



## A Retrospective Study on Post-arrival Mortality Rate of Australian Boer Goats in a Breeder Farm in Malaysia

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### ABSTRACT

Post-arrival mortality pattern and the causes of those mortalities were studied in a Boer goat breeding farm in Malaysia. The farm was established in October 2005, following an importation of 597 breeder Boer goats from Australia. Further importations of 534 Boer goats were made in July 2007, and 166 goats in March 2008. Farm records covering the period between October 2005 and December 2008 were analyzed for monthly mortality pattern with special attention on the post-arrival weeks. Upon arrival, goats were provided with vitamins, anti-stress and antibiotic cover. They were fed with cut grasses and supplemented with goat pellets at 350g/goat/day. Drinking water was also available *ad libitum*. During the study period of 2005 to 2008, there were significantly ( $p < 0.05$ ) higher rates of annual mortality during rainy months (7%-14%) as compared to dry months (2%-5%). Meanwhile, the post-arrival mortality showed an average of 27%, ranging between 13% and 43%, of the Boer goats died during the first 6 weeks of post-arrival. In particular, the goats arriving in the rainy months of October 2005 and March 2008 showed higher post-arrival mortality than those arriving in the dry month of July 2007. The post-arrival mortality pattern revealed a gradual but significant ( $p < 0.05$ ) increase as early as week 1, with an average of 5% mortality to reach peak at week 3 with 35% mortality before it gradually decreased to 6% at week 6 and 3% at week 7. The major causes of post-arrival mortalities were pneumonic manheimiosis and helminthiasis, which were associated with the stresses of handling, loading and unloading during shipment.

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### INTRODUCTION

The goat industry in Malaysia, with approximately 200,000 goats that are kept

mainly by smallholders, is rather small-scaled as it is supplying only 8% of the local demands for chevon (Aziz, 2007). Therefore, Malaysia has spent approximately RM5.8 million (USD1.7 million) annually to import livestock products, including goats and its products to fulfil this demand (Aziz, 2007). In trying to reduce the cost of importation of livestock products, the Malaysian government decided to enhance its livestock industry in 2005 (Ibrahim *et al.*, 2006). The first step taken towards enhancing the industry was to increase the cattle and goat populations to approximately 1 million heads respectively by 2010 through the breeding programme (Ibrahim *et al.*, 2006). Thus, importation of goats to increase the number of breeders, particularly Boer goats was started in 2006 from various goat-producing countries, particularly from Australia (Aziz, 2007). Currently, there are a total of 360,000 heads of goats in Malaysia with 56,000 Boer goats (DVS, 2008). This paper reports the post-arrival mortality pattern and the major causes of the mortality observed among the newly arrived Boer goats at a breeder farm in Malaysia.

## MATERIALS AND METHODS

### *Study Population*

This study was conducted at a Boer goat breeder farm that was established in 2005, following an importation of 597 Boer goats from Australia. The study was carried out for a period of 39 months, i.e. between October 2005 and December 2008, within which the period Boer goat importations took place 3 times, and it involved a total

of 1,297 heads of breeder Boer goats. All the imported goats were subjected to disease status and quarantine as required by the authority. At the end of the study period in December 2008, the farm consisted of approximately 1,500 goats of various ages that were kept in 9 slatted-flooring houses for tropical goat rearing (Jansen & van den Burg, 2004). Each house was able to keep between 100 and 300 goats with floor space of approximately 12ft<sup>2</sup>/goat. Water was available *ad libitum*, while feeding regime consisted of cut grasses at the rate of 2kg/goat/day and supplemented with goat pellet at the rate of 300-400g/goat/day. During non-raining months, the goats were allowed to graze between 11 a.m. and 3 p.m.

### *Study Protocol*

The study was started by analyzing the farm records for the period between October 2005 and December 2008 to obtain the monthly mortality pattern. Special attention was given to the post-arrival mortality pattern of the newly arrived Boer goats which arrived in October 2005 (597 goats), July 2007 (534 goats) and March 2008 (166 goats). The post-arrival mortality study period was 7 weeks, i.e. the period when mortality was observed before it returned to pre-arrival rate.

Meanwhile, post-mortem examinations were carried out on all dead goats. Appropriate samples were collected and processed for identification of the agents, particularly bacteria and parasite. The causes of the post-arrival mortalities for all cases were also noted and analyzed.

*Statistical Analysis*

The mean rates of mortality at different times of shipment were compared using the analysis of non-variance and LSD All-Pair-wise Comparison Test (Statistix 9, USA). Pearson’s correlation (Statistix 9, USA) was also selected to determine the correlation between the rainy and dry months. All the data were considered as significant at  $p < 0.05$ .

**RESULTS**

*Mortality Pattern*

Fig.1 reveals the general monthly mortality pattern among the goats in the farm during the study period of 2005 to 2008. It revealed significantly ( $p < 0.05$ ) higher rates of mortality (i.e. between 8% and 11%) during the rainy months of March to June and in October to December (i.e. between 7% and 14%) each year. The average monthly mortality in 2005 was significantly ( $p < 0.05$ ) higher at 10.1% compared to only 3.8%,

3.9% and 2.5% respectively in 2006, 2007 and 2008 (see Fig.1).

An average of 27% (ranging between 13% and 43%) of the newly arrived Boer goats was found to die within the first 6 weeks post-arrival. Meanwhile, the arrivals during the rainy months in 2005 and 2008 showed higher post-arrival mortality at 43% and 24%, respectively, as compared to merely 13% mortality following the arrival during the dry month in 2007. Following the analysis of the three shipments, an average of 5% newly arrived goats died in week 1, 6% in week 2, 35% in week 3, 31% in week 4, 18% in week 5 and 6% in week 6. These mortalities were significantly ( $p < 0.05$ ) higher than that of the pre-arrival period of week 0 (2.1%) (see Fig.2).

*Causes of Mortality*

The post-arrival mortalities were due to several major causes. In more specific, about 30% were due to pneumonia associated with infection by *Mannheimia haemolytica*,

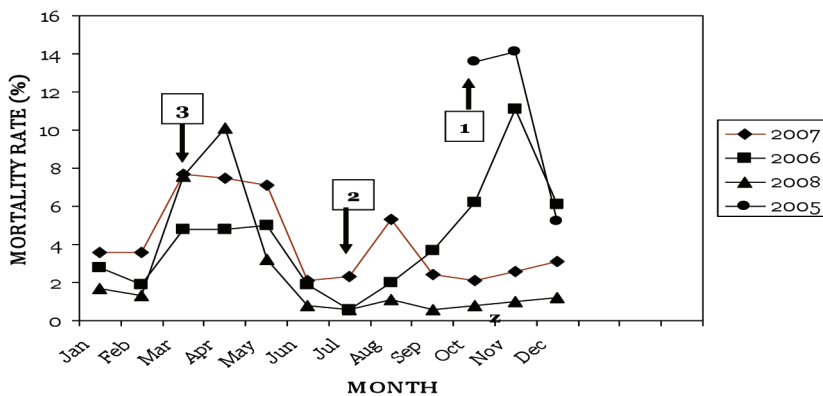


Fig.1: The monthly mortality rate of Boer goats between October 2005 and December 2008. There were significantly ( $p < 0.05$ ) higher rates during the rainy months of April to June and October to December each year. 1= first importation in October 2005, 2= second importation in July 2007 and 3= third importation in March 2008

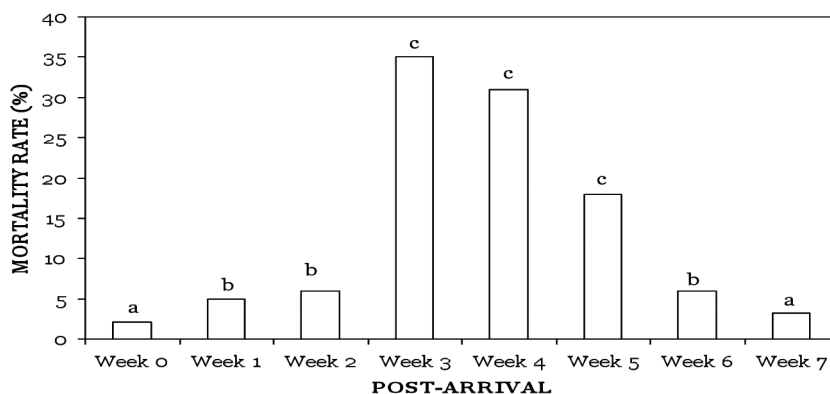


Fig.2: The weekly pre- and post-arrival mortality of goats in Malaysia. Mortality started as early as week 1 post-arrival and peaked in week 3 post-arrival before it slowly declined to pre-arrival rate in week 7 post-arrival. Different letters represent significant ( $p < 0.05$ ) differences.

29% were due to haemonchosis, 25% were due to complications associated with non-infective abortions, 10% were due to general weakness as a result of malnutrition, 4% were due to bloat following changes in diet and 2% were due to urinary calculi.

## DISCUSSION

This study revealed a high average monthly mortality in 2005 compared to 2006, 2007 and 2008. This is believed to be due to the inexperience in handling the newly arrived goats at the farm, which was established in 2005. There were evidences of poor feeding regime and the absence of basic disease control protocol.

A literature search on the pattern of post-arrival mortality among the imported goats had been futile. Nevertheless, it is well accepted that adaptation period leads to high mortality (Alexandre & Mandonnet, 2005). The post-arrival mortality pattern observed in this study is believed to be associated with the stress due to handling,

loading and transportation. This is in agreement with Minka *et al.* (2009), who found that handling was the most stressful time as compared to loading and unloading, particularly post-transportation. The stressful effects were further influenced by the arrivals during the rainy months (Scott, 2011). Although mortality was significantly higher as early as 1 week post-arrival, the majority of mortalities were observed in weeks 3 to 5 of post-arrival, before the mortality was reduced significantly in week 6 and back to almost pre-arrival rate in week 7. The average of 27% mortality within the first 6 weeks post-arrival is similar as the 25% mortality of the imported Dorset Horn sheep into Malaysia (Fatimah *et al.*, 1985). It seemed that during acclimatization, the energy expenditures by goats were affected, particularly during the first 8 weeks (Patra *et al.*, 2008) and this led to severe shipping stress (Kannan *et al.*, 2000) that further caused higher rate of mortality. Therefore, the mortality pattern observed in this study

should be noted and the timing of arrival that avoids rainy months attempts to reduce handling stress (Dass *et al.*, 2001) and herd health programme (Huttner *et al.*, 2001) upon arrival is important to minimize mortality, considering the fact that Boer goats are fairly resistant to many diseases (Erasmus *et al.*, 2000).

The respiratory tract infection and helminthiasis observed among the newly arrived Boer goats in this study have also been recognized as the major causes of mortality among goats (Kusiluka *et al.*, 1998). In fact, helminthiasis and pneumonic manheimiosis have been recognized as two major farmed goat and sheep diseases in Malaysia (see Fatimah *et al.*, 1985; Jasni *et al.*, 1991) and these incidences have been reported to be higher during rainy months than during dry months (Kusiluka *et al.*, 1998). Similarly, significant increases in the incidences of pneumonia and haemonchosis in adult goats during rainy months, as observed in this study, have led to the high rates of mortality (Mellado *et al.*, 1991). Nevertheless, the post-arrival mortality pattern observed in this study, which peaked at week 3 and returned to almost normal rate at week 7, was mainly due to post-arrival exhaustion and inability to eat properly, causing the animals to become stressed and leading to diseases. Therefore, it is extremely important for the newly arrived animals to be given anti-stress, vaccinated against pneumonic manheimiosis and treated with anthelmintic to reduce mortality.

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