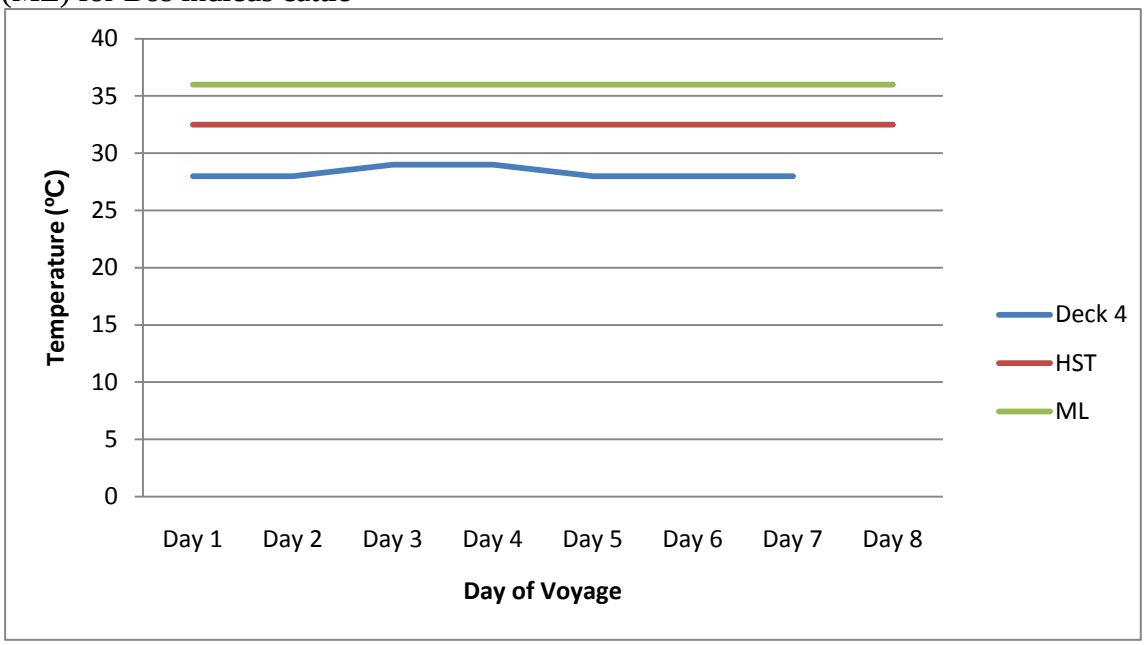
The stockman's daily reports for the voyage showed an ambient dry bulb temperature for the deck containing the buffalo of 31–32 ºC and an ambient wet bulb temperature of 28–29 ºC. Humidity was constant at 80%. The stockman report indicated that cattle showed none to mild signs of heat stress.

The heat stress threshold (HST) is the maximum ambient wet bulb temperature at which an animal can control its deep body temperature using normal physiological mechanisms of heat loss, such as panting, sweating, and shunting blood to large skin areas such as the ears. The mortality limit (ML) is the wet bulb temperature at which the animals will start to die. As there was no available data for buffalo, DAFF assessed the conditions against the known *Bos indicus* HST and ML. Note that buffalo are not cattle from the genus *Bos*, but are *Bubalus*

bubalis. The estimated HST is 32.5 °C for adult *Bos indicus* cattle. The estimated ML is 36.0 °C for adult *Bos indicus* cattle (Maunsell Australia Pty Ltd 2003).

Figure 1 shows that the wet bulb temperature did not exceed the HST at any time during the voyage.

Figure 1: Wet bulb temperature by day; heat stress threshold (HST) and mortality limit (ML) for Bos indicus cattle



The vessel stopped at sea for one day to undertake engine repairs. The exporter has informed DAFF that all the ship's systems, including ventilation, remained in operation during this time. The engine repairs did not affect the health and welfare of the livestock and the wet bulb temperature and level of heat stress reported by the stockman did not increase on that day.

Deck conditions

Deck conditions were initially dry, but on the day before arrival the decks were noted by the stockman to be wet to very wet, and in need of cleaning. The exporter has advised that the Captain was not allowed to clean the decks due to the close proximity to land.

Treatments administered and management of livestock during the voyage

During the voyage, the accredited stockman who accompanied the consignment administered anti-inflammatories (dexamethasone), antibiotics (oxytetracycline) and an injectable calcium, magnesium, phosphorus and glucose supplement to ill buffalo, and also to cattle that showed similar symptoms (see section 4.5). Several livestock that showed signs of illness were moved to sick pens for monitoring and treatment. The stockman reported that some affected livestock seemed to temporarily responded to the mineral supplement, and did not respond to other treatments given.

3.4. Buffalo illness during the voyage

The stockman's end of voyage report described approximately 12 buffalo as becoming lethargic with lowered heads, and in some cases the eyes became puffy. Approximately 8 buffalo were isolated in sick pens and still would not eat or drink. Approximately 7 buffalo eventually became too weak to stand. Deaths first occurred on Day 5 of the voyage.

The recumbent buffalo were treated as per the Stockman's cattle handbook general recommendations for downer animals.

3.5. Buffalo deaths during the voyage

There were 8 deaths out of 452 buffalo loaded, which equates to a mortality rate of 1.77%.

A chronology of events based on the daily voyage reports sent to the exporter, and information from the exporter is set out in Table 1. The reportable mortality level of 0.5% for the buffalo was triggered on day 7 of the voyage.

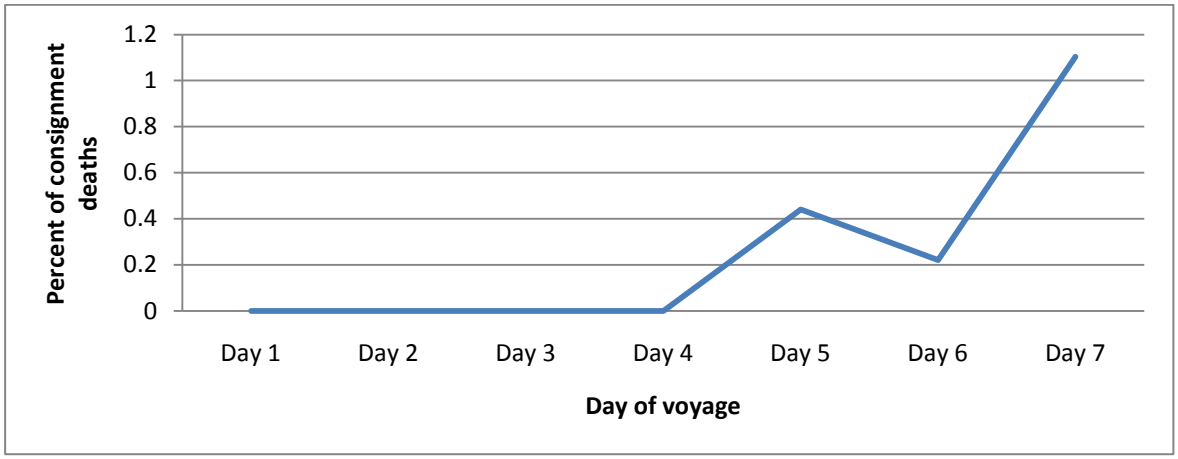
Table 1: Chronology of buffalo mortalities during voyage

Day	Events	Daily deaths	Cumulative deaths	Cumulative mortality rate%
1	Departed Darwin.	0	0	0%
2		0	0	0%
3		0	0	0%
4		0	0	0%
5	First buffalo mortalities occurred	2	2	0.44%
6	Ship stopped for engine repairs	0	2	0.44%
7	Preparing for arrival	1	3	0.66%
8	5 buffalo euthanased. Livestock discharged.	5	8	1.77%

Deaths per day

The first death occurred on day 5 of the voyage. Five of the eight deaths occurred on the final day, when the stockman euthanased recumbent buffalo while the vessel was unloading – two which were rejected by the importing country and three which were physically unable to be discharged due to their clinical signs.

Figure 2: Daily mortality percentage (not cumulative)



Deaths and property of origin

Buffalo were sourced from four properties of origin. The mortality rate for each property of origin is set out in Table 2.

Table 2: Properties of origin of buffalo and mortality rate

Property of origin	Number of buffalo sourced	Number of deaths	Mortality rate
1	298	6	2%
2	16	0	0%
3	46	0	0%
4	93	2	2.2%

All the deaths were traced to two of the four properties of origin.

Deaths by deck

The buffalo were loaded on the same deck, Deck 4. Mortalities were not focused on any particular area of the deck.

3.6. Daily reports from the accredited stockman

ASEL does not require the exporter to provide daily reports to DAFF for voyages of 10 days or less. Daily reports were submitted to DAFF for this consignment that contained combined buffalo and cattle mortality figures, without separation of mortality information by species. These daily reports showed that buffalo appeared to develop clinical signs from day 2 onwards. Treatments were given as detailed in section 3.3. The stockman's end of voyage report mentioned that the buffalo became lethargic and several developed swollen eyes. After being isolated to sick pens several buffalo were still reluctant to eat. Seven buffalo eventually become recumbent, including those that were euthanased.

3.7. Discharge

A daily report was not available for the day of discharge. There is no requirement in the ASEL for a daily report to be provided for voyages less than 10 days in length. The exporter reported that on the day of discharge, five buffalo were euthanased as they were unable to be discharged due to ill health.

3.8. AMSA evaluation of the vessel upon return to Australia

The next scheduled pre–-loading inspection of the vessel by AMSA on 16 January 2012 at Portland did not find any apparent deficiencies in the livestock services of the vessel.

4. EVALUATION

4.1. Cause of death

A lack of information has limited this investigation into the cause of the buffalo deaths. There was no information on buffalo class, gender or age, and no postmortem information.

The stockman did not do postmortem examinations of buffalo that died or were euthanased. The buffalo that died or were euthanased all showed similar clinical signs before death, suggesting a common cause, or causes, of death.

Five of the eight buffalo deaths were due to euthanasia by the stockman, because the buffalo were showing the same clinical signs as the buffalo that died en route and had become recumbent, and were not able to be discharged.

The exporter indicated from their own investigation that bovine ephemeral fever (BEF) may have caused the deaths. BEF is also known as ‘three day fever’ and has been reported in buffalo (Zaher &Ahmed 2011). BEF is transmitted by several species of mosquitoes and biting flies; it is not spread directly from animal to animal. BEF causes fever, with general lethargy and may progress to inappetance, stiffness and lameness. Nasal and ocular discharges, and in some cases patchy subcutaneous oedema of the head (particularly around the eyes), may develop. Recumbency may develop and progress to death (St George 2004).

The reported clinical signs of the buffalo that died or were euthansed are consistent with BEF. There was no evidence of unusually high BEF occurrences during September or October 2011 at the National Arbovirus Monitoring Program (NAMP) monitoring sites in the Northern Territory. There is not enough information to confirm that BEF, or any other infectious disease, caused the buffalo deaths.

The mortality threshold was exceeded on day 7 of the voyage (31 October 2011) and the exporter did not inform DAFF of this until 4 November 2011 which is a breach of the requirement of ASEL s5.11 that the exporter inform DAFF within 12 hours. Notification of DAFF within the required timeframe may have allowed DAFF to request additional information, such as the collection of post-mortem pictures or samples, or for the exporter to seek further advice. It is uncertain if this would have made a difference to the outcome of the investigation.

4.2. Property-of-origin factors

All buffalo that died originated from one of two properties of origin. Those properties provided 86% of the exported buffalo.

There is no evidence to determine whether property-of-origin factors contributed to the mortality rate.

4.3. Registered premises factors

The weather conditions did not markedly change during the time the buffalo were being prepared in the registered premises. There were no reports of any illness, and no deaths among the buffalo during their time in the registered premises.

There do not appear to have been any registered premises factors that contributed to the mortality rate.

4.4. Vessel factors

The vessel stopped at sea for one day for engine repairs; however, the exporter informed DAFF that there was no interruption to any livestock services.

All the buffalo were accommodated on a single deck, and the deaths did not seem to be associated with a particular part of that deck.

It is unlikely that vessel factors contributed to the mortality rate.

4.5. Weather during the voyage

Dry bulb and wet bulb temperatures and humidity on board the vessel remained near-constant throughout the voyage. The wet bulb temperature remained below the HST and ML for *Bos indicus* cattle and heat stress is unlikely to have contributed to the deaths. There are no reports of any adverse weather during the voyage.

4.6. The accredited stockman

The stockman treated sick buffalo with anti-inflammatory drugs, antibiotics and vitamin/mineral supplements, and separated them in sick pens as recommended for treatment of downer cows by the *Stockman's handbook* (LiveCorp 2008).

Improved record keeping, such as listing buffalo and cattle deaths separately in daily reports to the exporter, would have assisted this in the investigation, but record keeping did not contribute to the mortality rate.

There is no evidence that the accredited stockman failed to perform his duties.

5. OVERALL CONCLUSIONS

The cause of the clinical signs and subsequent deaths in the buffalo cannot be determined with any certainty.

The exporter breached s5.11 of ASEL by not informing DAFF of the reportable mortality until 4 days after the event.

6. ACTIONS FOR SUBSEQUENT VOYAGES

The exporter elected not to export any more buffalo until completion of their own internal investigation. At the time of finalisation of this report, the exporter has exported no more buffalo.

The exporter informed DAFF they would require all buffalo be vaccinated against ephemeral fever before future exports. An APVMA-registered vaccine is available for cattle. DAFF notes that it is likely that the exporter will need to apply to the APVMA for a permit for use of this product on buffalo.

The exporter provided DAFF with examples of revised daily and end-of-voyage report templates designed to avoid miscommunication of mortality events in the future.

Several steps were taken for the next consignment of cattle exported to from Darwin to Indonesia on board the same vessel:

- the accredited stockman was briefed on the previous mortality incident
- additional anti-inflammatory drugs were loaded by the exporter
- the exporter submitted daily voyage reports to DAFF for this voyage.

This voyage reported a mortality rate of 0.03%, which is below the reportable level, and also below the long-run average mortality rate for consignments of cattle exported from Darwin to Indonesia. This consignment did not include any buffalo and so few conclusions can be drawn as to the efficacy of the actions taken.

7. Recommendations

1. A minor non compliance be recorded against the exporter, for failing to notify DAFF of a reportable mortality incident within 12 hours of it occurring.
2. The exporter's operations and governance manual will be audited by DAFF, with emphasis on:
    - procedures to instruct accredited stockmen to keep adequate records of illness and treatments
    - procedures to inform DAFF of a reportable level of mortalities.
3. The end of voyage report template should be amended to require the individual identification of cattle and buffalo, the treatments received and the deaths that occurred. This would contribute to better analysis of the cause of deaths for future investigations. Ideally this should include the following information:

Record of treatments

Animal ID Visual / RFID	Location Deck / Pen	Date of treatment	Treatment(s) administered		Reason for treatment	Treatment outcome
			Drug	Dose		

Animals that die during the voyage should be recorded in a similar way:

Record of deaths

Animal ID Visual / RFID	Location Deck / Pen	Date of mortality	Post mortem findings	Causes of death

Attachment B

This information should be provided to DAFF as attachments to the end-of-voyage report.

8. REFERENCES

Middle Point (Humpty Doo), Northern Territory September 2011 Daily Weather Observations, Australian Government Bureau of Meteorology, viewed 5 March 2012, http://www.bom.gov.au/climate/dwo/201109/html/IDCJDW8033.201109.shtml

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