



# **AIR QUALITY DURING THE JOURNEY ON CAMARA NUSANTARA SHIP**

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Outline

Introduction

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Result and  
Discussion

Conclusion

# Regulation of the Minister of Transport of the Republic of Indonesia No. 30 of 2018 about Ship Operating Subsidies Livestock Event



**The benefit of the implementation of sea transportation for livestock is the efficiency of shipping time, moreover the source of local cattle in Indonesia is located in the eastern region.**

**INTRUDUCTION**



- Air quality is the level of clean air pollution (Zhang, 2005).
- The impact of the accumulation of livestock waste produces odors that become air pollution during the trip.



## **INTRODUCTION**

**THE OBJECTIVE OF THIS RESEARCH WAS:**

- ANALYSIS OF AIR QUALITY PER DECK OF THE SHIP DURING THE TRIP ON THE CAMARA NUSANTARA SHIP,**
- INFORMS THE THRESHOLD VALUE OF THE CONCENTRATION OF EACH GASES**

# MATERIALS AND METHOD

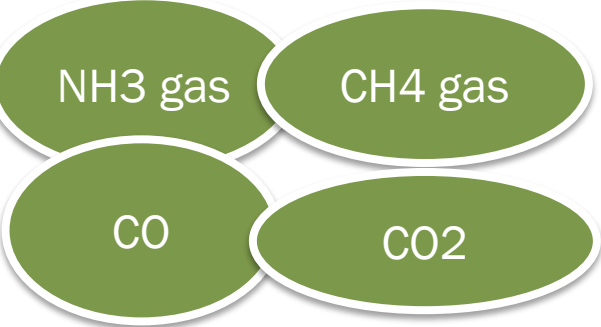
## Sampling Methode

Sampling using Bali cattle (from Kupang) which are ready to be sent to Jakarta. Long journey from Kupang to Jakarta for 5 days. During the trip, air quality measurements occur three times a day. Measurements begin at 9 am, 12 pm, and 4 pm local time.

# MATERIALS



Bali Cattle



# Tools



ANEMO METER

AMONIA DETECTOR



AIR METER

METAN DETECTOR



# MATERIALS AND METHOD

## AIR VELOCITY ANALYSIS

- Use mathematic conversion formula
- **Marine Order 43 (Cargo and cargo handling – livestock) 2018**

### Gases analysis

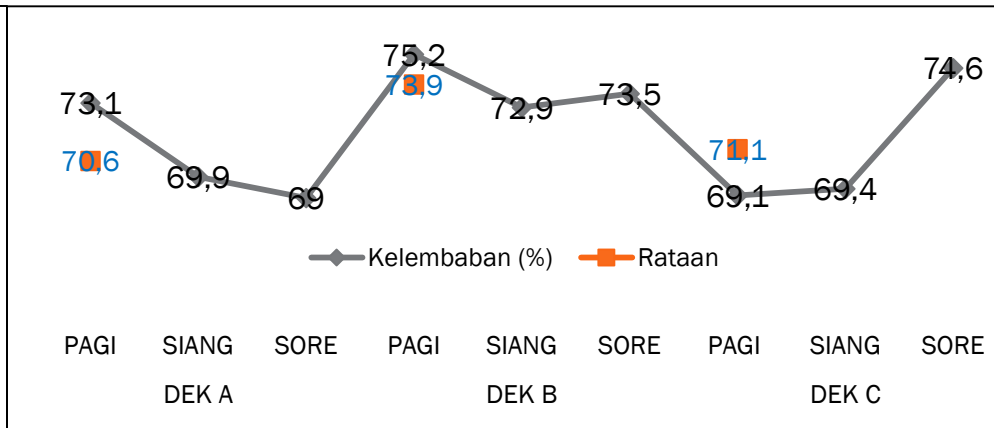
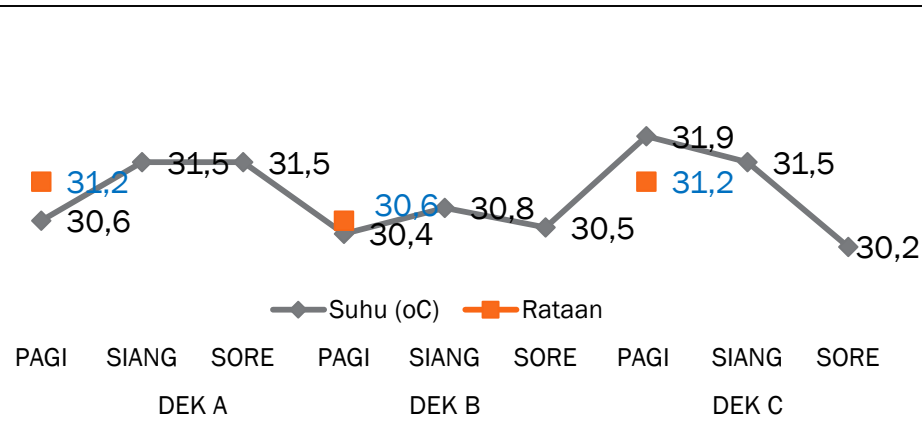
#### Threshold Value of gases:

- Australian Standart Export on Livestock , 2011
- Banhazi T and McCarthy M, 2016
- National Standart of Indonesia, 2005

This research was conducted observatively. The data obtained was processed descriptively by looking at the relationship between objects with supporting factors

## MATERIALS AND METHOD

Graptic 1 & 2. The temperature and relatif humidity of the cage on the ship during the trip

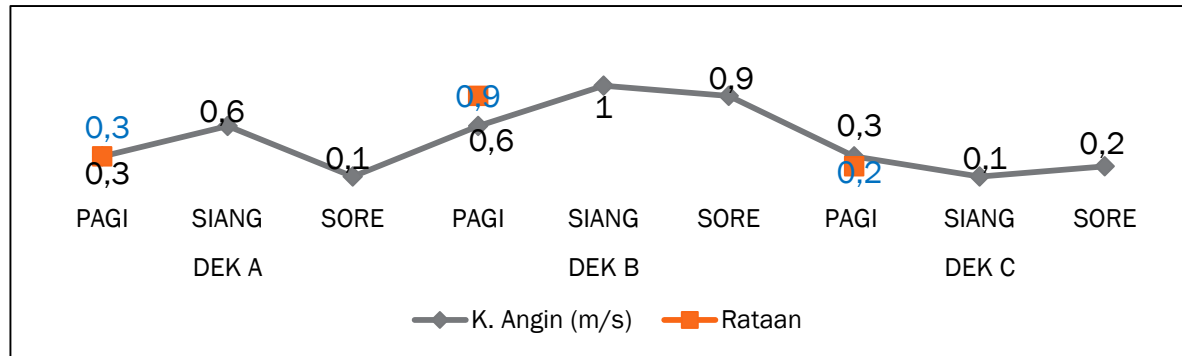


The optimum temperature for Bali cattle enclosure range 25-26 °C. (Praks, 2013)

the magnitude of the measured relative air humidity inside the enclosure contingent upon a source of moisture, wind speed and air temperature as controlling the rate of evaporation (Nuriyasa 1991)

## RESULT AND DISCUSSION

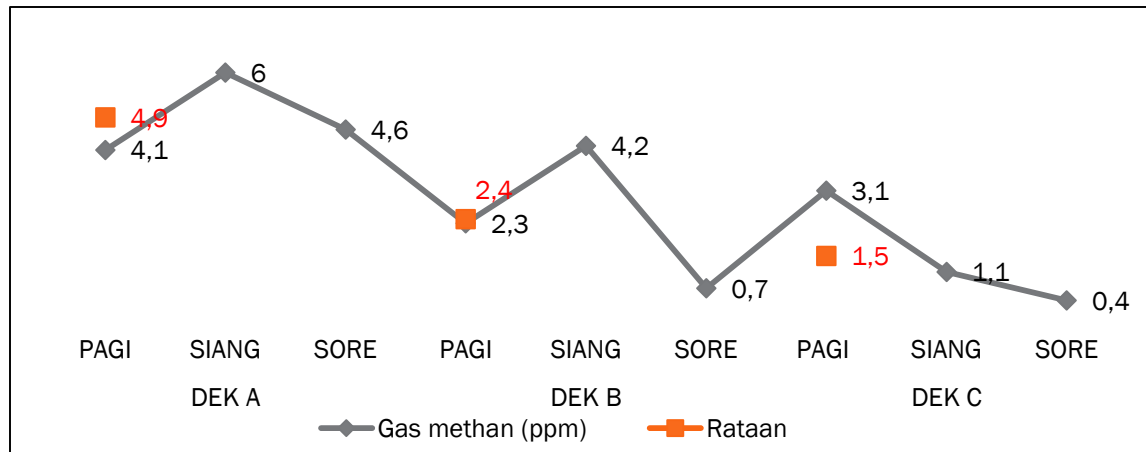
Grapic 3. The air velocity of the cage on the ship during the trip



For a vessel constructed or converted for the carriage of livestock after 26 May 2004 – the mechanical ventilation system must provide air from a source of supply, with a velocity across a pen of at least  $0.5 \text{ ms}^{-1}$ . (**Marine Order 43 (Cargo and cargo handling – livestock) 2018**)

## RESULT AND DISCUSSION

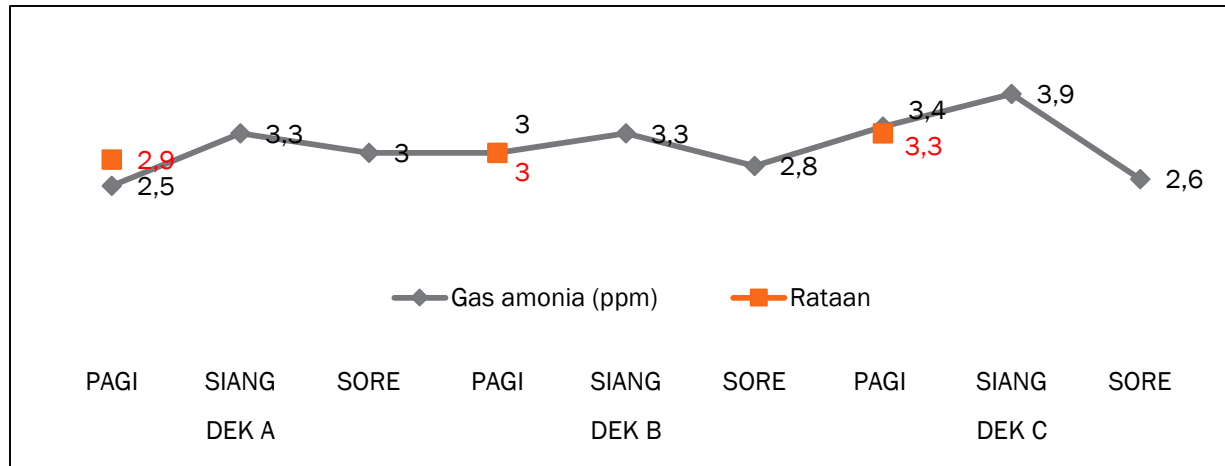
Graptic 4. Analysis methane gas of the cage on the ship during the trip



- The threshold value (NAB) of methane gas according to SNI (2005) is not yet available for standard setting, especially for ships
- Agriculture Food and Rural Development (2004) states the threshold of methane emissions amounted to 1.000 ppm for eight hours

## RESULT AND DISCUSSION

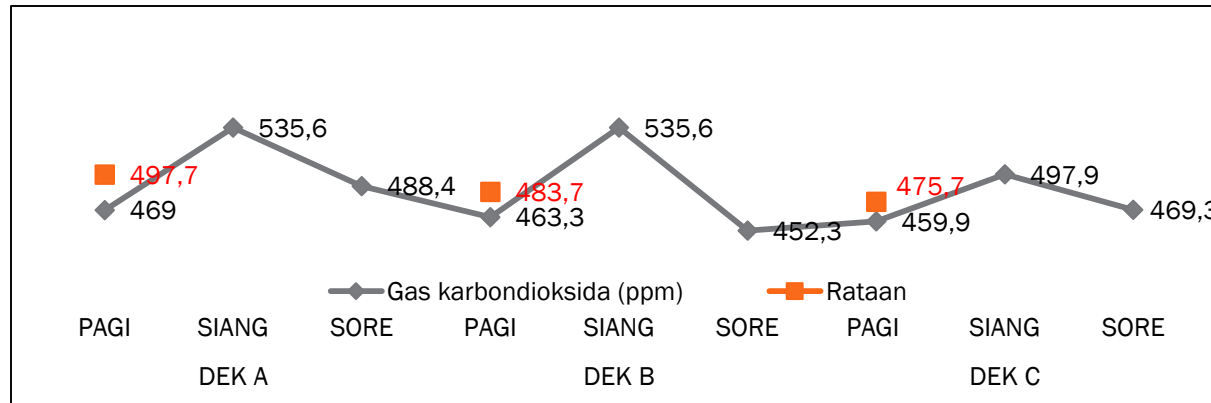
Graptic 4. Analysis ammonia gas of the cage on the ship during the trip



- According to ASEL (2011) the threshold gas of Ammonia is 25 ppm.
- Ammonia is produced from urease enzyme activity that breaks down urea in the faeces and urine concentration is affected by ambient temperature, urine concentration and pH level in the enclosure (Arogo et al. 2001; Pines and Philips, 2011).

## RESULT AND DISCUSSION

Grapic 5. Analysis carbondioxide gas of the cage on the ship during the trip



- Barber et al. (1993) suggest CO<sub>2</sub> existence can be monitored as an indicator of the efficiency of ventilation
- The source of CO<sub>2</sub> gas production on the deck mostly comes from the natural results of the respiratory system and animal metabolism. CO<sub>2</sub> emissions by livestock directly related to the body's metabolic activity (Meat and Livestock Australia, 2001).

## RESULT AND DISCUSSION

The air quality of each deck is influenced by several factors, namely the ventilation system, ventilation openings, livestock density, gas evaporation, gas properties, and the type of feed provided. The quality of each deck is different and has advantages and disadvantages.

**Conclusion**

- [ASEL] Australian Standards for the Export of Livestock. 2011. *Australian Standards for the Export of Livestock (version 2.3) 2011 and Australian Position Statement Export of Livestock*. Canberra (AU): Australian Government Department of Agriculture, Fisheries and Forestry.
- SNI. 2005. Nilai Ambang Batas. Jakarta (ID)
- Regulation of the Minister of Transport of the Republic of Indonesia No. 30 of 2018 about Ship Operating Subsidies Livestock Event
- Pines MK dan Philips CJC. 2011. *Accumulation of ammonia and other potentially noxious gases on live export shipments from Australia to the Middle East*. Australia (AU): University of Queensland, Center for Animal Welfare and Ethics, School of Veterinary Science.

## REFERENCE

# LAYOUT KAPAL

