*Case Report*

# Severe parasitic gastroenteritis (PGE) in a goat:

# A veterinary case report and way forward

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***Abstract***

This veterinary case report highlights the failure of herd health programme and feeding management that led to severe parasitic gastroenteritis (PGE) infection in a goat. The discussion of this case report is on the possible causes that led to this negative condition and way forward towards related to this case. For avoiding similar cases in the future to uplift the welfare of small ruminants. In this case report, a goat was presented with the history of severe diarrhea and inappetence. Furthermore, that farm did not practice regular deworming and vaccination programmes. Physical and clinical examination of the goat in this case report revealed emaciation, dullness, lethargy, pale mucuos membrane, anaemia, hypoglobinemia, hypoglycaemia and high strongyle egg count. Therefore, the clinical diagnosis of severe PGE concurrent with moderate pneumonia infection was made in this case. The therapeutic plans for this case were administration of anthelminthic drugs, fluid therapy, glucose replacement but unfortunately the patient died on the second day of hospitalization due to grave prognosis. Port mortem findings indicated the cause of the death of the patient to be due to hypovolemic shock caused by circulatory failure due to anaemia and hypoalbuminemia due to severe PGE infection and malnutrition. In conclusion, holistic application of herd health programmes (HHP) in small ruminants' farms are needed to avoid this type of cases.

**Keywords:** case report, goat, malnutrition, PGE, veterinary, way forward

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## Introduction

Parasitic gastroenteritis is one of the major and underestimated factors limiting the successes of small ruminant productivity worldwide. Parasites constitute a significant public health problem and can be transmitted directly or indirectly to humans through consumption of contaminated food or water (Sultan *et al.*, 2016). Parasitic gastroenteritis causes a devastating socio-economic downturn to livestock production, this in-turn affects farm profitably for both commercial and subsistence agriculture (Jesse *et al.*, 2017). This is because in small economies of the world, small ruminants make significant contributions to human livelihood (Zvinorova *et al.*, 2016). Parasitic gastroenteritis is mainly caused by nematode parasite, particularly strongyles which included *Trichostrongylus, Cooperia, Haemonchus, Strongyloides* and *Oesophagostomum* (Abdullah *et al.*, 2016; Jesse *et al.*, 2017b). Nor-Azlina *et al.* (2011) reported that strongyles are the major nematode parasitic infestation commonly found in goats. The condition is associated with severe diarrhea, anemia, lethargy, weight loss, tachycardia, tachypnea and death (Eysker and Hassan, 2005). Nematodes cause severe devastating economic losses in small ruminant production because of high mortality (Sani *et al.*, 2004). Additionally, small ruminant endoparasitism due to haemonchosis have been reported to be second most significant causes of mortality in sheep and goats (Nor-Azlina *et al.*, 2011).

Prevention and control of worms in sheep and goats depend solidly on anthelminthic drugs and chemical dewormers. However, cases of anti-helminthic resistance in small ruminants have been reported due to ease of access and availability to anthelmintic drugs which in part is aided by government subsidized ruminant health Programme (Nor-Azlina *et al.*, 2011; Jesse *et al.*, 2017a). This has led to the emergence and widespread dissemination of nematode parasite that are resistant to anthelminthic drugs. Effective control of parasitic gastroenteritis in ruminants is a multidisciplinary approach that includes the combination of chemotherapy, biological control, grazing management, worm vaccination and genetic resistance of the host. Additionally, having a more comprehensive understanding of the epidemiology of the parasites and its interaction with the host in a specific management, production and climatic environment provides a more rational and sustainable control of nematodes causing parasitic gastroenteritis. Furthermore, control measures also require understanding of the seasonal larval availability, factors that enhances hatchability of the parasites eggs, larva development and survivability as well as the origin of the larval stages (Bukhari and Sanyal, 2011; Nor-Azlina *et al.*, 2011; Ardo and Bitrus, 2015). This case report will discuss the possible causes and way forward towards PGE cases clinical in small ruminants.

## Clinical Description

A four-month-old semi-intensively raised, male Boer cross goat weighing 7.5 kg with a body condition score of 1.5/5 was presented to the large animal ward of the University Veterinary Hospital (UVH), Universiti Putra Malaysia with a complaint of inappetence and severe diarrhea. Farm records showed that the farm had 34 goats with a previous history of recurrent diarrhea. This farm did not practice any vaccination and deworming Programme.

***Clinical Examination:*** Physical examination of the goat showed that the patient was dull, lethargic, dehydrated (5%) with pale mucous membrane. The goat had a rectal temperature, pulse and respiratory rate of 37.1 °C, 86 bpm and 24 bpm respectively. Auscultation of the cranial left lung field revealed moderate crackling lung sounds sound. Further examination showed soiled perineum and enlargement of the right pre-scapular lymph node measuring 4cm x 2cm. The clinical diagnosis made at that point of time was severe PGE concurrent with moderate pneumonia infection.

***Sample collection and Diagnostic work up:*** Blood and fecal samples were collected for complete blood count (CBC), serum biochemistry and fecal egg count analysis. The result of the CBC revealed mild to moderate normocytic hypochromic regenerative anemia, leukocytosis, monocytosis and neutrophilia with regenerative left shift. Analysis of the serum biochemistry revealed hypoglycemia, hypoalbuminemia and hyperglobulinemia (Table 1). Fecal egg count revealed strongyle (30,100 epg), Strongyloides (800 epg) and coccidia (750 opg). The strongyle count was highly significant or this clinical case.

***Treatment plan:*** The therapeutic plan that was carried out for this case were the goat was administered Fercobsang® (4 ml) subcutaneously (SQ) BID, 2 ml Biodly (Crystallized trisodium salt of adenosine triphospate-0.1g, Vitamin B12 -0.05g, Sodium Selenite -0.10g, Crystallized potassium aspartate 1.00g and Crystallized magnesium aspartate-1.50g) Grovet, Netherlands, SQ, every other day (EOD) to improve the animal's blood profile, Levamisole (2.5 ml/10 kg) of 1.9 ml per os (PO) on the second day was administered to treat PGE parasite infestation. Lactated ringers' solution (140 ml) was also administered to correct the 5% dehydration, Propylene glycol 10 ml, PO and Mollases 10 ml, PO were also administered twice daily to provide immediate sources of energy. The goat however died on the second day after treatment was instituted due to grave prognosis and postmortem examination was performed. The farmer was then advised to improve the overall herd health program in the farm particularly the deworming program and regular screening for worm burden. Pasture management and correct nutrition supplementation to all the animals in the farm were advocated to avoid malnutrition.

***Postmortem findings:*** Systematic postmortem examination of the carcass was carried out to ascertain the actual cause of death. The procedure involved visual examination, palpation and incision of vital visceral organs such as the liver, lungs, kidney, intestinal, and mesenteric lymph nodes. The postmortem examination of the thorax showed

multifocal dark discoloration on the left cranial lobe of the lung and exudation of serosanguinous fluid upon incision of the lung tissue. Slight yellowish discoloration of the aorta and fibrin deposition was observed on the pericardial sac. Examination of the abdominal cavity revealed multifocal hyperemic segments in the small intestine, a distended gall bladder and enlargement of the mesenteric lymph nodes. The cause of death that can be concluded in this case are the goat died due to hypovolemic shock due to circulatory failure due to anemia and hypoalbuminemia due to PGE infection and malnutrition.

**Table 1** Complete blood count (CBC) and serum biochemistry profiles

| Parameters | Units | Results | Reference value |
|---|---|---|---|
| Packed cell volume (PCV) | L/L | 9% | 22-38% |
| Hemoglobin | g/L | 28.7 | 80-120 |
| Erythrocytes | X $10^{12}$/L | 6.34 | 8-18 |
| MCV | f/L | 16 | 16-25 |
| MCHC | g/L | 287 | 300-360 |
| Leucocytes | X $10^{9}$/L | 14.6 | 4-13 |
| Band neutrophils | X $10^{9}$/L | 0.15 | 0.00 |
| Segmented neutrophils | X $10^{9}$/L | 9.49 | 1.2-7.2 |
| Monocytes | X $10^{9}$/L | 0.88 | <0.55 |
| Eosinophils | X $10^{9}$/L | 0 | 0.05-0.65 |
| Plasma protein | g/L | 48 | 60-75 |
| Glucose | mmol/L | 0.7 | 2.7-4.7 |
| Total protein | g/L | 57.1 | 55-70 |
| Alkaline phosphatase | U/L | 25 | 90-200 |
| Albumin | g/L | 23 | 25-35 |
| Globulin | g/L | 34.1 | 35-45 |

***MCV=Mean corpuscular volume, MCHC=Mean Corpuscular Hemoglobin Concentration***

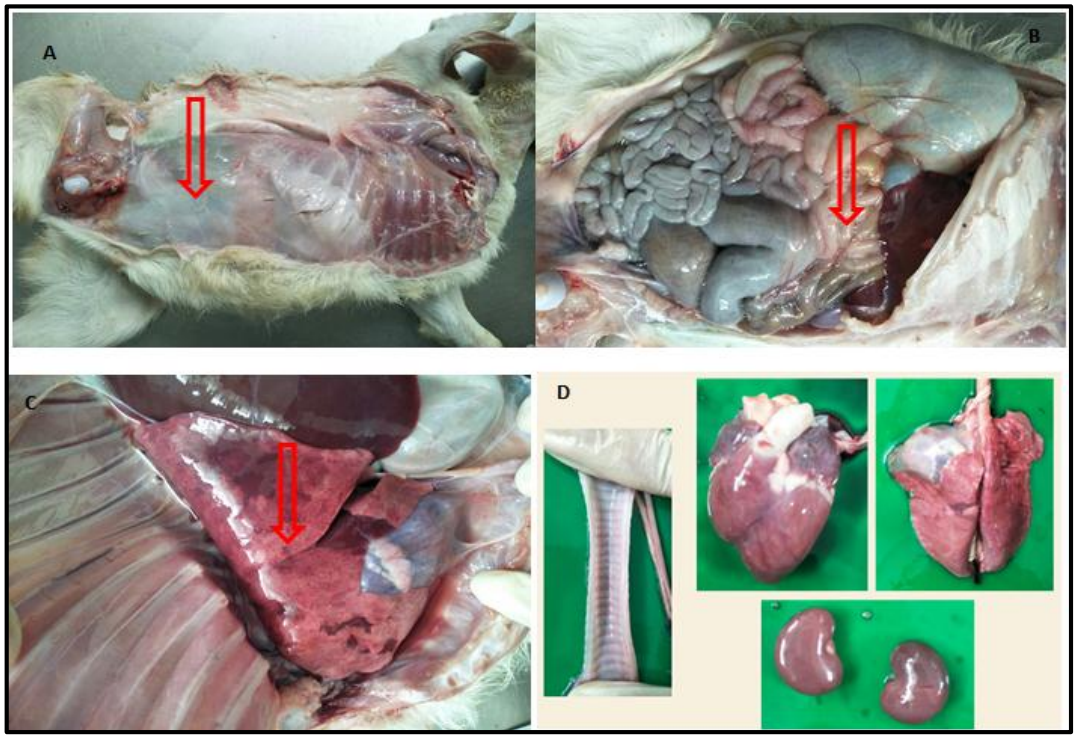


**Figure 1** Gross photographs of the carcass showing serous atrophy of the omentum (A), hyperemic segments in the small intestine (B) areas of red hepatization (consolidation) on the left cranial and caudal lung lobes (C) hyperemic trachea, hepatomegaly with areas of pericardial ecchymotic hemorrhages and swollen kidneys (D).

## *Discussion*

Parasitic gastroenteritis (PGE) is one of the most important causes of economic losses in small ruminant and cattle production. These losses arise from the severity of clinical signs such as anemia, diarrhea, anorexia, edema and decreased weight gain (Eysker and Ploeger 2000). This is particularly important in young animals because of lowered immunity that results in predisposition to infection and subsequent mortality. In this case report, the goat was less than 1-year-old and clearly manifested signs of PGE with bilateral serous nasal discharge and crackle lung sound. According to Chung *et al.* (2015), stress factors such as concurrent diseases and worm burden could alter the normal homeostasis of commensals in the upper respiratory tract leading to respiratory tract infection which was observed in this case. The diagnosis of nematode infection in small ruminants is

usually based on the fecal egg, larvae or total parasite count using flotation method such as McMaster chamber or Larval culture, serology and PCR detection (Roeber *et al.*, 2013; Jesse *et al.*, 2017b). In this clinical case report, McMaster chamber was employed for parasite fecal egg detection and high worm burden was observed. Effective diagnosis of the various forms of parasitic gastroenteritis in young small ruminants encompasses the integration of clinical history of the farms and animals as well as the clinical signs of poor body condition, reduced weight gain and anorexia. Other factors that are pertinent to arriving at good diagnosis of this condition include grazing history, season, age of the animal and the use of anthelminthic agents. This is consistent with the approach utilized in the management of this clinical case report. The goat reported in this clinical case report was young and farm records showed that its vaccination and deworming statuses were not up-to-date. Additionally, the goat manifested clinical signs of severe diarrhea and anemia, which are characteristics of PGE.

Importantly, administration of anthelminthic should be given priority whenever a case of gastroenteritis is suspected. This is because, eliminating the underlying cause of the condition is important in achieving a good prognosis. In this case, levamisole and ivermectin were administered to the goat to take care of both internal and external parasites. The goat was also administered blood tonics, antibiotics and other supplements to improve its overall welfare.

Even though the goat died while treatment was on-going, the farmer was advised on the practice of good management practice with emphasis on improving grazing pattern and nutrition of the other animals in the farms. This is consistent with the findings of Knox *et al.* (2006) and Sykes & Coop, (2001) where the authors reported a correlation between resilience of animals to parasite infestation and improvement in their overall nutrition. Additionally, it was observed that animals placed on nutritious diet can withstand the stress of worm burden in comparison to those on low plain ration. In this case, analysis of the blood profile of the goat showed that the animals had anemia in addition to hypoproteinemia and hypoglycemia. Based on postmortem examination of the carcass, the cause of death can be attributed to hypovolemic shock associated with the anemia that had arisen due to the PGE infection and lice infestation. In a study by Jesse *et al.*(2017b), whole blood transfusion proved to be effective in a sheep with complicated case of PGE. The success of the transfusion in the study can be attributed to the prompt presentation of the case to the clinic by the client. In this study, the PCV of the goat was 9%, which is critical and incompatible with life. In another study by Abdullah *et al.* (2016), blood transfusion to ewe with PGE proved to be abortive as the animal died on the 5$^{th}$ day of hospitalization.

Prevention and control of gastrointestinal parasites can also be achieved through vaccination. These vaccines work by identifying hidden protective antigens collected from the cells of the worm's intestines (Zvinorova *et al.*, 2016). Because PGE causes severe economic losses, it is important to adopt the practice of an effective herd health program that include parasite control program which is focused at prevention rather than treatment. It is important to note that treating goats after heavy worm infestation produce little results on the overall welfare of the animals and the prospect of minimizing environmental contamination is low. This could partly explain why the goat in this clinical case report died even after instituting treatment regime. Therefore, to avoid such losses by farmers, adult goats should be treated with anthelminthic every two to three months while deworming of kids should be carried out immediately after weaning and repeated 21 days after the initial dose has been administered (Shahudin *et al.*, 2018).

## Conclusion

This clinical case reported the management of a severe case of parasitic gastroenteritis in a goat. The blood profile of the animal showed significant alteration in the hematology and serum biochemistry due to the parasitic infection which was evident from the fecal egg count. The cause of death can be attributed to hypovolemic shock due to anemia resultant from the severe PGE infection concurrent with malnutrition. In conclusion, strict and consistent application of holistic herd health program (HHP) in livestock will avoid negative condition towards these animals and will uplift the welfare of the livestock animals.

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