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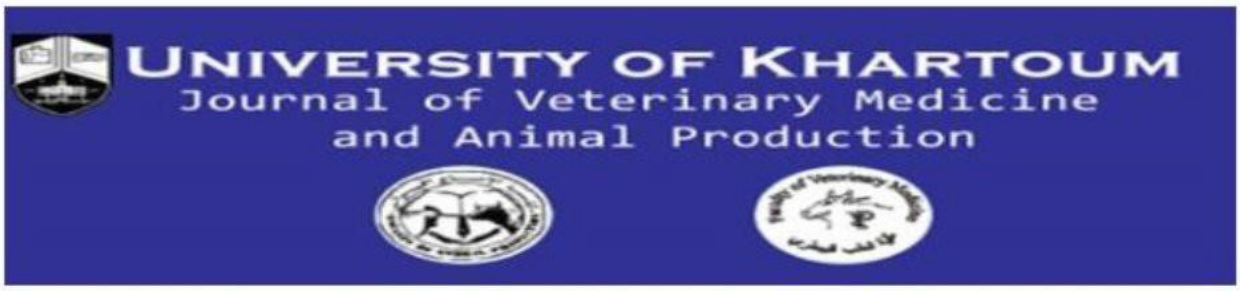

Pathology of Clostridial Enterotoxaemia associated with Pulpy Kidneys in Hamari Lambs in Khartoum: Case Report

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Abstract

To the best knowledge of the author, this report describes for the first time the pathology of enterotoxaemia occurred due to *clostridium perfringens* in Sudanese Sheep. Three animals out of 20 fattening Hamari (desert eco-type) lambs showed diarrhea and weakness. Two lambs died and subsequently submitted for necropsy. Diagnosis was confirmed by presence of the typical short bacilli with round ends bacteria in mucosa of spiral colon. Both lambs showed signs of toxemia, where petechiae were noticed in endocardium, pericardium, mucosa of spiral colon and duodenum. Considering the time from death till necropsy, kidneys in both animals were remarkably soft and fragile (pulpy) which is a sign of rapid autolysis due to clostridial toxins. Encephalomalacia and remarkable infiltration of oligodendroglia were evident in 1 lamb, while cerebral edema was prominent in the other lamb. In conclusion, diagnosis was established relying on symptoms and lesions; Hemorrhagic inflammation of the duodenum and spiral colon, pulpy kidneys, encephalomalacia and presence of rod-shaped bacilli with round ends *clostridium perfringens* in colon.

Key words:C.perfringens, desert sheep, enterotoxaemia, kidney.

المستخلص

وفقا لأفضل ما توصلنا اليه من معرفة ومعلومات، يصف هذا التقرير لأول مرة إمراضية التسمم المعوي المسبب بواسطة بكتيريا المطثية الحاطمة (*Clostridium perfringens*) في الضأن السوداني. في قطيع يتكون من عشرين حملا من سلالة الحمري والذي تم تربيته بهدف التسمين، اظهرت ثلاثة حملان اعراض وهن واسهال، نتج عنه نفوق اثنان. تم ارسال الجثث الي غرفة التشريح بقسم علم الأمراض بكلية الطب البيطري، جامعة الخرطوم لإجراء تشريح ما بعد الموت. تم تأكيد التشخيص عندما وُجدت بكتيريا ذات مظهر نموذجي تمتاز بالشكل العصوي القصير ولها نهايات دائرية في مخاطية القولون. كِلا الجثتين اظهرتا اعراض التسمم حيث لوحظ النزف الحبري بشغاف القلب، والتامور، و مخاطية القولون والإثني عشر. مع الأخذ بعين الإعتبار الفترة الزمنية من الموت حتى إجراء التشريح، أظهرت الكليتان ملمس رخو بشكل لافت للنظر، وذلك بسبب التحلل السريع الناتج عن تأثير سموم البكتيريا. تلين الدماغ وإرتشاح الخلايا الدبغية من نوع (Oligodendroglia) كانا واضحين بشكل جلي في احدى الجثتين. بينما وذمة الدماغ كانت بارزة في الجثة الأخرى.

ختاماً، تم التشخيص بناءً على الأعراض السريرية والأفات المرضية التالية: إلتهاب القولون والأثني عشر النزفي، و ملمس الكلى الرخو، وتلين الدماغ، و ظهور بكتيريا المطثية الحاطمة ذات الشكل العصوي مع النهايات الدائرية في القولون.

الكلمات المفتاحية: بكتيريا المطثية الحاطمة، الضان الصحراوى، التسمم المعوي، الكلية

Introduction

Clostridium perfringens is a serious microorganism that affects humans and animalsdue to their ability to produce several lethal toxins that can cause enteric and or enterotoxemic diseases (Uzal *et al*., 2014; Revitt-Mills *et al*., 2015). Clostridium perfringens is gram-positive anaerobic rod bacteria that are classified into 5 toxino-types (A, B, C, D, and E) according to the type of the toxin (Songer *et al*., 1996; UzalandSonger 2008). Lesions of enterotoxaemia were described in sheep depending on experimental inoculations (Buxton *et al*., 1976; Buxton *et al*., 1978); However, little is known about distribution of lesions in natural cases.Gross and histopathological lesions of clostridial enterotoxaemia in Sudanese Sheep have not been reported before. Taking this into account we described the pathological findings of clostridial enterotoxaemia in naturally infected feed lot Hamari (desert-eco type) lambs for the first time.

Materials & Methods

Two male lambs aged 5 and 6 months respectively were submitted to our necropsy facility for post-mortem. Necropsy was performed after detailed case history was recorded. Sick animals were among a group of feedlot lambs of the Hamari breed. The number of animals that showed signs were 3 out of 20. One lamb died 3 days after showing signs of incoordination and diarrhea. Another lamb was suddenly found dead at animal house in the morning. No symptoms were observed prior death except green diarrhea with offensive odor was noticed around anal orifice and under tail. The third lamb showed signs of diarrhea; However, its health state improved after receiving treatment by giving sterile charcoal orally and single injection of long acting Amoxicillin (L.A). All affected animals were in a good body condition. It worth noting that the owner stated a sudden shift in diet to high concentrate.

After post-mortem, samples from small and large intestines, kidneys, heart, lung, liver and brain were excised, kept in 10% buffered formalin, routinely processed and stained with hematoxylin and eosin (H&E).

Results

Necropsy of the lamb No. 1 revealed; Subcutaneous serous atrophy of fat in various regions of the body. Petechial hemorrhages were observed on the epicardium and endocardium of ventricles. Interestingly, kidneys were remarkably friable and mushy with porridge-like texture. (fig.1).

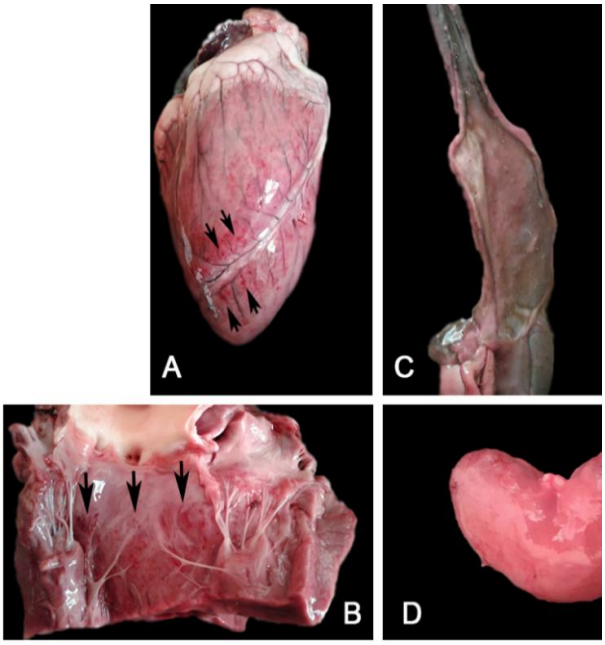

Figure-1. Necropsy of lamb No. 1. **A:** Epicardial petechial hemorrhages were seen parallel to the coronary grove (arrows). **B:** Endocardial petechial hemorrhagesin the left ventricle (arrows). **C:** Green watery contents inside small intestine. **D:** Friable texture of kidney was noted.

Necropsy oflamb No. 2 revealed; Lungs were moderately congested, heavy and wet indicating edema.Ecchymotic hemorrhages were observed in the endocardium of the left ventricle near valve. Hydropericardium was evident. Extensive serous yellowish fluid with presence of a large yellowish fibrin clot were seen inside abdominal cavity. Duodenum was filled with watery hemorrhagic fluids that can be seen through serous surface (fig 2A). Petechial hemorrhages were noticed in the mucosa of the duodenum (fig 3A). Spiral colon showed petechial to ecchymotic hemorrhages in the mucosa (fig 3B). Rumen was filled with undigested dry feed. Interestingly, kidneys were remarkably friable, soft and severely congested.

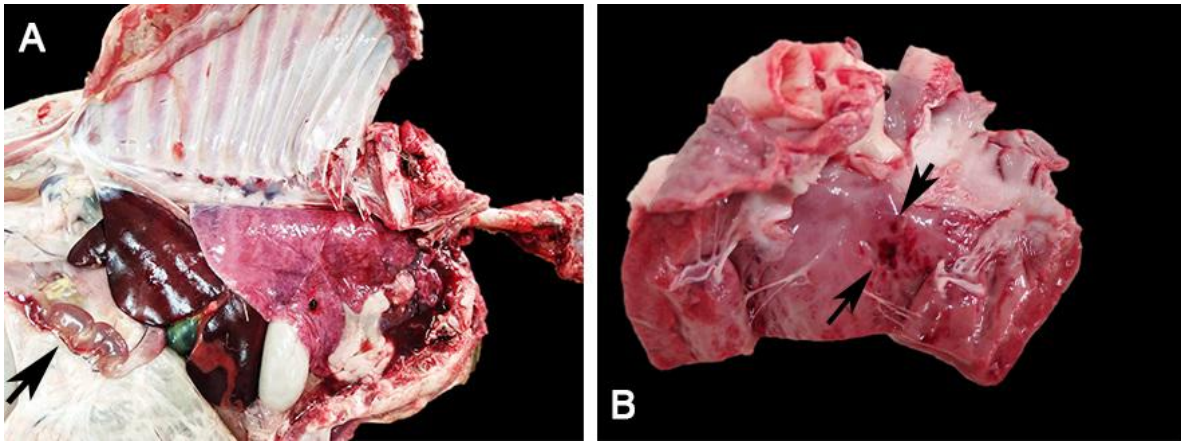

Figure-2. Necropsy of lamb No. 2 died due to enterotoxaemia. **A:** The abdomen was cut opened that showed the duodenum filled with watery hemorrhagic contents (arrow). **B:** EndocardialEcchymotic hemorrhages were observed in the upper side of the left ventricle near valve.

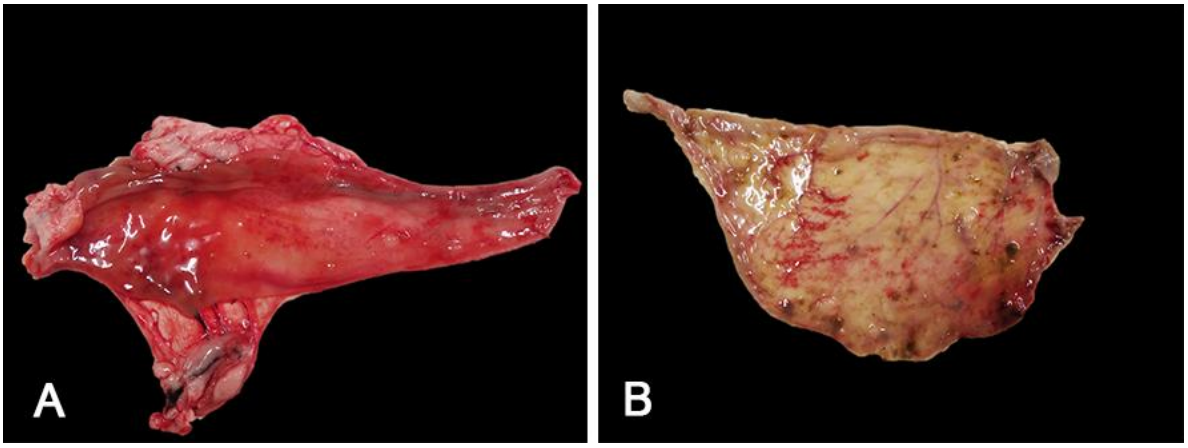

Figure 3. Necropsy of lamb No.2 died due to enterotoxaemia. **A:** Bloody contents were evident in duodenum with petechial hemorrhages. **B:** Petechial to ecchymotic hemorrhages were remarkable in the mucosa of spiral colon.

Histopathological examination of lamb No.1 reveled; Diffused and focal infiltration of rod-shaped with round ends bacteria in mucosa and inside intestinal glands of Spiral colon (fig 4). Lesions were more prominent in kidneys. Acute tubular necrosis (ATN) was evident in large areas in kidney tissue, and it was more evident in renal cortex than medulla (fig 5D). In brain, encephalomalacia and infiltration of oligodendroglia were prominent in cerebral cortex (fig 5A&B). In addition, hyperemia and focal infiltration of lymphocytes were noticed in cardiac muscle (fig 5C).

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Histopathological examination of the lamb No.2 revealed; hemorrhagic duodenitis and colitis characterized by large numbers of mononuclear cells chiefly consisting of lymphocytes in mucosa of duodenum and spiral colon, besides hyperemia in submucosa (fig 6 C&D). Subendocardial hemorrhage and hyperemia were noted in cardiac muscle. Kidneys were severely autolyzed (fig 6B). Cerebrum showed edema around blood vessels and diffuse infiltration of oligodendroglia in the grey and white matter (fig 6A).

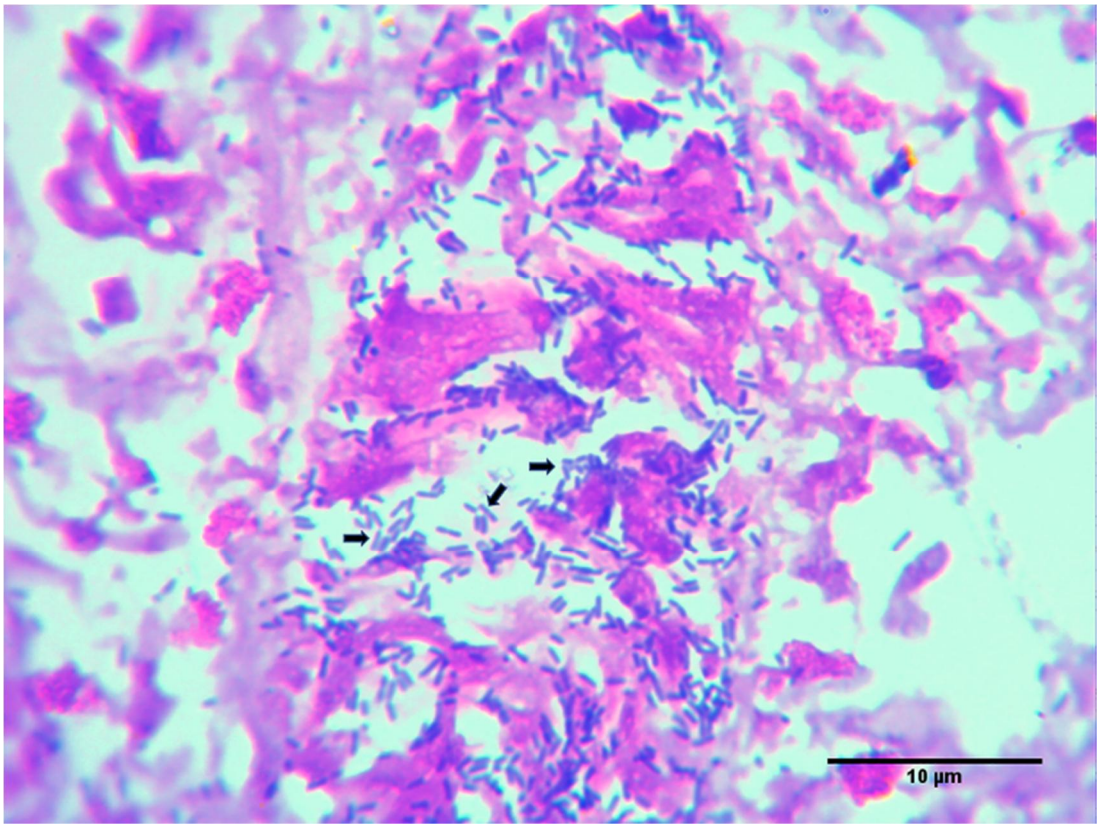

Figure. 4. Histology of lamb No.1 died due to enterotoxaemia. Spiral colon showed large number of bacteria inside intestinal glands. Bacteria have a unique morphology of rod shape with round ends which is a characteristic feature of *Clostridium perfringens*. H&E Stain.

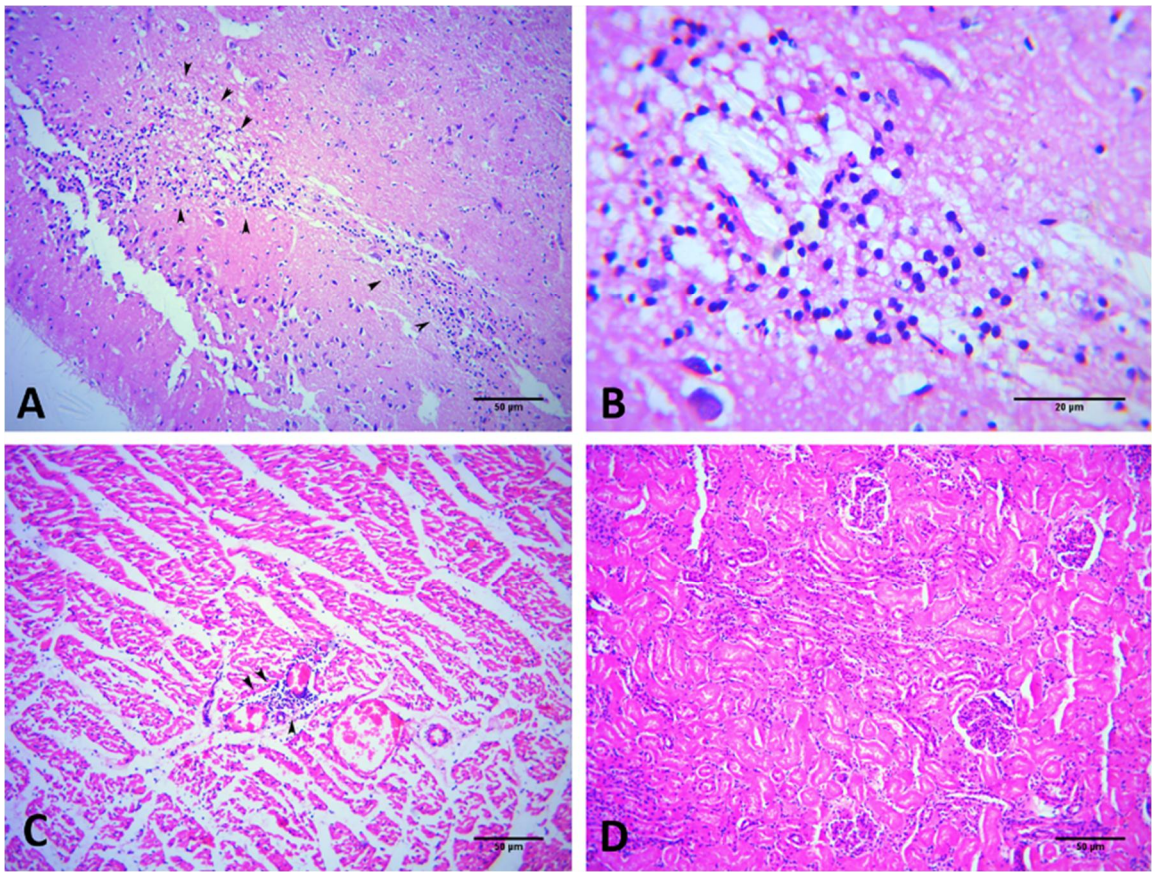

Figure-5. Histologyof lamb No.1 died due to enterotoxaemia. **A:** Vacuolation and infiltration of oligodendroglia were prominent in cerebral cortex (arrow heads). **B:** A closer view of oligodendroglia infiltrating in areas of vacuolation in cerebrum. **C:** Hyperemia and focal infiltration of lymphocytes in cardiac muscle. **D:** Acute tubular necrosis (ATN) was evident in kidneys. H&E Stain.

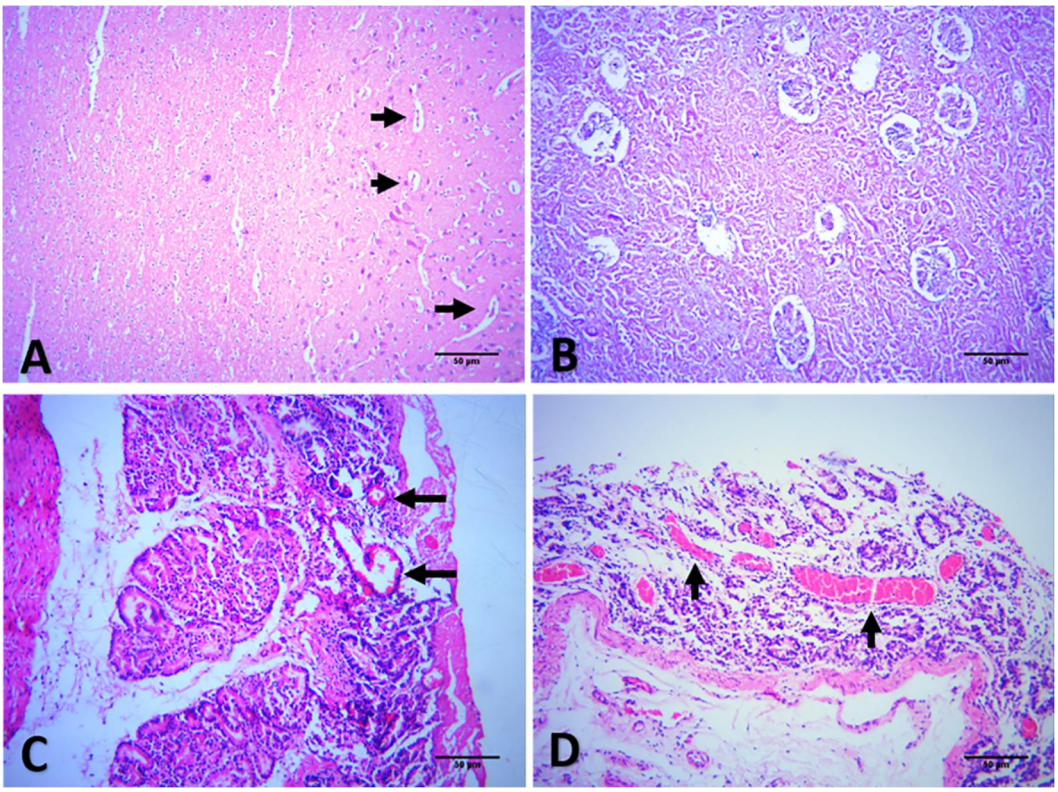

Figure 6. Histologyof lamb No.2 died due to enterotoxaemia. A: Cerebrum showed edema (arrows). B: Kidneys were severely autolyzed. C & D: Hyperemia was remarkable in duodenum and spiral colon respectively. H&E Stain.

The pathology of *C. perfringens* enterotoxaemiahave not been reported before in Sudanese sheep. We therefore described the lesions that were typical for *Clostridium perfringens* enterotoxaemia in feed lot Hamarilambs. Diagnosis was established based on case history, symptoms and lesions. In our reportcases of diarrhea were noted after sudden shift in diet to high concentrates that contain Sorghum and wheat bran. Likewise, this observation was reported by Lewis (2000). Symptoms of disease were acute and per acute in thefirst and second lamb respectively, which were consistent with Uzal and Songer (2008) findings. Lesions were characterized by hemorrhagic duodenitis and colitis associated with presence of short bacilli with round ends bacteria which is typical for *C. perfringens* in mucosa of colon.In addition, petechial and ecchymotichemorrhages along with serous fluids in body cavities were observed.Moreover, Kidneys were markedly autolyzed considering the time from death to necropsy and that was shown by pulpy and soft texture of kidneys when compared to other parenchymatous organs. Furthermore, Encephalomalacia and cerebral edema were prominent. Interestingly, the aforementioned lesions were in agreement with previous reports byBarker (2007), Giannitti(2021), Salvarani(2019),Uzal and Songer(2008),Uzal(2008). To the best of our knowledge, this is the first case report of clostridial enterotoxaemia in Hamari Sheep.

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