Occurrence of rumen foreign bodies in sheep and goats slaughtered at the Addis Ababa Municipality Abattoir

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Abstract

A preliminary work was conducted to assess the prevalence of rumen foreign body and identify the type of foreign bodies in small ruminants slaughtered at the Addis Ababa municipality abattoir from November to March 2008. A total of 697 sheep and goats rumen was examined for the presence of indigestible foreign bodies. Of the total animals examined sheep and goats accounted for 311 (44.6%) and 386 (55.4%), respectively. The overall prevalence of rumen foreign bodies were found to be 23.2% (n= 162). Of these 86 (53.1%) were sheep and 76 (46%) were goats. The study revealed a higher presentation of females 116 (71.6%) than males 46 (28.4%) of both species. Plastic bags were recovered as the most common foreign bodies. Other foreign bodies retrieved were leather 30 (4.3%), rope 3 (0.4%), hair ball 2 (0.3%), and paper 2 (0.3). The weight of the foreign bodies removed was from 100 to 2000 gram. Sex and age were found to have a significantly higher ($p<0.05$) interaction with ruminal foreign body. The condition was found to occur more frequently in females at 3-4 years of age. It has been evidenced that body condition also has a significant association with the weight of the foreign body. The weight of the foreign body recovered was significantly higher ($p< 0.05$) in emaciated and thin ovine female. Results of this preliminary work indicated that the prevalence of rumen foreign body is higher in small ruminant species. The most likely reasons would be shortage of forage during the long dry season and increased pollution of grazing land mainly by plastic bags and other garbage materials.

Keywords: Abattoir, Rumen foreign bodies, sheep and goats

Introduction

Ingestion of foreign body in cattle was reported to be a condition of great economic importance and causes severe loss of production and high mortality rates (Radostitis *et al*., 2000). Sheep and goats are highly selective feeders and ingest significantly less amount of foreign bodies as compared to cattle (Hailat

et al., 1996). However, the ingestion of indigestible materials may occur during period of food scarcity (Igbokwe *et al.,* 2003). Reports from cattle and sheep reared within urban and sub-urban environments indicated that impaction of the rumen resulted from the accumulation of foreign bodies, such as plastic bags which causes interference with flow of ingesta leading to the distension of rumen and absence of defection (Abdullahi et al., 1984; Igbokwe et al., 2003; Remi-Adewunmi *et al*., 2004). The presence of these foreign materials in the rumen and reticulum also hampers the absorption of volatile fatty acids and consequently reduces the rate of animal fattening (Igbokwe *et al.,* 2003). In Jordan, an estimated loss of 25 million USD in productivity and health associated with plastic impaction has been reported (Hailat *et al*, 1996). The prevalence of ruminal foreign body impaction is also well documented in other parts of Africa (Igbokwe *et al*., 2003, Remi-Adewunmi *et al*., 2004). In Ethiopia small ruminants are left to roam and seek their own feed as the raising system is mainly extensive type. The areas available for grazing particularly in the case for animals reared in the urban and sub-urban areas are polluted with plastics, ropes, hair, wool and metals. This pollution may be predicated as a growing problem for grazing animals because of the poor waste management system and inadequate availability of feed during the long dry season. The fact that rumen impaction by these foreign bodies is mostly asymptomatic 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. Hence, the purpose of this study was to asses the prevalence of rumen foreign bodies in small ruminants slaughtered at the Addis Ababa Municipal Abattoir and to identify the type of rumen foreign bodies and study for the factors associated with the ingestion of those foreign bodies in small ruminants.

Materials and methods

Study area

The study was conducted at Addis Ababa municipality abattoir.

Study design

To asses the prevalence of rumen foreign bodies and to identify the type of foreign bodies, a total of 697 small ruminants' rumen was examined from November 2007 to March, 2008 at the Addis Ababa Municipality Abattoir. Sheep and goats presented for slaughter were identified by sex, species, age and body condition score prior to slaughter. Age was determined based on dental eruption as previously described by Otesile and Obasaju (1982). Body condition was

evaluated based on scores ranging from Score 1 (emaciated and thin) to Score 5 (obese) as described by Thompson and Meyer (1994). After slaughter the rumen was removed carefully from the abdominal cavity and opened, and any foreign body obtained was washed, dried, identified and weighed accordingly.

Data Management and Analysis

All sheep and goats presented for slaughter were identified by a unique identification number. Besides, each animal was listed against its species, sex, age and its body condition score. The types of foreign bodies obtained were recorded in accordance to their frequency of occurrence and the weight of the foreign body was expressed in grams. All data were managed using computer-based data management system (MS excel and SPSS software). For the analysis, descriptive statistics (frequency distribution, mean, standard deviation) was employed. Prevalence of indigestible rumen foreign body was expressed as the number of cases of foreign bodies found to the total number of animals examined at the slaughter house. A separate analysis was carried out on the prevalence rumen foreign body across the two species (sheep vs. goat). The effect of sex and age on the occurrence of the disease was also tested for a significant difference using chi –square. To know whether the size of foreign body has effect on Body Condition score (BCS) regression analysis was carried out. Similar analysis was also performed on the effect of age on the size of foreign body.

Results

From a total of 697 small ruminants, 311 sheep (44.6%), and 385 goats (55.4%) were examined for the presence of indigestible foreign bodies. Of these, 324 (46.5%) and 373 (53.5%) were males and females, respectively. The different age group of animals examined were 121 (17.4%) between 1-2 years of age, 485 (65.7%) between 3-4 years age and 118 (16.9%) >4 years of age.

Foreign body was found in the rumen in 162 (23.2%) of the total small ruminants' examined. The types of foreign bodies found were plastic bags, rope, hair, paper, and leather (Figure 1 and 2). Plastic bags were the most common as observed in 162 (100%) of the positive cases. Leather 30 (4.3%), Rope 3 (0.4%), hair 2 (0.3%), and paper 2 (0.3), were the other foreign bodies retrieved from the rumen. The types of foreign bodies encountered and their frequency of occurrence with regards to the species of small ruminants are presented in Table 1. In both species the prevalence of rumen impaction was higher in females than in males. Impaction due to plastics occurred in 116 (71.6%) and 46 (28.4%) of the females and males, respectively (Table 2).

1a

1b

Figure 1: Interwoven plastic foreign body mixed with ingesta weighing 1.5kg removed from 5 year old ewe (a); Plastic foreign body changed to hard mass removed from the rumen of 3 year old male goat (b), slaughtered at the Addis Ababa Municipality abattoir


2a

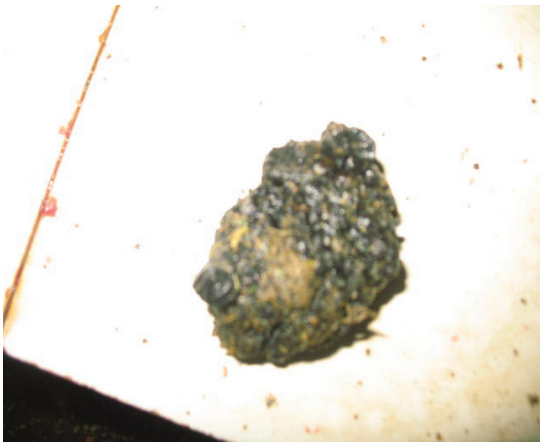
2b

Figure 2. Recently ingested plastics bag removed from the rumen of goat (a); Plastic foreign body removed from the rumen of 4 year old sheep (b), slaughtered at the Addis Ababa Municipality abattoirs

Table 1: Frequency of occurrence of rumen foreign bodies in small ruminants slaughtered at Addis Ababa municipality abattoir

Animal species	**Frequency of occurrence**				
	Plastic	**Rope**	**Hair**	**Paper**	**Leather**
Ovine	86 (53.1%)	2 (1.2%)	2 (1.2%)	2 (1.2%)	16 (9.9%)
Caprine	76 (46.9%)	1 (0.6%)	-	-	14 (8.6%)
Total	162 (100%)	3 (1.8%)	2 (1.2%	2 (1.2%)	30 (18.5%)

Table 2: Sex distribution of rumen foreign body in small ruminants slaughtered at Addis Ababa municipality abattoir

Sex	Frequency of occurrence				
	Plastic	Rope	Hair	Paper	Leather
Male	46 (28.4%)	1(0.6%)	-	-	2
Female	116 (71.6%)	2 (1.2%)	2 (1.2%)	2 (1.2%)	28
Total	162 (100%)	3 (1.8%)	2 (1.2%)	2 (1.2%	30 (18.5%)

Plastic bags and leather were more frequently encountered in adults between three and four years of age. Young animals (less than 2 years) had only plastic impaction. Plastics, rope, hair, paper, leather were recovered from the rumen of older sheep and goats (Table 3).

Table 3: Age distribution of rumen foreign body in small ruminants slaughtered at the Addis Ababa municipality abattoir

Age (Year)	Frequency of occurrence				
	Plastic	Rope	Hair	Paper	Leather
<2	15 (9.3%)	-	-	-	-
3-4	108 (66.7%)	1 (0.6%)	1		22
>4	39 (24%)	2 (1.2%)	1	2 (1.2%)	8
Total	162 (100%)	3 (1.8%)	2 (1.2%)	2 (1.2%)	30 (18.5%)

Sex and age were found to have significantly higher ($p<0.05$) interaction with rumen foreign body. The condition was found to occur more frequently in females at 3-4 years of age.

The body condition of the animals examined were scored as emaciated and thin 266 (38.2%), average 304 (43.6%), fat 117 (16.8%) and obese 10 (1.4%). Plastics and leather were more frequently encountered in emaciated and thin (score 1 and 2) sheep and goats. Average body conditioned (score 3) of shoats were found to have plastic and leather foreign bodies. Fat (score 4) and obese (score 5) had only plastic impaction (Table 4).

Table 4: Association of body condition score with the occurrence of rumen foreign body of small ruminants slaughtered at the Addis Ababa Municipality abattoir

BSC	Frequency of occurrence				
	Plastic	Rope	Hair	Paper	Leather
Emaciated & thin	108	1	1(0.6%)	1(0.6%)	21
Average	45	2 (1.2%)	1(0.6%)	1 (0.6%)	9
Fat	8	-	-	-	-
Obese	1	-	-	-	-
Total	162	3 (1.8%)	2 (1.2%)	2 (1.2%)	30 (18.5%)

The weight of the foreign body recovered was significantly higher ($p< 0.05$) in ovine female >4years of age, and emaciated and thin animals (Table 5).

Table 5: The association between species, sex, age, and BCS with the weight of rumen foreign bodies removed from the rumen of sheep and goat slaughtered at the Addis Ababa Municipality abattoir

Animal species	Weight of foreign body (gm)	
	Mean	std. Deviation
Ovine	167	358.43
Caprine	106.48	255.65
Total	133.87	307.09
Sex	Mean	std. Deviation
Male	56.36	178.72
Female	201.19	372.74
Total	133.89	307.09
Age (Year)	Mean	std. Deviation
<2	72.98	200.85
3-4	123.51	292.95
>4	236.52	4 11.76
Total	133.87	307.09
BSC	Mean	std. Deviation
Emaciated & thin	238.14	386.62
Average	85.43	252.58
Fat	31.45	120.04
Obese	31.00	98.03
Total	133.85	307.09

Discussion

This study revealed an overall prevalence of 23.2% (n=162) of rumen foreign body in sheep and goats slaughtered at Addis Ababa Municipality Abattoir.

In Ethiopia, no abattoir study was so far conducted on rumen foreign bodies, and hence this is the first report. Igbokwe *et al (*2003) reported a prevalence rate of 19.3% in sheep in Nigeria. On the contrary, a much higher prevalence rate (97%) was reported in Nigeria in sheep and goats brought from urban areas for slaughter (Remi-Adewunmi *et al*., 2004). Hailat *et al* (1996) recorded a prevalence rate of 8.9% in Jordan. The difference in the prevalence rate might be due to differences in the origin of animals presented for slaughter and type of waste management system between the countries. It has been reported that ingestion of foreign bodies is associated with shortage of forage and increased pollution of grazing land with indigestible foreign bodies (Hailat *et al.,* 1996; Rossow and Horvath, 1985). Similarly, in Ethiopia, feed shortage is prevailing particularly during the long dry season and most owners of small ruminants do not supply supplementary feed to this species of livestock Pollution of the environment particularly with plastic bags has been a common observation in both urban peri-urban areas.

Rumen foreign body occurred less frequently in goats than in sheep due to the selective nature of goats while grazing (Remi-Adewunmi *et al*., 2004; Murray, 1980). Similarly, the findings of this study revealed the frequent occurrence of rumen foreign body in sheep.

Igbokwe *et al* (2003) reported a higher prevalence in female animals. In this study, the same findings were observed. This may be associated with increased appetite of female animals due to the nutritional demands during pregnancy and lactation. Additionally, female animals are kept longer than the males for breeding and hence predisposition could be more than that of the male animals.

Animals aged between 3-4 years were found frequently to have rumen foreign bodies. Animals in this age group had more foreign bodies than the young ones because of gradual accumulation of these types of foreign bodies in the rumen. Rumen impaction with foreign bodies was found to occur more frequently in emaciated and thin animals. This is due to the interference of the foreign body with the absorption of volatile fatty acids causing reduced weight gain (Remi-Adewunmi et al., 2004).

Plastics were found in all of the animals with rumen foreign bodies in this study. The wide spread use and improper disposal of plastic bags could be the reason. Similar findings were reported in other countries like Nigeria (Remi-Adewunmi *et al*., 2004) and Jordan Hailat *et al,* 1996)

This preliminary work showed the risk of the wide-spread use and improper disposal of plastic (polythene) bags to the health of small ruminant population raised mainly in urban and peri-urban areas. Lack of awareness among livestock owners on the risk of ingestion of these materials on the health of their animals also contributed to the high prevalence of rumen impaction in this species. Shortage of feed during the long dry season increase the likelihood of ingestion of plastic foreign bodies which is also associated with a shortage of feed specifically of minerals and vitamins origin. The finding of this study could help environmental activists, veterinarians, policy makers and livestock owners to recognize the impact of plastic foreign bodies on small ruminant health and productivity in this country.

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