

Prevalence of Indigestible Foreign Body Ingestion in Small Ruminants Slaughtered at Luna Export Abattoir, East Shoa, Ethiopia

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Abstract: Cross sectional study was conducted on 768 slaughtered animals (384 sheep and goats each) at Luna Export Abattoir to determine the prevalence of foreign bodies in rumen and reticulum of small ruminants and to identify the common risk factors associated with their occurrence. The study animals were selected by using stratified random sampling method from the study population. From the total of 768 animals examined, 47 (6.1%) were found positive for the occurrence of indigestible foreign bodies in rumen and reticulum. From each 384 sheep and goats examined 29 (7.55%) and 18 (4.68%) were positive, respectively. The types of foreign bodies detected were plastics, hair ball, leather and wire. Plastics were the most common found in 59.6% of the cases. Prevalence of foreign body occurrence recorded in <2 year, 2-3 year and >3 year olds was 1.8%, 7.5 and 41.2%, respectively while the prevalence rate recorded in thin, average, fat and very fat animals was 9.8, 3.4, 4.8 and 0%, respectively. Among the considered risk factors, age and body condition score of the examined animals significantly affected ($p < 0.05$) the prevalence of fore-stomach foreign bodies whereas species was not associated with ingestion of indigestible foreign body. The prevalence of foreign body ingestion found in small ruminants by this study shows that littering the environment with plastic bags and other indigestible materials could pose serious health problem for free grazing small ruminants.

Key words: Foreign body, small ruminants, rumen, reticulum, abattoir, prevalence

INTRODUCTION

In cattle, ingestion of foreign body was reported to be a condition of great economic importance as it causes severe loss of production and high mortality rates (Radostitis *et al.*, 2000a, b; Ramin *et al.*, 2008). Though sheep and goats are said to be highly selective feeders and ingest significantly less amount of foreign bodies as compared to cattle (Hailat *et al.*, 1997), the ingestion of indigestible materials may occur during period of feed scarcity (Igbokwe *et al.*, 2003). Reports from cattle and sheep reared within urban and sub-urban environments indicates that impaction of the rumen resulted from the accumulation of foreign bodies such as plastic bags interfered with flow of ingesta leading to the distention of rumen (Abdullahi *et al.*, 1984; Igbokwe *et al.*, 2003; Remi-Adewunmi *et al.*, 2004). The presence of foreign bodies in the rumen and reticulum also hampers the absorption of volatile fatty acids and consequently reduction in the rate of animal fattening (Igbokwe *et al.*, 2003).

In Ethiopia, small ruminants are kept under an extensive type of management and are very likely to be

exposed to the ingestion of indigestible garbage of various sources due to a wide spread environmental contamination with plastic bags, absence of policy to protect the environment from such insults and the frequent occurrence of drought that predispose animals to nutritional deficiency and pica. Despite the presence of the predisposing factors, the study so far conducted in Ethiopia on the prevalence of indigestible foreign body ingestion by small ruminants was scarce.

Although, some penetrating foreign bodies can be diagnosed using deep abdominal palpation and by eliciting and detecting pain behind the xiphoid process of the sternum, most non-penetrating foreign bodies are asymptomatic to be detected by physical examination in live animals requiring expensive and sophisticated diagnostic equipments such as radiography, ultrasonography and endoscopy (Blood and Radostitis, 1989; Hailat *et al.*, 1998). As acquiring such kinds of equipments is infeasible for this type of study in a developing country, studying it in the abattoir is the best option. Therefore, the objectives of this study were to determine the prevalence of various types of indigestible

foreign bodies in rumen and reticulum of small ruminants slaughtered at Luna Export Abattoir and to identify common risk factors associated with their occurrence.

MATERIALS AND METHODS

Study area: Cross sectional study was conducted on male sheep and goats slaughtered at Luna Export Abattoir from November 2008-March 2009. The abattoir was found in Modjo Town, Lume district, East Shoa Zone of Oromia Regional State, Central Ethiopia at a distance of 70 km south east of Addis Ababa. The origins of sheep slaughtered at the abattoir were from Borena, Gamogofa and Arisi whereas goats were from Afar, Wollo, Borena, Arisi and Babili.

Study design: The total sample size, 768 animals, comprising 384 animals of each species was determined as described by Pfeiffer (2002) and the study animals were selected by stratified random sampling technique. Each animal selected for the study was further identified by providing a unique identification number that could be used for both ante and post mortem examinations of the animal. Ante-mortem inspection was conducted on individual animals entering in to the lairage and the species, age and Body Condition Score (BCS) were recorded. The age of the bucks was estimated by means of their dentition as described for African indigenous goats (Steele, 1996; Pasquini *et al.*, 2003). Body condition was evaluated based on a 5 point scale (ranging from 1-5 representing emaciated, poor, acceptable, fat or very fat animals, respectively) as described by Thompson and Meyer (1994). After slaughter, the stomach was carefully removed from the abdominal cavity and placed in a container. Rumen and reticulum were incised and thoroughly examined by visual inspection and palpation. All the contents were examined thoroughly for the presence of foreign bodies. Magnets were used for the detection of metallic objects. Then the foreign bodies were washed, dried, identified and labeled.

Data management and statistical analysis: The species of each animal and the values of its age and body condition score were recorded along with the post-mortem findings.

All data were stored using computer based data score were recorded along with the post-mortem findings. All data were stored using computer based data management system employing MS excel and analyzed by SPSS software. The χ^2 -test was applied to test if there is any statistically significant association between risk factors such as species, age and body condition score.

RESULTS AND DISCUSSION

Prevalence of foreign body in relation to animal species: A total of 768 small ruminants (384 sheep and 384 goats) were examined for the presence of indigestible foreign bodies in the fore-stomach and 47 (6.1%) of them were found positive. From 384 sheep and 384 goats examined, 29 (7.55) and 18 (4.68%) were positive for foreign body, respectively. There was no significant association between species difference and foreign body ingestion ($p>0.05$) (Table 1).

The types of foreign bodies detected were plastic, hair ball, leather, polyethylene plastic bag and wire. The most commonly observed foreign bodies were plastics 28 (59.6%) followed by hair ball 7 (14.9%), leather 7 (14.9%), polyethylene plastic bag 4 (8.5%) and wire 1 (2.1%) in decreasing order of occurrence (Table 2).

Prevalence of foreign body in relation to animal age: From 285, 466 and 17 animals examined with the age of <2 years, 2-3 years and of >3 years old, 5 (1.8%), 35 (7.5%) and 7 (41.2%) were found positive for foreign body ingestion. There was significant difference ($p<0.05$) between old and young animals in the occurrence of foreign body in their fore-stomachs (Table 3).

Plastic and leather were more frequently encountered foreign bodies in the fore-stomach of animals between 2-3 years olds whereas young animals (<2 years old) had

Table 1: Prevalence of foreign body in small ruminants slaughtered at Luna Export abattoir

Animal species	No. of examined animals	No. of positive animals	Prevalence (%)
Ovine	384	29	7.55
Caprine	384	18	4.68
Total	768	47	6.10

$\chi^2 = 2.74, p>0.05$

Table 2: Frequency of different types of foreign bodies in small ruminants slaughtered at Luna Export Abattoir

Animal species	Frequency of occurrence					
	No. of positive animals (%)	Plastic (%)	Hairball (%)	Leather (%)	Polyethylene plastic bags (%)	Wire (%)
Ovine	29 (61.7)	19 (65.5)	3 (10.3)	3 (10.3)	3 (10.3)	1 (3.4)
Caprine	18 (38.3)	9 (50.0)	4 (22.2)	4 (22.2)	1 (5.6)	-
Total	47 (100.0)	28 (59.6)	7 (14.9)	7 (14.9)	4 (8.5)	1 (2.1)

$\chi^2 = 2.74, p>0.05$

Table 3: Prevalence of foreign in different age groups of small ruminants

Age group	No. of examined animal	No. of +ve animals	Prevalence (%)
<2 year	285	5	1.8
2-3 year	466	35	7.5
>3 year	17	7	41.2
Total	768	47	6.1

$\chi^2 = 47.39, p < 0.05$

Table 4: Age and type of foreign body in small ruminants at Luna Export Abattoir

Age (years)	Frequency of occurrence				
	Plastic (%)	Hair ball (%)	Leather (%)	Polyethylene plastic bag (%)	Wire (%)
<2	3 (6.4)	2 (4.3)	-	-	-
2-3	23 (48.9)	4 (8.5)	6 (12.8)	2 (4.3)	-
>3	2 (4.3)	1 (2.1)	1 (2.1)	2 (4.3)	1 (2.1)
Total	28 (59.6)	7 (14.9)	7 (14.9)	4 (8.5)	1 (2.1)

$\chi^2 = 47.9, p < 0.05$

Table 5: Prevalence of foreign body and Body Condition Score (BCS) of small ruminants

BCS	No. of examined animals	No. of +ve animals	Prevalence (%)
Thin	305	30	9.8
Average	324	11	3.4
Fat	126	6	4.8
Obese	13	0	0.0
Total	768	47	6.1

$\chi^2 = 12.77, p < 0.05$

only plastic and hairball. Plastic, hairball, leather, polyethylene plastic bag and wire were recovered from the rumen and reticulum of older sheep and goats (Table 4).

Prevalence of foreign body in relation to body condition:

From 305, 324, 126 and 13 animals examined with thin, average, fat and obese body condition, 30 (9.8), 11 (3.4), 6 (4.8) and 0 (0%) were positive for foreign body, respectively. There was significant difference ($p < 0.05$) between different body condition scores and foreign body distribution in rumen and reticulum (Table 5).

Plastic and leather were more frequently encountered in thin (score 2) sheep and goats. Average body conditioned (score 3) sheep and goats were found to have plastic, hairball, leather and polyethylene plastic bag. Fat (score 4) sheep and goats were found to have only plastic and hair ball while obese or very fat (score 5) sheep and goats were not found to have foreign bodies in their fore-stomach (Table 6).

Prevalence of foreign body in relation to the stomach compartment affected:

From 47 positive cases of foreign body, 41 (87.2%) were occurred in rumen while 6 (12.8%) in reticulum (Table 7). Occurrence of foreign body was significantly different ($p < 0.05$) in rumen and reticulum.

Ingestion of indigestible foreign materials by small ruminants is a common worldwide problem previously reported from Nigeria (Igbokwe *et al.*, 2003;

Table 6: Body Condition Score (BCS) and frequency of occurrence of the types of foreign body at Luna Export Abattoir

BSC	Frequency of occurrence				
	Plastic (%)	Hair ball (%)	Leather (%)	Polyethylene plastic bag (%)	Wire (%)
Thin	19 (40.4)	3 (6.4)	5 (10.6)	2 (4.3)	1 (2.1)
Average	4 (8.5)	3 (6.4)	2 (4.3)	2 (4.3)	-
Fat	5 (10.6)	1 (2.1)	-	-	-
Obese	-	-	-	-	-
Total	28 (59.6)	7 (14.9)	7 (14.9)	4 (8.5)	1 (2.1)

$\chi^2 = 12.77, p < 0.05$

Table 7: Prevalence of foreign body in rumen and reticulum of small ruminants at Luna Export Abattoir

Organ	No. of positive animals	Prevalence (%)
Rumen	41	87.2
Reticulum	6	12.8
Total	47	100.0

$\chi^2 = 7.68, p < 0.05$

Remi-Adewunmi *et al.*, 2004), Jordan (Hailat *et al.*, 1997) and Sudan (Ghurashi *et al.*, 2009; Bakhiet, 2008; Mohammed *et al.*, 2006). This study revealed an overall prevalence of 6.1% ($n = 47$) of rumen and reticulum foreign body in sheep and goats slaughtered at Luna Export Abattoir. From 384 sheep and 384 goats examined in this study, 29 (7.55%) and 18 (4.68%) were positive for foreign body, respectively. Nearly similar prevalence rate of 8.9 and 11% were reported in sheep and goats by Hailat *et al.* (1997, 1998), respectively from Jordan. However, higher prevalence rates were reported previously (Roman and Hiwot, 2010; Ghurashi *et al.*, 2009; Mohammed *et al.*, 2006; Igbokwe *et al.*, 2003). The difference in the prevalence rate might be due to the difference in the sex composition and origin of animals or the drought condition in the study year. All animals slaughtered at Luna Export Abattoir are males. Higher prevalence rate of foreign body in the female animals was reported (Roman and Hiwot, 2010). Moreover, the sheep and goats slaughtered at Addis Ababa Abattoir have a chance to stay at the hands of the traders for days and weeks before getting sold and may be exposed to graze garbage contaminated with plastic bags. Remi-Adewunmi *et al.* (2004) had reported a much higher prevalence rate (97%) in sheep and goats brought from urban areas of Nigeria for slaughter. Mohammed *et al.* (2006) had also retrospectively studied the occurrence of foreign bodies in goats from Khartoum state and reported the prevalence of 52.9% in 2000 and 33.3% in 2001.

This study showed the absence of significant association between species difference and foreign body ingestion ($p > 0.05$). However, Roman and Hiwot (2010) and Hailat *et al.* (1997) found the presence of significant association between species difference and foreign body ingestion ($p < 0.05$). This may also be ascribed to the variation in the origin of animals studied.

In this study, older animals and animals having poor body condition were found to be more frequently affected with indigestible foreign body. This is in agreement with the findings of Roman and Hiwot (2010), Hailat *et al.* (1998, 1997). The finding of more foreign bodies in older animals than the young ones may be due to the gradual ingestion of indigestible materials over the prolonged period of time. The more frequent occurrence of rumen and reticulum impaction in emaciated and thin animals might be attributed to the interference of the foreign body with the absorption of volatile fatty acids causing reduced weight gain. Emaciation, abdominal distension, lack of feces in the rectum, foamy salivation, recumbency and inappetence was reported in sheep with indigestible foreign bodies (Igbokwe *et al.*, 2003).

The types of foreign bodies detected in this study were plastic, hair ball, leather, polyethylene plastic bag and wire. Hailat *et al.* (1997) also found plastic bags, pins, nails, hair balls, ropes and leather occurring as indigestible foreign bodies. The result of this study indicated that plastics were the most common cause of rumen impaction found in 59.6% of the cases in the rumen. This is in accordance with the reports of Roman and Hiwot (2010), Hailat *et al.* (1997), Igbokwe *et al.* (2003) and Remi-Adewunmi *et al.* (2004). This may be attributed to improper disposal of plastic in urban and peri urban areas. This study indicated that most foreign bodies occurred in the rumen (87.2%) than reticulum (12.8%) of sheep and goats. This may be due to the fact that many ingested feed goes to the rumen.

CONCLUSION

The finding of this study showed that littering the environment with plastic bags and other indigestible materials could pose serious health problem for free grazing small ruminants unless appropriate measure is taken.

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