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Research Article

Prevalence Of Foreign Bodies in Rumen and Reticulum of Cattle Slaughtered at Gimbi Municipal Abattoir

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Abstract

A cross-sectional study was conducted from November 2022 to April 2023 on 484 slaughtered cattle at Gimbi municipal abattoir to determine the prevalence of foreign bodies in their rumen and reticulum and to identify the common risk factors associated with its occurrence. Animals presented for slaughter were examined and all informations were recorded during ante-mortem inspection. On post-mortem inspection, rumen and reticulum of slaughtered cattle were thoroughly examined by visual inspection and palpation and all the contents were inspected. The types of foreign bodies were identified and recorded after washing. From 484 animals examined, 65 (13.4%) were found positive for the presence of foreign bodies in rumen and no foreign body was found in reticulum. The types of foreign bodies detected were plastics, piece of cloth, rope, needle and shoelace. Plastics were the most common foreign body (75.4%) found in this study. Prevalence of foreign bodies were significantly associated with body condition and age of the animals ($p < 0.05$). Foreign bodies were more frequent in older cattle (>8years) than in younger (4-8years). The prevalence of ruminal foreign bodies were highest in poor body conditioned animals compared to cattle with better body condition. The prevalence of foreign body ingestion found in cattle by this study show that littering the environment with plastics and other indigestible materials could pose health problem for free grazing cattle. So proper disposal of non-dietary material is very important to prevent health problem caused due to ingestion of foreign bodies by cattle.

Keywords: Abattoir; Cattle; Foreign body; Gimbi, Prevalence; Reticulum; Rumen

Introduction

Ethiopia is a leading country in the number of livestock population in the African continent with an estimated 59.5 million cattle, 30.7 million sheep, 30.2 million goats and 56.53 million poultry [5]. The livestock sector has a significant role in socioeconomic activities of the country and contributes much to the national economy particularly with regard to foreign currency earnings through exportation of live animals, meat, skin, and hides [1]. However, the output of this livestock sector in terms of its contributions to the improvement of the livelihood of animal owners and for the growth of national economy is at a lower stage compared to the vast resource on hand [17,18]. The major constraints contributing to low productivity include low genetic potential of the animals, poor nutrition and prevailing animal diseases [6,7].

Among the prevailing animal diseases, ingestion of foreign bodies by ruminants is becoming a common worldwide problem [11]. Gastrointestinal foreign bodies are among the most common surgical emergency in veterinary medicine. Cattle are more susceptible to foreign body syndrome than small ruminants because they do not use their lips for prehension and are more likely to eat chopped feed; lack of oral discrimination in cattle may lead to ingestion of foreign bodies would be rejected by other species [32]. Ingestion of foreign body in cattle is result a condition of great economic importance and causes severe loss of production and high mortality rate [24].

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 [16]. 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. Ruminant are notorious for ingestion of foreign bodies. Ingestion non- dietary materials in mainly related to nutritive deficiency and feeding management of

the animals and causes various problems in different organs of the animals glositis, esophagitis, ruminitis, impaction of rumen, traumatic pericarditis (TP) and traumatic reticulo-peritonitis (TRP) are the possible health problems which can be caused by the ingestion of foreign bodies by the ruminants. Among these, disease of rumen and reticulum are of great economic importance because of severe losses on productivity of the animals sometimes leading to the death of the animals [32].

Ingested foreign bodies by cattle are divided into two main groups; the first category is foreign bodies of metallic origin and the second is foreign bodies of non-metallic origin. The types of foreign bodies that found in rumen and reticulum of cattle were plastics, clothes, ropes, needles, nails and wires [3]. Some of these foreign bodies were penetrating, while others were found accumulated in the rumen [2]. Ingestion of indigestible foreign bodies in cattle is a pathological condition of both economic and health importance [21]. Indigestible plastic foreign bodies that accumulated in the rumen of ruminants causes ruminal impaction, recurrent tympany, and many other adverse health effects [21]. Entrance and migration of foreign bodies through the body tissue leads to many complications that differ according to the nature and the ways of its entrances in to the tissue [27]. The ingestion of foreign bodies that penetrate the reticulum, the diaphragm and pericardium, resulting in traumatic pericarditis. The extensive management system can be incriminated as a major predisposing factor for acquiring indigestible rumen foreign bodies in ruminants; shortage of forage during dry season and nutritional deficiency also leads animals to find their own feed from grazing lands, which is potentially contaminated with various types of indigestible foreign bodies [19].

The problem is serious usually in the urban and peri-urban areas where there are extensive buildings constructions are carried out and where there are improper lastic materials disposal. These materials are thrown on the roads and near the fences or anywhere and this is the way or the main cause of dying mainly due to the foreign bodies [26]. The fact that rumen impaction by those foreign bodies is mainly asymptomatic in nature and only diagnosed in live animals if the material is accumulated in large amount and thus, it can be adequately studied during postmortem examinations in the abattoirs [32].

The types and prevalence of foreign bodies in rumen and reticulum of cattle has been identified and reported by [20] at Badano woreda Municipal abattoirs in eastern Ethiopia, [4] at Nekemte Municipal abattoir in Western Ethiopia, [31] at Gondar Elfora abattoir in Northern Ethiopia.

However, no studies have been carried out on types and prevalence of foreign bodies in cattle and associated risk factors for the occurrence of foreign bodies on cattle in the study area. Therefore, the objectives of the present study were

- To determine the Prevalence of foreign bodies,
- To identify the types and risk factors that are associated with the occurrence of foreign bodies in rumen and reticulum of cattle slaughtered at Gimbi municipal Abattoir.

Materials and Methods

Study area

Gimbi town is the capital town of West Wollega zone and located in the eastern part of the zone at a distance of 441 km from Addis Ababa. Astronomically the study area is located between 9^0 10'N to 9^0 17'N latitude and 35^0 44'E to 36^0 09'E longitude [8].

Study animals.

The study was conducted on cattle slaughtered at Gimbi Municipal Abattoir. Cattle slaughtered in the abattoir came from the town itself and localities around the town like Enango, Jitu, Dongoro, Arjo, Tole and others. Those animals came from local areas were considered as animals originated from rural area and those bought from Gimbi town as those from Town (urban) area. All cattle slaughtered were local breed, male and adult.

Study design

A cross-sectional study method was conducted from November 2022 to April 2023 to assess the prevalence of the rumen and reticulum foreign bodies andto identify the types of foreign bodies and associated risk factors for the occurrence of the foreign bodies. Breed, age, body conditions, sex and origin of the studied animals were considered as risk factor for occurrence of foreign bodies. During the study time the animals were categorized into three as young, adult and old and age of studied animals were estimated based on dentition pattern and their body condition scoring was made based on their origin, animals were grouped into six different districts.

Sample size determination

The study animal were selected using simple random sampling method from cattle slaughtered on the day of sampling after assigning unique number to each and every cattle slaughtered that day.

The required sample size was determined based on the procedure and formula described by (34); using 50% expected prevalence of foreign bodies in cattle in the area, and 5% desired absolute precision and at 95% confidence level and calculated as follow;

$n = (1.96)^2 Pexp. (1-Pexp)/d^2$

Where,

n = required sample size.

Pexp = Expected proportion of population of indigestible Foreign bodies are 50%.

d = Desired absolute precision (0.05).

Using the above formula, the minimum of 384 cattle are intended to be sampled but to generate reliable data and to increase the precision, the sample size was increased and 484 cattle were taken

Study Methodology

Ante- mortem examination

During ante-mortem examination, the selected animals were assessed and recorded in terms of sex, age, Origin and body condition. The age of animals were classified as young (4-8 years) and old age(.8years) based on dental eruption; body condition was classified as poor, medium and good based on body appearance and spine process.

Post-mortem examination

The stomach of each animal was removed from abdominal cavity. All compartment were inspected for the existence of foreign bodies. Finally, the location and the types of foreign bodies were identified and recorded.

Data management and analysis

The data collected were recorded on special formats prepared for this purpose as indicated in Annex 1 and raw data were entered into Microsoft excel spread sheet. The prepared data was analyzed using stata release 11 statistical software (Stata Corporation, college station. TX). The potential risk factors considered in the study were origin, body condition and age of the animal. Association between variables was analyzed using Pearson's Chi-squared or Fisher's exact tests. During the study different risk factors like age, origin and body condition were recorded.

Results

Prevalence of foreign bodies in rumen and reticulum of cattle

From 484 cattle examined, 65 (13.5%) had foreign bodies in their rumen. No foreign body, however, was found in reticulum. Among 205 animals originated from towns and 279 animals from rural areas, 29(14.1%) and 36 (12.9%) were found to contain foreign bodies in their rumen respectively. There was no significant association between origin and rumen foreign body prevalence ($p > 0.05$) as shown in the table 1.

Types of foreign bodies.

The types of foreign bodies found were plastics, piece of cloth, rope needle and shoelace. Plastics were the most common foreign bodies encountered which accounted for 10.1% of overall prevalence and as shown in table below.

Origin	No of Observations	No. Positive	Prevalence (95%CI)	P-Value
Town	205	29	14.1 (10.0-19.6)	
Rural	279	36	12.9 (9.5-17.4)	0.780
Overall	484	65	13.4 (10.7-16.8)	

Table 1: Prevalence of foreign bodies in rumen of cattle originated from towns and rural areas.

Prevalence of foreign bodies in relation to age groups

From 484 animals, 427 animals were 4-8years old and 57 animals were >8years old. Among these animals higher foreign body prevalence (28.9%) was observed in older animals (>8years) and lower prevalence (11.5%) was encountered in younger animals (4-8years). The Chi-square test showed that there was significant ($p < 0.05$) difference in the prevalence of foreign bodies among the ages groups. Older animals (>8years) had higher prevalence (28.1%) of foreign bodies compared to younger animals (4-8years) (11.5%).

Prevalence of foreign bodies in rumen in relation to body condition

The overall foreign body prevalence in Poor (thin), medium and good body conditioned animals was 38.6%, 8.8% and 5% respec-

Types of Foreign bodies	No. of Animal Examined	No. of Animal Positive	Prevalence (%)
Plastic	-	49	75.4
Clothes	-	11	16.9
Ropes	-	3	4.6
Needles	-	1	1.5
shoelace	-	1	1.5
Overall	484	65	13.4

Table 2: Types and frequency of foreign bodies in rumen of cattle slaughtered at Gimbi Municipal abattoir (n = 484).

Factors	Level	No. of Observations	No. of Positive	Prevalence (95%CI)	P-Value
Age	4 -8 Years	427	49	11.5 (8.8-14.8)	0.001
	> 8 Years	57	16	28.1 (18.1-40.8)	
Overall		484	65	13.4 (10.7-16.8)	

Table 3: Prevalence of foreign bodies in relation to age groups.

Factors	Level	No. of observations	No. of positive	Prevalence (%95CI)	P-Value
Body condition Poor		88	34	38.6(29.1-49.1)	
	Medium	296	26	8.8(6.1-12.6)	0.000
	Good	100	5	5(2.2-11.2)	
Overall		484	65	13.4(10.7-16.8)	

Table 4: Prevalence of rumen bodies in rumen of cattle by body condition.

tively. The chi-square test showed that there is significant ($p < 0.05$) difference between presence of foreign bodies and body conditions of animals. Cattle with poor body condition had the highest prevalence of rumen foreign bodies compared to cattle with medium and good body conditions as discussed in table 4.

Discussion

The present study revealed an overall foreign body prevalence of 13.4% in cattle slaughtered at Gimbi municipal abattoir and this result is in agreement with the result reported by [10]. from Bedelle Municipal abattoir. A study conducted in Nekemte municipal abattoir also reported a comparable level of 17.5% prevalence [15]. However, the result obtained from this study is substantially low compared to previous studies by [9]. who in Turkey reported prevalence of 73.4% in cattle slaughtered at Iskenderun slaughter house. This is most likely due to differences in the level of urbanization and hence the level of contamination of the environment, or due to differences in cattle management practices. It has been reported that prevalence of ruminal foreign bodies may be associated with shortage of feed especially vitamins and minerals [12,30]. Feed shortage usually occurs at specific time in Ethiopia: moreover, most owners don't provide supplementary feed to ruminant animals. The feed shortage in turn, may predispose the animal to negative energy balance and force them to feed on unusual materials including plastic, cloth, rope and even metallic substances [12].

The present study revealed that the higher prevalence were recorded in animals originated from town than those originated rural areas. However, there was no significant association between origin and ruminal foreign body prevalence. Contrary to our findings a study in Nigeria revealed an overall ruminal foreign bodies prevalence of 97% in animals brought from urban areas for slaughter. In Nigeria, prevalence of foreign body was observed to be higher in animals originating from urban setting than from rural areas [28].

In this study, older (>8 years) animals were found to be more frequently affected with indigestible foreign body. Animals aged greater than 8years were found more frequently to have foreign bodies in their rumen than animals with 4-8years of age. This find-

ing is in agreement with the work of [25] who reported (17.85%) of the animals had higher frequency of foreign bodies in rumen and reticulum in the old age [24]. also reported old dairy cattle are the most commonly affected group. This might be associated with increase of exposure through life and many were found accumulate and lead the undead animals to be positive.

There is statistically significant association between foreign body occurrence in rumen and body condition of the animals. Animals having poor body condition were found to be more frequently affected with indigestible foreign body [24], reported a higher prevalence in animal having poor body condition. Poor body condition by itself might be due to the contribution of the foreign body that is the animal loss weight after it has been exposed or it might be due to the interference of foreign body with the absorption of volatile fatty acid (VFA) and thus causes reduced weight gain [27]. Emaciation, abdominal distension, lack of feces in rectum, foamy salivation, recumbence, and in appetence was reported in sheep with indigestible foreign bodies [14].

Plastics (75.4%) were the most common foreign bodies recovered, followed by clothes (16.9%). This finding is similar to the work done by [22] and [33]. The highest prevalence of plastics might be due to improper disposal of plastics, and as well shortage of feed which is a common problem in current study area. It has been explained that shortage of feed during the long dry season increase the likelihood of ingestion of plastics foreign bodies which is also associated with a shortage of feed specifically of minerals and vitamins origin [29].

This study indicated that all numbers of foreign bodies were found in the rumen and no foreign bodies were found in the reticulum [13]. also have reported higher foreign body in rumen than in the reticulum. This may be because heavy metallic foreign bodies were not detected in this study and may be due to larger size of the rumen as compared to that of the reticulum. Only heavy materials could sink down to the reticulum.

Conclusions and Recommendations

This study revealed that littering the environment with plastics and other indigestible materials could pose health problems for free grazing cattle unless appropriate mitigation measures are taken. Based on the findings of this study the following are recommended:

- Livestock owner should be aware of the risk of allowing ruminant animals to graze on polluted environment with indigestible foreign materials,
- Proper feeding management should be established.
- Strict legislation regarding proper disposal of indigestible materials from households and factories should be formulated by policy makers.
- Veterinarians and animal health workers should consider foreign body as differential diagnosis for gastrointestinal disorders.
- Further study should be conducted to determine the occurrence of foreign bodies with its economic impact.

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