



Review on foreign body in rumen and reticulum of ruminants

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ABSTRACT

Cattle play significant contribution in Ethiopian economy as source of meat, milk, drought power, income and foreign exchange. Gastrointestinal foreign bodies are among the most

common surgical emergency in veterinary medicine. Swallowed metallic object such as nails or piece of wires, fall directly into the reticulum or pass in to the rumen and are subsequently carried over the rumen reticular folds into the cardio-ventral part of the reticulum. Cattle are more likely to ingest foreign bodies than small ruminant since they don't use their lips for prehension and are more likely to eat a chopped feed. The condition is more common during drought because animals are grazing closer to the ground. The object can penetrate the diaphragm and enter the thoracic cavity causing pleuritis. Metal detectors were used at one time to aid in the diagnosis of traumatic reticuloperitonitis. Ferrous metallic foreign bodies can be detected with metal detectors. Foreign bodies have great economic significance associated with reduced production and productivity of animals suffering from them.

Keywords: Foreign body, Reticulum, Rumen, Ruminants

1. INTRODUCTION

Ethiopia has great potential for increased livestock production, both for local use and for export. However, expansion was constrained by inadequate nutrition, disease, lack of support services and inadequate information on how to improve animal breeding, marketing and processing. Thus, the country is not utilizing this huge potential livestock resource and an improvement in this sector. Therefore, has the potential to contribute significantly to national income and to the welfare of the majority of rural families (CSA, 2009). However, their contribution is below their expected potential due to prevalent livestock diseases, poor management system and poor genetic performance (Abebe, 1995). Cattle are more susceptible to foreign body syndrome than small ruminants because they do not use their lips for prehension and they eat chopped feed; lack of oral discrimination in cattle may lead to ingestion of foreign bodies would be rejected by other species (Desiye and Mersha, 2012). Traumatic reticuloperitonitis (TRP) is a relatively common disease in adult cattle caused by the ingestion and migration of a foreign body in the reticulum. The typical foreign body is a metallic object, such as a piece of wire or a nail, often greater than 2.5 cm in length. The majority of affected cattle (87%) are dairy cattle and 93% are older than 2 years of age. It has been hypothesized that dairy cattle are more commonly affected than beef cattle since they are more likely to be fed a chopped feed, such as silage or hay (Hailant *et al.*, 1996). A large number of adult dairy cattle have metallic foreign bodies in their reticulum without signs of clinical disease (Rebhum *et al.*, 1995).

Ingestion of foreign body in cattle is result a condition of great economic importance and causes severe loss of production and high mortality rate. The ingestion of foreign body is mainly related with nutritional deficiencies and feeding management and cause various problem in different organ of the animal, mainly in rumen and reticulum. The problem that are caused vary with the duration that the foreign body has been present, the location of the foreign body, the degree of obstruction that is caused as well as problems associated with the material of the foreign body. The disease of rumen and reticulum are great economic importance because of severe losses on productivity of the animals sometimes leading to the death of the animals (Radostits *et al.*, 2007). Entrance and migration of foreign bodies through the body tissues lead to many complications that differ according to the nature of the foreign body and the way of its entrance in to the tissues. TRP relatively common disease in cattle caused by the ingestion of

foreign bodies in the reticulum swallowed metallic objects fall directly on the reticulum or pass into the rumen and subsequently carried over the rumeno-reticular folds in to the cranio ventral part of the reticulum (Jones *et al.*, 1997).

Non metallic foreign bodies in the reticulo-rumen cause recurrent rumen tympani in adult dairy cattle over a period of time, these materials, form large tight balls inside the rumen leading to anorexia decreased production and progressive loss of body condition (Jafarazadeh *et al.*, 2004). The presences of foreign bodies in the rumen and reticulum also hamper the absorption of volatile fatty acids (VFA) and consequently reduction in the rate of animal fattening. The perforation of the wall of the reticulum allows leakage of ingesta and bacteria which contaminates the peritoneal cavity, resulting in local or diffuse peritonitis and also penetrate pleural cavity causing pleuritis and pneumonitis and into the pericardial sac causing pericarditis (Cavedo *et al.*, 2004).

The condition is serious in our country usually in urban and peri-urban areas where extensive farming system are carried out and proper plastic material disposal is no conditioned and so thrown on roads and near the fence or anywhere and that is way our dairy cattle are dying mainly associated with foreign bodies (Ramaswamy and Sharma, 2011). In Ethiopian formation regarding the magnitude and occurrence of fore stomach foreign bodies is very limited. The fact that rumen impaction by these foreign bodies is mainly a symptomatic in nature and only diagnosed in live animals if the material is accumulated in large amount and thus, it can be adequately studied in abattoirs (Desiye and Mersha, 2012).

Based on the above statements the objectives of this study are:

- a) To assess the prevalence of rumen and reticulum foreign bodies in cattle slaughtered at Jimma Municipal Abattoir,
- b) To identify the type of rumen and reticulum foreign bodies and to study the associated risk factors with the ingestion of foreign bodies in cattle.

2. LITERATURE REVIEW

2.1 Etiology

Swallowed metallic object such as nails or piece of wires, fall directly into the reticulum or pass in to the rumen and are subsequently carried over the rumen reticular folds into the cranio ventral part of the reticulum. The reticulo-omasal orifices elevated above the floor, which tends to retain heavy object in the reticulum and honey comb like reticulo mucosal surface traps sharp object (Radostits *et al.*, 2007). Perforation of the wall of reticulum allows leakage of ingesta and bacteria which contaminates the peritoneal cavity (Kahn, 2005). In addition vigorous contraction of reticulum aided by the movement of diaphragm make the thin potential foreign body to penetrate through the reticular wall at different sites and in varying direction (Sharma and Pankaj, 2006).

Rumen tympany due to metallic or nonmetallic mostly polythene material foreign bodies are among the most common cause of gastrointestinal disorders in ruminants (Radostatis *et al.*, 1994). Plastics can be termed as wide range of chemical materials either synthetic or semi synthetic solid materials like polyethylene, polyvinyl chloride and polystyrene largely used in plastics manufacturing industry, which pose a threat to livestock and environment. Plastic garbage continues to increase in modern world, more concentrated in cities and towns (Ramaswamy and Sharma, 2011). Ingested foreign bodies by cattle are divided in to two main groups which are called foreign body of metallic origin and foreign body of non metallic origin (Vanitha *et al.*, 2010).

2.2 Epidemiology

The majority of affected cattle 87% are dairy cattle and 93% are older than two years of age (Kahn, 2005). It is hypothesized that dairy cattle are more commonly affected than beef cattle since they are more likely to feed a chopped feed such as silage or hay. The disease is usually sporadic but out breaks has occurred when sources of wire have become mixed in to feed supplies. Adult dairy cattle are most commonly affected because of their more frequently exposure (Hailat *et al.*, 1996). The condition is more common during drought because animals are grazing closer to the ground or are being fed harvested material that is contaminated with foreign objects (Mohammad *et al.*, 2006). Due to intensive system of livestock rearing for maximal production, high-rise in deficiency state especially of calcium, phosphorus and micro-minerals, has resulted in perverted appetite, which is one important factor for intentional ingestion of foreign objects.

2.3 Pathogenesis

If the reticular wall is injured without penetration to the serous surfaces no detectable illness occur and the foreign body may remain fixed most perforation occurs in the lower part of the cranial wall of reticulum but some occur laterally in the direction of the spleen and medially towards the liver. In the sites for long period and gradually be corroded away (Radostitis *et al.*, 2007).

The initial reaction to perforation is one of acute local peritonitis and depending on the severity of the local peritonitis. The ventral aspects of the reticulum becomes adherent to varying degrees to the abdominal floor and diaphragm. This result in decreased reticular motility and reticular abscess formation which is a common complication and may be located between the reticulum and the ventral body wall, between the reticulum and the right thoracic wall and between the reticulum and the spleen (Andrews *et al.*, 2003). Spread of the inflammation causing generalized or diffuse peritonitis may occur in the cows that calves at time of perforation and in cattle that are forced to exercise. During the initial penetration of the reticulum, the foreign body may penetrate beyond the peritoneal cavity and into the pericardial sacks or pleural. This may occur commonly in cows in advanced pregnancy than in non-pregnant cows this is because of gravid uterus, although it is uncertain (Semieka, 2010).

The object can penetrate the diaphragm and enter the thoracic cavity causing pleuritis and sometimes pulmonary abscessation and the pericardial sac causing pericarditis, sometimes followed by myocarditis. Occasionally, the liver or spleen may be pierced and become infected, resulting in abscessation, or septicemia can develop (Gokce *et al.*, 2007). Rumen impaction is a condition which results from the accumulation of the indigestible materials in the rumen which interferes with the flow of ingesta leading to distention of the rumen and passing of scanty or feces (Radostits *et al.*, 2007).

2.4 Clinical Signs

The initial penetration of the reticulum is characterized by sudden with complete anorexia, rumino reticular atony and marked drop in milk yield usually to about one third or less of the previous milking (Andrews *et al.*, 2003). The animal is reluctant to move and does so slowly walking; particularly downhill is often accompanied by grunting. The heart rate is normal or slightly increased, and respiration is usually shallow and rapid. Initially, the cow exhibits an arched back; an anxious expression; a reluctance to move; and an uneasy, careful gait. Forced sudden movements as well as defecating, urinating, lying down, getting up, and stepping over barriers may be accompanied by groaning. A grunt may be elicited by applying pressure to the xiphoid or by firmly pinching the withers, which causes extension of the thorax and lower abdomen (Misk *et al.*, 1999).

Most animals prefer to remain standing for long periods and lie down with great care and arching of the back occurs in about 50% of cases, along with the appearances of tenseness of the back and the abdominal muscles so that the animal appears gaunt or "tucked up". Defecation and urination cause pain and the acts are performed infrequently and usually with grunting. This result in constipation scant feces and in some cases retention of urine (Radostits *et al.*, 2007). Rumination is absent and reticular and rumen movements are markedly depressed and usually absent and pain can be elicited by deep palpation of the abdominal wall just caudal to the sternum (Gokce *et al.*, 2007). In chronic peritonitis, the appetite and milk yield does not return to normal after prolonged therapy with antimicrobials. The body condition is poor, the faces are reduced in quantity and there is an increase in undigested particles. A persistent slightly elevated temperature is supportive evidences of the presences of a chronic inflammatory lesion. Clinical signs associated with chronic peritonitis include anorexia, unthriftiness, decreased milk production, rumen hypomotility and change in manure consistency (Cavedo *et al.*, 2004).

Localized traumatic reticulo peritonitis is characterized by varying degrees of locally extensive fibrinous adhesions between the cranioventral and the ventral aspects of the reticulum. Adhesions and multiple abscesses may extend to either sides of the reticulum involving the spleen, omasum, liver, abomasum and ventral aspects of rumen. Large quantities of turbid foul-smelling fluid containing clots of fibrin are usually present (Radostits *et al.*, 2007).

2.5 Diagnosis

2.5.1 Metal detection

Metal detectors were used at one time to aid in the diagnosis of traumatic reticuloperitonitis. Ferrous metallic foreign bodies can be detected with metal detectors but the instruments are of limited uses because most normal dairy cows are positive for metal over the reticular areas. An electronic metallic detector may identify metal object in the reticulum but does not distinguish between perforating and non-perforating foreign body (Rahel, 2011).

2.5.2 Laparoscopy

Laparoscopy in cattle is a promising tool for clinical diagnosis and treatment. The application of this tool during abdominal explorations biopsies allows the avoidance of invasive and useless surgical interventions and even diagnosis and prognosis of certain conditions (Sojka *et al.*, 1990).

2.5.3 Ultrasonography and radiography

In contrast to radiography, ultra sonography provides more precise information about the contour of the reticulum and reticular motility (Radostits *et al.*, 2007). In cattle with TRP ultra sonography can be used to identify morphological changes in region of cranial, ventral or caudal reticular wall. Radiography obtained allows the identification of radio opaque bodies and gas/ fluid interfaces typical of an intrabdominal abscess. The drawback of

this technique is that not all heavy sharp objects will have sufficient density to show on an x-ray (Rahel, 2011).

2.5.4 Wither Pinch test

Wither test by pinching withers to cause depression of back and eliciting grunt is effective diagnostic tool. Tympanic sounds usually heard 2-3 seconds before primary ruminal contraction can be felt through the left flank (Sharma and Pankaj, 2006). The foreign body syndrome can be diagnosed by palpation on both sides of abdomen and with a stethoscope for evidence of grunt (Singh, 2005).

2.6 Treatment

Two methods of treatments are used for TRP which are conservatives or medical treatment and rumenotomy. Conservative treatment comprises immunization of the animal by administration of antimicrobial for the inflammation for 3-5days (Radostatis *et al.*, 1994). A magnet administered orally falls into the cranial sac of the rumen, but normal ruminal contraction usually brings the magnet to the reticulum and foreign bodies still partially in the lumen of the reticulum that have injured the reticular wall are attracted to and fixed to the magnets, thus preventing their migration from continuing and most times returning the foreign body into the lumen of reticulum (Roman and Hiwot, 2010). Rumenotomy in cattle is a routine procedure for treatment and diagnostic purposes. Surgical removal of the foreign body through the rumenotomy incision is widely used as a primary treatment. The recovery rate varies depending on when the surgery is done relative to the time of initial penetration (Ramaswamy and Sharama, 2011).

2.7 Control and prevention

Prevention of hard ware disease in dairy cattle involves around managing animal feed and animal grazing areas so they avoid ingestion of heavy sharp object. Bovine eating habits cannot be altered and prevention of sharp objects in the feed is not entirely possible, so prophylactic insertion of magnets at the early ages is a good idea (Radostitis *et al.*, 2007). Eliminating sources of sharp foreign objects in the feed supply prevents TRP. Installation of large magnets on feed handing equipment and prophylactic administration of the fore stomach magnets to all animal at 6 to 8 month of ages prevent almost all cases caused by magnetizable object (Smith, 2009). Prevention of TRP is preferred to either conservative medical treatment or surgery (Eddy, 1992).

Although one source does not believe magnets are an effective preventative measure the majority of clinicians agree that all cattle over one year of age should have a prophylactic magnet placed in the reticulum (Ducharme and Fubini, 2004). Cattle should be kept away from construction sites and crop fields should be monitored for metal debris. Also, processed feed can be passed over magnets to recover any magnetic foreign bodies prior to being fed to cattle (Buczinski *et al.*, 2010).

2.8 Conclusion and Recommendation

Foreign bodies have great economic significance associated with reduced production and productivity of animals suffering from them. Ingestion of metallic and non- metallic foreign bodies by cattle is the most important not only because of its mortality and morbidity but also it contributes a lot for animals output.

Thus, based on the above conclusion; awareness for animal owners should be implemented to avoid the risk of foreign body ingestion by their animals, keeping cattle away from the site of new construction and keeping away from old and unclear grazing sites, animal owners should be advised to keep their cattle in intensified manner so that the owners could easily control their accessibility to foreign bodies.

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