

Full Length Research Paper

Studies on the rumen pathology of Sudanese desert sheep in slaughter house

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Accepted 24 June, 2008

The present study was conducted to study the pathology of the Sudanese sheep in Elshaheed Nasr Eldeen slaughter house, Khartoum-North, Sudan. The prevalence of foreign body in rumen is substantially high. Haematology revealed decrease in RBC, PCV, Hb and MCV whereas there is increase in MCH and MCHC which indicated microcytic hyperchromic anaemia. Necropsy of rumens revealed congestion, haemorrhage, slough, and erosion. Focal thickening, diffuse, non-pattern of papillary shortening and stunting of the mucosal rumen were seen. However, thinning of the rumen walls were observed in some cases. Histopathological examination revealed the hyperplastic changes with prolonged rete pegs and frond-like downward growths.

Key words: Foreign body, rumen, desert sheep, slaughter house.

INTRODUCTION

Sudan accommodates a huge number of sheep. Sudanese sheep are reputed for their quality meat which is in rising demand by consumers in Middle East countries; and for their highly valued skins (McLeroy, 1961a, 1961b; Muffarrih, 1991). Sheep of the Sudan are mainly maintained on rangeland under migratory system of production to make use of land resources where other agricultural activities are limited by climate, soil, environmental conditions or by lack of irrigation water. The climatic conditions under which Sudan desert sheep are maintained are characterized by long dry season and a short wet season; and these results into seasonal availability of grazing. Desert sheep are thirst tolerant and can walk long distances. They have been found to tolerate high ambient temperature more than goats under experimental conditions (McLeroy, 1961a).

It is generally accepted that sheep are selective feeders and ingest significantly less foreign bodies compared to cattle. In cattle, metallic foreign bodies are present in the reticulum. It was reported that a large proportion of cattle with ingested foreign bodies (plastic) in the rumen had displacement of abomasum and a decrease in milk production (Al-Majali et al., 1995). In sheep the incidence of foreign body ingestion was only 2% in adult sheep and 0.1% in lambs (Radostitis et al., 1994). Traumatic reticulo-hepatitis in a sheep and reticular bleeding in a heifer causing sudden death were reported by

Hailat et al. (1993, 1996). As the grazing lands become more and more polluted with plastics, ropes, hair, wool and metals, it may be predicted that foreign bodies would be a growing problem for grazing animals in the Sudan (Mohammed, 2004).

Foreign body incidence is responsible for many deaths per year in Sudan (Mohammed, 2004). Mohammed et al. (2006) recorded the prevalence of foreign body in caprine rumen during the hot dry season ranged from 32 to 10% during the years 1998-2002 and declined in winter from 11 to 3% during the same period. Hailat et al. (1997) recorded the prevalence and associated pathology of foreign body in the rumen and reticulum of sheep presented to the veterinary clinic and slaughter houses in Jordan. Hailat et al. (1998) found that sub clinical cases exceeded clinical ones. The prevalence in sheep was low, yet it is still considered quite important.

Metallic foreign bodies were also reported in sheep in Jordan as the result of heavy environmental pollution (Abo-Shehadeh et al., 1991; Hailat et al., 1996b). Remi-Adewunmi et al. (2004) carried out an abattoir survey of foreign body and rumen impaction of small ruminants in Nigeria. They recorded 77% of sheep and 20.7% of goats have had indigestible garbage. They also reported that sex and age had a significant interaction with rumen impaction, occurring more in females of over 30 month of age. Breed distribution of rumen impaction in sheep was



Figure 1. Recumbency of sheep

Table 1. Prevalence and pathological conditions of rumen.

Pathological condition	Number of cases
Foreign body	60
Impaction	2
Haemorrhages	48
Rumenitis	62
Damage of papillae	49
Abscess	2
Parasite	1

significantly higher in some breed than in others. Abdelmajeed et al. (1991) found that foreign bodies in goats in Sudan were 5-30% of clinical cases presented to clinics. Ruminal indigestion in goats was attributed to foreign bodies and progressive toxicity was proposed to be the cause of death in goats (Fouad et al., 1990).

Sheep with foreign body show inappetence for several days or complete anorexia with evidence or loss of weight, an enlarged apple shaped abdomen; pear shaped on right and apple shaped or the left with or without bloat. In most cases there are no or less abnormalities on haematological examination (Radostitis et al., 1994). The main pathological lesions encountered in sheep with plastics in their rumens were rumenitis, erosion and hyperplasia (Hailat et al., 1995). Pathological hyperplasia may be a precursor to neoplastic proliferation (Robbins et al., 1984). It is unclear whether these hyperplastic changes were due to the mechanical irritation induced by the ingested plastic or to some chemical substances released from the plastic irritating the proliferation of the ruminal epithelium (Hailat et al., 1998). The present work was planned to investigate the clinical signs, haematological changes and the pathologic lesions associated with foreign bodies in the rumen.

This condition is economically important because of the severe loss of production. It causes high mortality rate and many cases go unrecognized. Among the clinically

affected animals about 25% develop incurable condition while other 75% can be expected to recover completely with conservative treatment or routine surgical intervention (Radostitis et al., 1994).

MATERIALS AND METHODS

Sixty two 1-2 years old male sheep were ante mortem examined and used in this study. The study was carried out in Elshaheed Nasr Eldeen slaughter house, Khartoum North, Khartoum, Sudan. Blood sample were collected from the jugular vein of sheep in heparinized vacutainers and examined for haemoglobin concentration (Hb), packed cell volume (PCV), red blood cell (RBC) counts, and white blood cell (WBC) counts (Coles, 1986).

Postmortem findings were recorded and the grossly affected rumens were examined immediately after slaughtering for the presence of foreign body, impaction, rumenitis and haemorrhages. Samples of tissue specimens of each case were fixed in 10% neutral buffered formal solution and processed by paraffin embedding technique for microscopy (section at 5 μ m and stained with haematoxylin and eosin (H and E) (Bancroft and Stevens, 1990).

RESULTS

The clinical finding ranged from severe to mild in newly ingested foreign body and small disseminating parts. Some showed decumbency, dullness, weakness and emaciation (Figure 1) and some showed respiratory difficulties. All sheep weight ranged between 9-11 kg. Table 1 shows the prevalence of foreign body and other pathological conditions found in rumen. Foreign bodies were found in almost 60 sheep while impaction was only two cases. Most cases showed degrees of rumenitis. Haemorrhage and congestions with damages on ruminal papillae were observed.

Haematological data showed that sheep with foreign bodies had high white blood cell (WBC) counts and low RBC count, PCV and Hb concentration. The MCV, MCH and MCHC values were high. Gross examination revealed that all animals with histological are proven to have rumen lesions. The signs of rumenitis, haemorrhage, and presence of foreign body were obvious on gross examination with majority of plastic foreign body cases (Figure 2) and impaction. These were confirmed with microscopic examination that showed that rumenitis papillae damage was present.

On necropsy, areas of congestion, haemorrhages (Figure 3), and stunting of the papillae, thickening of the wall, erosion, ulceration and scar formation were seen in the rumen. In sparsed papillae, there were shortening. In other areas complete loss of patches of papillae was evident. Sloughed mucosa was also observed. Histopathological lesions concerned with foreign body includes: hydropic degeneration, cellular vacuolation, submucosal oedema and disruption of stratified epithelium with dilated lymphatics in sub mucosa. Focal hyperplasia of the ruminal epithelium in different regions was also prominent. It had the appearance of finger like projections of variable length was growing towards the lamina propria and the



Figure 2. Foreign body in ruminal content (black plastic).



Figure 3. Areas of haemorrhage and foreign body.

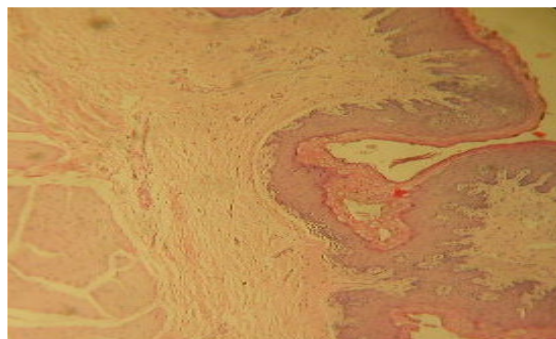


Figure 4. Downward hyperplasia of sub mucosa. Papillae broad and fungoid. H and E (200x).

underlying sub mucosa and in some cases reaching the muscularis (Figures 4, 5, 6, 7 and 8).

DISCUSSION

The prevalence of foreign body in sheep is substantially

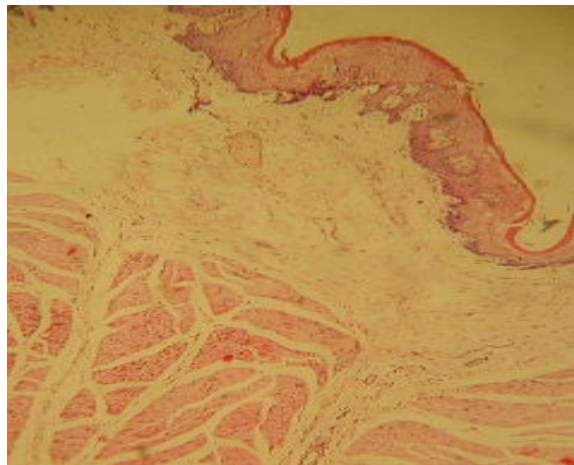


Figure 5. Downward hyperplasia of sub mucosa. Thickening of keratinized cell layer and compacted vacuolation and intracellular pigments. Thick separated muscle layers. H and E (200x).

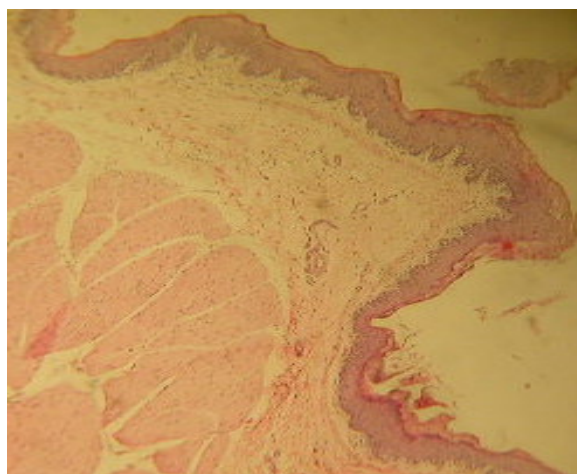


Figure 6. Patchy thickening of ruminal mucosa and widening of submucosa with a small number of polymorphonuclear inflammatory cells infiltration. H and E (200x).

high compared to previous studies by Radostitis et al. (1994), Hailat et al. (1996) and Mohammed et al. (2006). This is most likely due to the increased pollution of grazing lands by plastics. It has been reported that this condition may be associated with shortage of feed especially minerals and vitamins, (Rossow and Horvath, 1985; Hailat et al., 1996).

Sheep with plastics had low RBC, PCV, Hb and MCV. MCH and MCHC were increased suggesting a microcytic hypochromic type of anaemia (Coles, 1986; Hailat et al., 1995; Hailat et al., 1996). The sloughing, stunting, erosions, inflammatory response, and the hyperplasia are most likely to be due to the pressure on the wall of the rumen caused by the foreign body. This may also be due to the chronic irritation of the fore-stomach wall by the

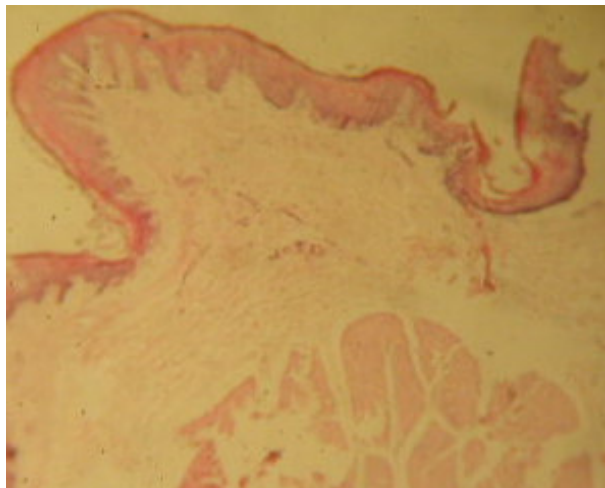


Figure 7. Elongated papillae; Some area of thin mucosa; pigmented cells. H and E (200x).

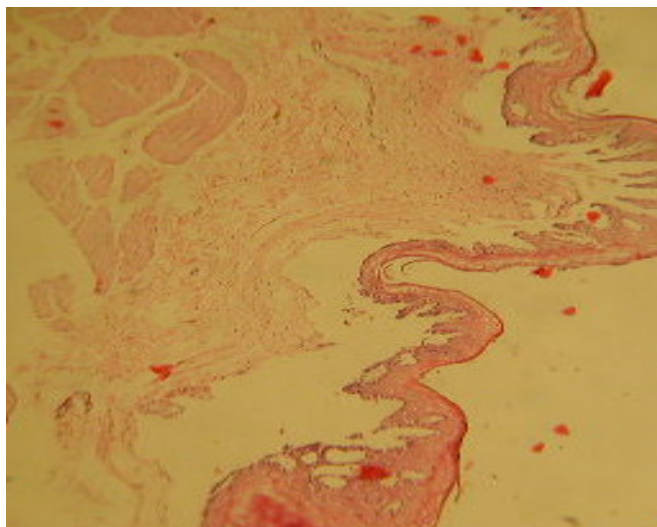


Figure 8. Separation of mucosa. Thickened area of mucosa with vacuolation. Collection of mononuclear cells. H and E (200x).

foreign body leaving the wall exposed to secondary infection which resulted in both inflammatory and hyperplastic changes. Dowan et al. (1995) reported only a minimal inflammatory response in the brain of sheep to plastic particles which had found their way into the brain parenchyma after intra-arterial injection.

The hyperplastic changes seen in the rumen are of great interest. These changes are due to the mechanical irritation induced by the foreign body or to some chemical substances released from the plastic which initiated the proliferation of the epithelium of the rumen. It is well known that pathologic hyperplasia constitutes a fertile soil in which cancerous proliferation may eventually arise (Robbins et al., 1984). In none of these cases, however,

were tumors found. Most of these findings were consistent with those reported by others in cattle (Rook and Thomas, 1983; Barker and Van Dreumel, 1985; Tanimoto et al., 1994).

It is concluded that the ingested foreign bodies (plastics in particular) may play an important role in the pathogenesis of rumenitis in sheep and represents one of the distinct types of rumenitis. It also causes a very distinct type of ruminal hyperplasia. The results also suggest that the most common foreign body in sheep in Sudan is plastic bags and a clean-up of the environment will substantially reduce foreign body-pica syndrome in sheep.

ACKNOWLEDGEMENTS

I am grateful to Professor AA. Gameel, Faculty of Veterinary Medicine, University of Khartoum for great help and advice and thanks are due to students: Gareeballah Adam, Ali Salheen, Israa Babiker, Mohammed ElDai and Rania Abdalkareem, College of Veterinary Medicine and Animal Production, Sudan University of Science and Technology for their technical help.

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