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CASE REPORT

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Two potentially zoonotic parasites infecting Philippine brown deer (*Cervus mariannus* desmarest, 1822) in Leyte Island

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ABSTRACT

This case report describes the necropsy findings of two potentially zoonotic parasites infecting the Philippine brown deer (*Cervus mariannus*) in Leyte Island, Philippines. A female deer aging approximately 5-year was presented for necropsy to the Diagnostic Laboratory at the College of Veterinary Medicine, Visayas State University. Gross pathology was recorded and the selected organs having lesion were collected for histopathological studies. Results showed severe necrotizing lesions in the nasal and palatal areas, infestation of calliphorid maggots, hepatic fibrosis, cholangitis, cholecystitis, lung atelectasis and duodenitis. Heavy ruminal fluke infection was also observed. Two potentially zoonotic parasites namely *Fasciola gigantica* and *Sarcocystis* spp. were identified. The Philippine brown deer appears to have a role in transmission and amplification of zoonotic parasites, and can also be threatened by diseases caused by the parasites.

Keywords

Fasciola, Paramphistomum, Philippine deer, *Sarcocystis,* Zoonotic parasite

ARTICLE HISTORY

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INTRODUCTION

The Philippine brown deer (*Cervus mariannus*), also known as Philippine Sambar, is classified as vulnerable species declared by the International Union for the Conservation of Nature (IUCN). In the Philippines, groups of *C. mariannus* are mainly cited in the forest of Luzon, Mindanao, Samar, and Leyte. They were considered as extinct in many Philippine islands, particularly Biliran, Bohol and Marinduque (Oliver et al., 2008). The vulnerability of the species in the country was attributed to indiscriminate hunting and habitat destruction, and partly by health deterioration as influenced by biotic and abiotic factors (Borgsteede, 1996; Maala, 2001). Parasites belong to biotic factors that influence survival of wild animals. They directly inflict the host by damaging the localized organ and indirectly by nutrient competition (Borgsteede, 1996; Jenkins et al., 2015). Few of the endoparasite infections among endemic wild deer in the Philippines were reported elsewhere (Eduardo, 1993, 1995).

Meanwhile, parasites infecting wildlife do not only cause pathology leading to mortality, but also can infect human considering the present climatic change and human socioeconomic activities. Two of these parasites are the zoonotic trematode and protozoan from animals under the genus *Fasciola* spp. and *Sarcocystis* spp., respectively (Thompson, 2013; Jenkins et al., 2015).

Fascioliasis causes significant morbidity in both humans and animals. In the Philippines, *Fasciola gigantica* is highly prevalent among domestic ruminants with few reported human cases (Auer et al., 1995; Molina et al., 2005; Gordon et al., 2015). The global trend of human fascioliasis however is increasing with at least 2.5 million cases in many countries (Hien et al., 2008; Nyindo and Lukambagire, 2015). Aggravating the scenerio are the reported *Fasciola* sp. resistance against triclabendazole; the drug of choice for animal and human fascioliasis (Winkelhagen et al., 2012; Crilly et al., 2015).

Sarcocystosis is also a prevalent zoonotic disease derived from wild and domestic animals (Fayer et al.,

2015). Few of the *Sarcocystis* species have been noted from various animals in the Philippines (Claveria et al., 2004). Current outbreak of human sarcocsytosis was actually reported in Malaysia where wildlife is being suspected as the source of infection (AbuBakar et al., 2013).

The current case report aimed to describe the occurence of two aforementioned zoonitic parasites in Philippine brown deer from Leyte Island. To the author's knowledge, there has been no report of these parasites infecting deer in the study area. This finding may stimulate awareness for possible transmission between wildlife, domestic animal and human in the Philippines.

METHODOLOGY

The Philippine sambar deer was captured by hunters in the forest of Baybay city, Leyte, Philippines (**Figure 1**). Their natural habitat was reported to be in the forested areas of Pangasugan mountain. The footprints of the deer were usually seen and traced from the village or barangay of Pangasugan to the barangay of Caridad.

A female deer aging approximately 5-year was presented to the Diagnostic Laboratory at the College of Veterinary Medicine, Visayas State University. External examina-tion for lesions and ectoparasites in the integumentary system and orifices were conducted thoroughly. Body condition scoring with a range of 1 to 5 was also performed as described by Audigé et al. (1998). The animal was open through midline incision and the internal organs were examined for lesions from the head and cervical region, rib cage, abdominal area and musculoskeletal system, respectively. Moreover, each organ was examined for endoparasites. The collected parasites were placed in Alcohol-Formalin-Acetic acid solution (AFA) for preservation and microscopic examination. Selected tissue samples were placed in 10% buffered neutral formalin.

Figure 1. Philippine Sambar deer normal habitat is located in the forested areas of Baybay City, Leyte.

RESULTS

Necropsy Findings: External examination of the deer showed body condition score of 1 out of 5. This is characterized by very sharp sacral process, extremely prominent wing of pelvis, and little muscle with no fat in the rump area (Audigé et al., 1998). Moreover, the body coat was dull with fragile hairs when plucked. There was noticiable scaling at the back with hyperpigmentation. Ecchymosis was also observed in the udder and inguinal area. Examination of the head part showed severe inflammation, necrosis and myiasis of the muzzle (**Figure 2**). The hypomela-notic area of the face has the skin, connective tissues, and turbinate bones severely damaged by flesh eating maggots (family Calliphoridae). This extends to the upper palate of the oral cavity resulting to ulcerations with fibrinopurulent exudates. The soft palate was mildly inflamed and necrotic but myiatic fly larvae has extended into the region considerably.

Gross pathology showed localized atelectasis in the middle and caudal lung lobes. The liver was examined *in situ* and found to have peritoneal adhesion. Severe fibrosis and hemorrhages were also observed. Cutting

Figure 2. Inflammation, necrosis and myiasis of the hypomelanotic muzzle area of Philippine brown deer.

Figure 3. Leaf like trematode (*Fasciola gigantica*) in the cut area of deer liver (arrow). Note the hyperplastic and inflamed bile ducts (A) and the long and large *Fasciola gigantica* (70 mm length x 11 mm width).

the liver parenchyma, tracing the bile duct and gall bladder showed numerous liver flukes (**Figure 3**). The gall bladder was hyperplastic and the cut liver parenchyma suffered fibrosis and cholangitis. Examination of the fore-stomach revealed numerous *Paramphistomum* spp. attached on the ruminal wall near the ruminoreticular orifice (**Figure 4**). The duodenum of the deer revealed mucoid inflammation with reddening of the mucosa. Previous examination of the other deer which belonged to similar captured batch revealed sarcocysts in the striated muscles with eosinophilic infiltrations (**Figure 5**).

Figure 4. Red conical flukes (*Paramphistomum* spp.) in deer's rumen near the ruminoreticular orifice.

DISCUSSION

The present study reported the occurrence of two zoonotic parasites and heavy infection of *Paramphistomum* spp. in Philippine brown deer. There were few reports dealing with faunistic distribution of endoparasites among endemic deer population in the country. The reported helminth species were *Ogmocotyle indica*, a trematode found in the intestine of Luzon Sambar deer (*Cervus philippinus*) (Eduardo, 1993); *Strongyloides* spp., *Oesophagostomum* spp., and *Bunostomum* spp. from Calamian deer (*C. calamianensis*); and *Monieza* spp., an intestinal cestode from similar Calamian deer (Eduardo, 1995). Hence, our finding is an addition to the current parasitic fauna found in Philippine brown deer.

In the Philippines, *F. gigantica* and *Paramphistomum* spp. were mainly reported in livestock animal, especially ruminants (Molina et al., 2005; Gordon et al., 2015). *F. gigantica* causes severe hepatobiliary pathology while *Paramphistomum* spp. causes catarrhal enteritis resulting to animal's death and economic losses (O'Toole et al., 2014). Moreover, *F. gigantica* is the most prevalent liver fluke in the Visayas (Gordon et al., 2015), and reported to infect human by ingesting metacercaria from uncooked vegetables or unclean drinking water. Human fascioliasis in the Philippines is considered as a rare disease (Eduardo, 1991; Auer et al., 1995). However, significant numbers of human cases were noted in neighboring Asian countries such as China, Vietnam, Cambodia, Singapore and India (Nyindo and Lukambagire, 2015). Meanwhile, there were no updated surveys concerning human fascioliasis in the Philippines despite the reported high prevalence (95 to 96%) in ruminants (Gordon et al., 2015). Possible spill-over transmission could happen between domestic ruminant, wildlife (e.g., deer) and human in areas with high *Fasciola* and Lymnid snail densities (Jenkins et al., 2015), especially that both animals probably share common pasture, and together with human a common water source. The reports of

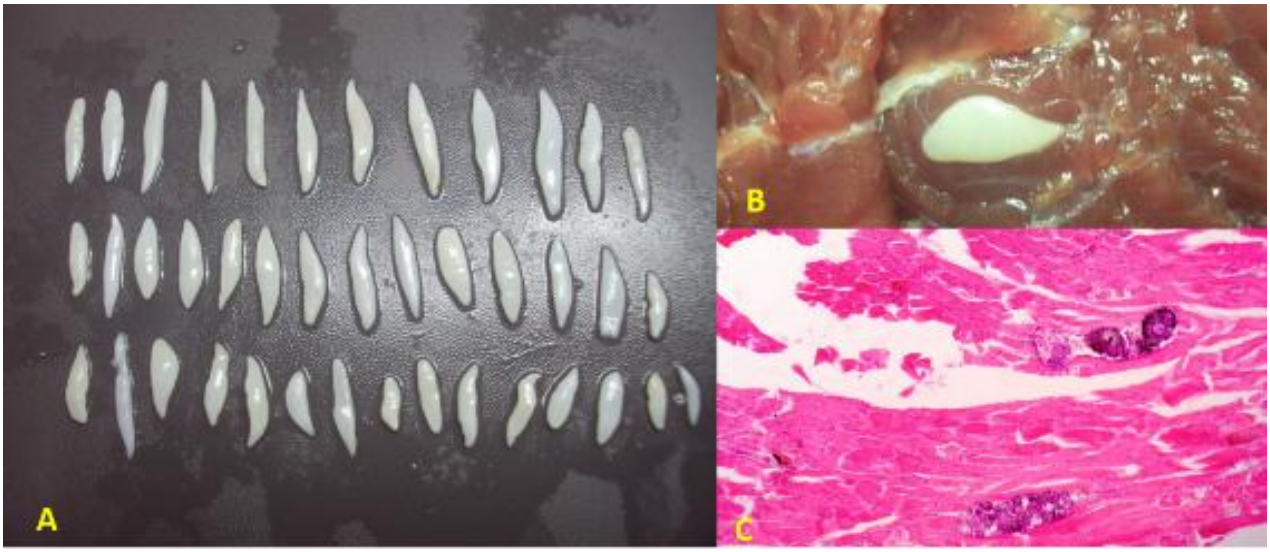

Figure 5. Fusiform-shaped sarcoysts in Philippine brown deer muscle (A and B). Note the globular metrocyte and the presence of bradyzoites within the sarcocyst (C.)

Sarcocystis spp. from the Philippines were limited to carabao (*S. levinei, S. cruzi*, and *S. fusiformis*), cattle (*S. cruzi, S. bovifelis, and S. bovihominis*), pig (*S. miescheriana*), goat (*S. capracanis*), rat and python (*S. singaporensis*) (Claveria et al., 2004; Baticados and Baticados, 2011). In the aspect of zoonosis, humans can serve either as definitive or intermediate hosts of the parasite. The documented species of *Sarcoystis* that can infect human once sarcosysts are ingested from beef and pork are *S. bovihominis* and *S. suihominis*, respectively (Fayer et al., 2015). Since, there are numerous unknown species of *Sarcosystis* that could infect wild animals (e.g., deer), plus wildlife hunting for food is still common in the study area, the risk of getting infected is undisputable (Fayer et al., 2015; Portugaliza and Bagot, 2015). On the other hand, humans could also serve as intermediate host of *S. lindemanni* and *S. nesbitti* once they ingested sporocysts through contaminated water. To date, reports of this invasive muscular form of sarcocystosis in Asia were found mainly in Malaysia, with few cases in India and Thailand (Harris et al., 2015). In the Philippines, the lack of potable water supply in some rural areas could initiate transmission of the parasite to human (Magalhães et al., 2015).

CONCLUSION

This report describes new insight on the transmission dynamics of zoonotic parasites concerning wildlife involvement. The Philippine brown deer appears to have a role in the amplification and transmission of zoonotic parasites, and can also be threatened by its pathology.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

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