CASE REPORT

RUMEN PARAMPHISTOMOSIS IN *BOS INDICUS* FROM A SAMPLE RECEIVED BY VETERINARY RESEARCH INSTITUTE OF IPOH, PERAK

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ABSTRACT. This case report describes paramphistomosis from the rumen of an infected 3-year-old *Bos indicus* or also known as Zebu cattle that was sent to the Veterinary Research Institute (VRI), Ipoh, Perak for post-mortem examination with a history of a sudden death. On post-mortem, it was found that the rumen contents had a large number of pink, pear shaped flukes, which measured about 1 cm in length attached to the rumen wall. On performing the sedimentation technique on the rumen contents, operculated eggs with germ cells were observed microscopically under compound microscope with a magnification of 100×. Regular screening of cattle for flukes is an important part of parasite control programmes especially in endemic areas as it can cause anaemia and deterioration in body condition.

Keywords: paramphistomosis, rumen fluke, cattle, operculated eggs

INTRODUCTION

Paramphistomosis (or paramphistomiasis) is an endoparasitic infection caused by digenetic trematodes which belong to the family of Paramphistomidae (Mage *et al*., 2002). Generally, paramphistomosis is an economically important disease to ruminant livestock such as cattle, sheep, goats and deer (Morley, 2017; Huson *et al*., 2017). Paramphistomosis is associated with significant morbidity, mainly caused by the activity of juvenile flukes in the intestine of the ruminant final host (Zintl *et al*., 2014). According to the data compiled in the Annual Reports of the VRI (Veterinary Research Institute, n.d., a; b; c), a case of paramphistomosis was reported in the year 1994, 2008, 2012 and 2013, respectively. In 2013 was a case of high mortality of 40 buffaloes in Johore where one of the the dead animals showed the presence of severe paramphistomosis (Jamnah *et al.,* 2013).

Prevalence of paramphistomosis is highest throughout the tropical and sub-tropical regions (Elsheikha and Khan, 2011). However, the increase in the incidence of rumen fluke and its geographical range in Europe have also been reported recently (Zintl *et al*., 2014). In the Philippines, *Paramphistomum* spp. (besides *Fasciola gigantica*) mainly reported in ruminant livestock (Molina *et al*., 2005; Gordon *et al*., 2015). In Thailand, the cases of paramphistome infection from 1991 to 1995

were mainly due to *Paramphistomum* sp. with the prevalence of 46%, 41%, 39%, 30% and 50%, in these five years, respectively (Prasitirat *et al*., 1997). Meanwhile, Beriajaya *et al.* (1981) reported situations of paramphistomosis in several places of Indonesia, recording the highest infestation in cattle compared to other ruminant livestock such as in Aceh (94.80%), Lampung (69.84%), Java (41.60%), Sulawesi (53.23%) and Bali (100%). In 2015, a prevalent study of paramphistomosis in Bali cattle conducted in city abattoirs of Denpasar (Bali, Indonesia) reported 15% positive from all the samples collected with female cattle 1.97 times more likely to be infected compared to male cattle (Lestari *et al*., 2017).

Ironically, even though stomach fluke infection commonly occurs in rumen, *Paramphistomum cervi* (stomach fluke) is also found attached to the liver of buffaloes and caused severe damage to the liver (Khatoon *et al*., 2003). A recent field study by Khadijah *et al.* (2017) showed that out of 60 faecal samples of cattle, 10% was positive for co-infection of both *Fasciola* and *Paramphistomum* eggs while 5% was positive with only *Paramphistomum* eggs. The 3-month abbatoir study also revelaed that *Fasciola* (73%) and *Paramphistomum* (18%) were the main causes of liver condemnation in cattle and buffaloes (Khadijah *et al*., 2017).

CASE HISTORY

In this study, an investigation was carried out to find the cause of death of the animal. On post-mortem, the rumen and its contents were grossly examined. The fresh flukes were collected, observed and measured. Meanwhile, the rumen contents were examined for the presence of helminth eggs by using simple floatation and sedimentation techniques (Christopher *et al*., 1992; MAFF, 1986).

The rumen flukes were identified based on the helminthological key by Taylor *et al*., 2007. Morphological observation showed both the trematode parasites and the eggs were identified as *Paramphistomum* sp. (Chaoudhary *et al.,* 2015; Taylor *et al*., 2007). Grossly, heavy burdens of pink pear-shaped trematodes were attached to the ruminal palillae (Figures 1 and 2). Based on morphological observation, these amphistomes were identified as adult fluke of *Paramphistomum* sp. due to their conical shape with posterior broad end (acetabulum), the position of their anterior sucker and larger sized ventral sucker at the posterior end (Figures 3 to 6). Its average size measured (1.13-1.59 cm in length and 0.53-0.68 cm in width) from a total of 20 flukes that were measured. Histological examination of this parasite is needed so that the morphology can be well appreciated and to further confirm the species (Chaoudhary *et al*., 2015).

Using a sedimentation technique, several pale white coloured eggs were observed under a stereo microscope (10× objective magnification) from the sediment of the rumen washings. These eggs were further observed and measurements taken with a compound microscope. The eggs of *Paramphistomum* sp. found in the ruminal contents showed numerous clear coloured and operculated eggs about 130 µm to 180 µm in length were observed (Figure 7). Meanwhile, no other helminth eggs

Figure 1: Numerous pink pear-shaped parasites attached to the ruminal palillae.

Figure 2: Rumen flukes attached firmly on the rumen wall (close-up).

were observed from the rumen contents from both floatation and sedimentation techniques.

Diagnosis on the rumen sample showed this animal had suffered from severe paramphistomosis as numerous flukes were attached firmly on the rumen wall, which may have resulted in loss of blood and anemia (Morley, 2017). Large burdens of paramphistomosis may contribute to the mortality of the animal due to damage of host intestinal tissue and haemorrhagic enteritis, which include hypoproteinaemia and anaemia (Millar *et al.,* 2012).

Even though this animal was kept in an intensive system (zero grazing, cut and carry grass/food pellets in its diet), the previous history of management of the animal was unclear. Generally, an animal can get infected by grazing pastures contaminated with larval stages of the parasite such as near the water bodies, drains and rivers where the intermediate host such as snails can be found. However, in the intensive systems where grazing is not allowed, the grass that is brought to the pens for feeding could also be contaminated with these larvae thus causing the infection (Huson *et al*., 2017; Morley, 2017). Therefore, regular screening and treatment is necessary to prevent this infection. According to Zintl *et al.* (2014), the longevity of the parasite may also cause the intensively reared cattle continue to harbour rumen flukes acquired prior to housing.

In some cases, the adult flukes in the stomach could be quite harmless and usually do not cause complications, despite the high numbers that can congregate there as they could merely be preparing for reproduction (Brown, 2005). However, the masses of young rumen flukes attaching to the gut wall and feeding on it are very harmful. This is because young flukes may destroy the tissue of the gut, thus disturbing the digestion and the immune system. The more susceptible animals including young animals and the immune-suppressed animals such as sick or otherwise weakened are prone to be harmed by the rumen flukes. If the animal has low immunity, any opportunist microbes

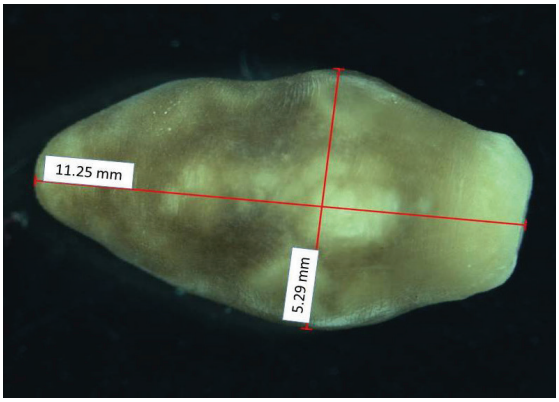

Figure 3: The average length of the flukes is about 1.0 cm (adult stage, >0.5 cm).

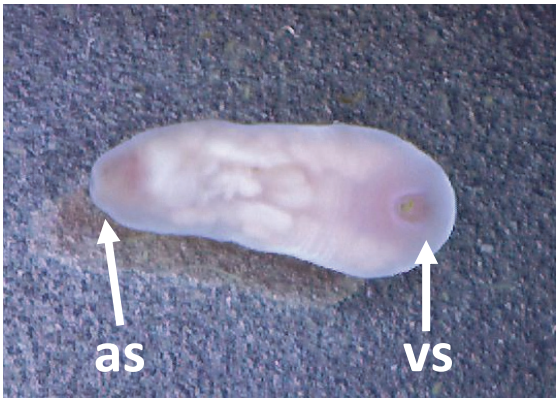

Figure 4: The position of anterior sucker (as) and the ventral sucker (vs) of this amphistome

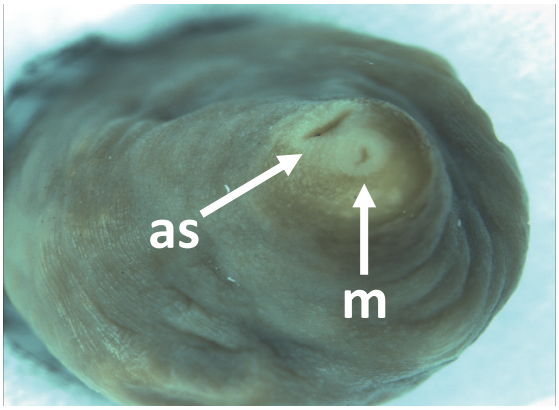

Figure 5: The anterior sucker (as) near to its funnel-shaped mouth (m).

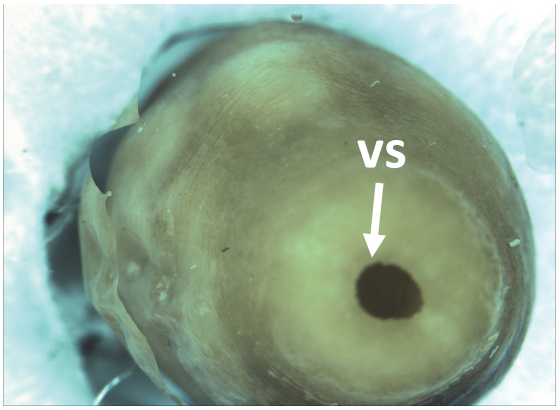

Figure 6: The larger sized acetabulum/ ventral sucker (vs) located at the posterior end.

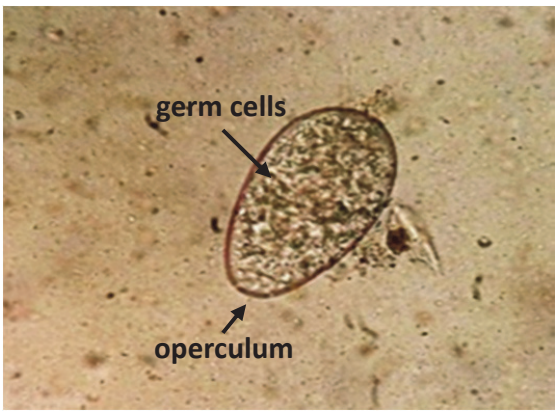

Figure 7: Note the presence of clear-colored and operculated eggs sized about 130-180µm in length.

may cause severe case (Hooper et al., 2012). Therefore, fatalities might occur.

DISCUSSION

The investigation of this case concludes that the cattle was susceptible to paramphistomum infection. This case also shows that intensively managed animals that are not grazed may also harbor the infection and care must be taken to obtain clean, uncontaminated grass for the animals. Apart from this, regular treatment and monitoring of faecal samples such as sedimentation test can be done to prevent severe infections and stem the infection at an early stage. Severe paramphistomosis might contribute to the death of the cattle as reported in this case. Further investigation is needed to identify the main cause of helminthic infections among the ruminant livestock. Therefore, this study encourages holistic approach including effective preventive and control measures to rectify the problems of parasites of ruminants throughout the country.

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