

A CROSS-SECTIONAL STUDY ON THE PREVALENCE AND ASSOCIATED RISK FACTORS OF RUMEN AND RETICULUM FOREIGN BODIES OF CATTLE SLAUGHTERED AT SHASHEMENE MUNICIPAL ABATTOIR, SNNPRS, ETHIOPIA

MESELE ABERA, UIASE BIN FAROOQ* and URFEYA MIRZA
School of Veterinary medicine, Hawassa University, Hawassa, Post Box No. 5, ETHIOPIA

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ABSTRACT

The objective of present study was to determine prevalence of rumen and reticulum foreign bodies, type of foreign bodies and associated risk factors in cattle slaughtered at Shashemene municipal abattoir, Oromia regional state, Ethiopia. Ante mortem and postmortem examination was done for assessment of age, sex, breed, body condition and recovery of foreign bodies, respectively. From a total of 428 cattle examined, 68 (15.09%) were found positive for the occurrence of foreign bodies. The results showed statistically significant difference ($p < 0.05$) in prevalence among different sexes, age groups and body condition scores and higher prevalence was observed in female (66.70%), old animals (20.60%), crossbred (41.50%) and animals with poor body condition (57%), respectively. Therefore sex, age, breed and body condition score were considered as potential risk factors and it was concluded that continued awareness creation among farmers should be instituted and appropriate solid waste disposal system need to be implemented in the study area.

Keywords: Cattle, Foreign body, Rumen, Reticulum, Shashemene

Ingestion of metallic and non-metallic foreign bodies is the most common problem encountered in cattle. Not only mortality and morbidity, it also causes decrease in productivity. It is common in developing countries where the standard of animal management is unsatisfactory (Berrie *et al.*, 2015). This is due to the reason that, cattle commonly ingest foreign objects, as they do not discriminate against metal materials in feed and do not completely masticate feed before swallowing. The disease is common when green chop, silage, and hay are made from fields that contain old rusting fences or baling wire, or when pastures are on areas or sites where buildings have recently been constructed, burned, or torn down. The condition tends to be more common during drought because animals graze closer to the ground or are fed harvested material that is contaminated with foreign objects (Hayder *et al.*, 2006). In developed countries, industrialization has further increased the occurrence of foreign bodies in ruminants. The problems that are caused vary with the duration of foreign body presence, 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 condition is serious in our country usually in urban and peri-urban areas where extensive construction is carried out and plastic waste disposal is not conditioned and so thrown on roads or anywhere and that is way our dairy cattle are dying mainly associated with foreign bodies (Ramaswamy and Sharma, 2011). Therefore, the study was carried out to estimate the current prevalence of

foreign body in cattle slaughtered at Shashemene municipal abattoir, to identify the type of rumen and reticulum foreign bodies, and to study the risk factors associated with the ingestion of these foreign bodies in cattle.

MATERIALS AND METHODS

Study area: The study was conducted in Shashemene Municipal Abattoir which is located in Oromia National Regional State, 250 km south of Addis Ababa.

Study population and study design: The study was carried out on cattle that were brought to abattoir from three different major market areas namely Alelu, Kofale and Arsi Negele and these animals were managed under both extensive and semi-extensive farming system. Among 428 Cattle studied, 88 were crossbreds, whereas the rest were local breeds. On the average, 60 cattle were slaughtered per day and approximately about 20,000 cattle were slaughtered per year. A cross-sectional study was carried out from November 2015 to April 2016 at Shashemene municipal abattoir to assess the prevalence of rumen and reticulum foreign bodies, identifying types of foreign bodies and associated risk factors.

Sample size determination and sampling method: The sample size was determined by using the formula given by Thrusfield (1995). To calculate sample size, 17.07% expected prevalence from Rahel (2011), 95% confidence level and 5% desired absolute precision ($d=0.05$) was used. Therefore, according to Thrusfield, the sample size was determined as follows:

$$n = \frac{(1.96)^2 \times P_{ex} (1-P_{ex})}{d^2}$$

* Corresponding author: farooquiase@gmail.com

Where, n = required sample size, P_{ex} = expected prevalence (17.07%) and d = desired absolute precision; 1.96 = the value of Z at 95% confidence level

Accordingly, minimum of 218 animals should be sampled, but to increase the accuracy of the prevalence estimates, a total of 428 animals were sampled. During each visit day, animals were selected by systematic random sampling.

Data collection:

Ante mortem examination: Ante mortem examination on individual animals was done for assessment of age, sex and body condition of the animals. Age was categorized into young (<5 years), adult (5-10 years) and old (>10 years) based on dentition eruption described by DeLahunta and Habel (1986). Body condition of cattle was recorded as poor, medium and good based on the appearance of the animal and manual palpation of the spine and transverse processes of the lumbar vertebrae described by Nicholson and Butterworth (1986).

Post mortem examination: In the postmortem examination, rumen and reticulum was examined. Immediately after slaughter, in the evisceration stage, the stomach was carefully removed from the abdominal cavity and opened and explored for the prevalence of any foreign non dietary material by inspection and palpation. Any foreign bodies obtained during inspection were washed with water to remove adhering feed material and then identified. For positive animals, the location and type of the foreign bodies was recorded.

Data management and analysis:

The data collected were entered and stored in Microsoft excel worksheet. Before subjected to statistical analysis, the data were thoroughly screened for errors and properly coded. For analysis, STATA-11 (Stata Corp. College Station, Texas, USA) software was used and table was used to summarize and present the data collected. The prevalence of rumen and reticulum foreign bodies was calculated as percentage by dividing total number of animal positive for foreign bodies to the total number of animal examined. Pearson chi square (χ^2) test was employed to assess the existence of association between prevalence of the foreign bodies and different potential risk factors considered.

RESULTS AND DISCUSSION

Occurrence: From a total of 428 cattle (33 female and 395 male) examined for the presence of any foreign bodies in their rumen and reticulum, 15.90% (68/428) of them were

found positive. Out of this 44 (64.70%) were in the rumen, 14 (20.50%) in reticulum and 10 (14.70%) in both, rumen and reticulum. The types of foreign bodies were needles, wires, plastics, leathers, clothes and ropes. Leathers, plastics and clothes were the most common as observed in 49 (72.10%) of the positive cases (Table 1). This level of prevalence of foreign bodies is significant to affect the health of the study animals. In Jordon, Ismail *et al.* (2007) reported that 77% cases of adult dairy cattle suffering from recurrent tympany had indigestible foreign bodies. Hailat *et al.* (1997) from Jordan reported 25 million USD estimated loss in productivity and health associated with plastic impaction. Ingestion of indigestible foreign materials by ruminants is a common worldwide problem also reported from Nigeria (Igbokwe *et al.*, 2003; Ghurashi *et al.*, 2009).

The prevalence of rumen and reticulum foreign bodies in cattle slaughtered at Shashemene municipal abattoir in this study is found to be 15.90%. This finding is in agreement with the study of Tesfaye and Chanie, 2012 (13.22%), Berrie *et al.*, 2015 (14.80%) and Rahel, 2011 (17.07%) in Jimma municipal abattoir, Gondar Elfora abattoir and Hawassa municipal abattoir, respectively. However, this finding is lower than the reports of Sheferaw *et al.* (2014) in Amhara region and Negash *et al.* (2015) in eastern Ethiopia as they reported prevalence of 41.80% and 43.40%, respectively. Moreover, Tefaye *et al.* (2012) reported prevalence of 23.9% in the fore stomach of cattle in eastern Ethiopia. This variation in prevalence of foreign body in rumen and reticulum of cattle may be attributed to differences in management system in which the animals are reared (intensive, semi- intensive or extensive), waste disposal systems in the areas where cattle graze and in probability of exposure of cattle to foreign bodies. Moreover, feed shortage which usually occurs at specific time of the year especially during dry period, December to early March in most part of Ethiopia predispose the animals to feed on unusual materials including plastics, clothes, ropes and even metallic substances (Hailat *et al.*, 1997).

Prevalence of foreign bodies with regard to sex: Of the 15.90% total prevalence of foreign bodies in cattle, 11.60% and 66.70% were detected for male and female animals, respectively (Table 2). This finding is in agreement with the report of Tesfaye and Chanie (2012) who reported prevalence of 10.34% and 80% in male and female animals, respectively. This might be associated with physiological difference between male and female

Table 1**Proportion of rumen and reticulum with foreign bodies in cattle slaughtered at Shashemene municipal abattoir with regard to location**

Types of foreign bodies	Location			Total
	Rumen	Reticulum	Both Rumen and reticulum	
Metallic	-	13 (19.1%)		13 (19.1%)
Plastic and other indigestible materials	44 (100%)	49 (72.1%)	4 (40%)	49 (72.1%)
Metallic and Plastic and other indigestible materials	-	6 (8.8%)	6 (60%)	6 (8.8%)
Total	44 (64.7%)	68 (100%)	10 (14.7%)	68 (100%)

Table 2**Prevalence of foreign bodies in rumen and reticulum of cattle slaughtered at Shashemene municipal abattoir and its associated risk factors**

Risk factors	Categories	No. examined	No. Positive	%	χ^2	p-value
Sex	Female	33	22	66.7	68.99	0.000
	Male	395	46	11.6		
Age	Adult	239	29	20.6	5.71	0.017
	Old	189	39	12.1		
Body condition	Good	273	28	10.2	43.00	0.000
	Medium	127	24	18.9		
	Poor	28	16	57.1		
Breed	Local	339	31	9.1	55.47	0.000
	Cross	89	37	41.6		
Origin	Aleleu	118	20	16.9	0.17	0.917
	Kofale	164	26	15.9		
	Arsi Negele	146	22	15.1		
Total		428	68	15.9		

animals. Female animals face higher demand for certain minerals during late pregnancy to support fetal growth and during early lactation for milk production and the resulting increase in appetite and possible development of pica may lead to ingestion of foreign bodies (Weaver, 2004). It may also be associated with longevity of female animals which increases their chance of exposure (Tiruneh and Yesuwork, 2010).

Prevalence of foreign bodies with regard to age: Out of 428 animals examined for presence of rumen and reticulum foreign bodies, statistically significant difference in prevalence ($p < 0.05$) among different age groups was observed and prevalence of 12.10% and 20.60% were observed for adult and old animals, respectively. Foreign bodies were more frequently

encountered in old animals than adults. This finding is in agreement with the work of Reddy *et al.* (2014) and Fromsa and Mohammed (2011), who reported the higher prevalence of 93% and 81.25% of foreign bodies in old cattle, respectively. The higher prevalence in old cattle might be associated with increase of exposure through life and gradual accumulation of foreign bodies in the rumen and reticulum which lead the live animals to be positive.

Prevalence of foreign bodies with regard to body condition score: In the present study, higher prevalence of foreign bodies in rumen and reticulum were detected in cattle with poor body condition (57.14%) as compared to good (10.20%) and medium (18.90%) body condition animals. This result was in consistent with the findings of Berrie *et al.* (2015), who recorded 39.72%, 11.47% and

8.70% and the report of Tesfaye and Chanie (2012) (72.72%, 35.95% and 7.33%) for poor, medium and good body condition, respectively. This higher prevalence of foreign body might be due to the contribution of the foreign body itself after it has been exposed or it might be due to the interference of foreign body with the absorption of volatile fatty acid and thus causes reduced weight gain (Ismael *et al.*, 2007).

Prevalence of foreign bodies with regard to location:

The types of foreign bodies found were categorized as metallic and plastic and other indigestible material. In this study, higher proportion 72.10% of plastic and other indigestible materials and 19.10% of metallic foreign bodies were collected. Moreover, 44 (100%) plastic and other indigestible materials were from rumen and 13 (92.90%) metallic foreign bodies were from reticulum. The finding is in agreement with the work of Tesfaye and Chanie (2012) who reported the higher number of foreign body occurrence in the rumen (79.20%) than reticulum (20.80%) and Anwar *et al.* (2013), who also reported that most foreign bodies are encountered in the rumen (58.45%) than reticulum (19.32%) of Achai cattle. The higher prevalence of foreign body in rumen may be due to its larger size.

It was also found that metallic foreign bodies 13 (92.90%) were most frequently recovered from reticulum. This finding is in line with the reports of Radostits *et al.* (2007) and Tesfaye and Chanie (2012), who reported the prevalence of 90% and 65.30% from reticulum, respectively. The reason might be due to retention of these foreign bodies by the honey comb structure of the reticular mucosa and due to gravity, these heavy foreign bodies settle in the ventral part of the fore stomach.

The occurrences of these foreign bodies in the study area might be associated with rapid industrialization, increase in the garbage disposal mostly in plastic bags, increased urbanization, keeping animals in the areas with new construction sites, shortage of feed during the long dry season and lack of awareness among livestock owners on the risk of ingestion of these foreign materials.

Prevalence of foreign bodies with regard to breed: The results of the present study showed higher prevalence of 41.50% (37/89) in cross-bred and 9.10% (31/339) for local (indigenous) animals, respectively. This finding is in agreement with the work of Berrie *et al.* (2015), Tesfaye and Chanie (2012) and Rahel (2011), who also reported higher prevalence of 35.18%, 70.00% and 58.82% in crossbred animals, respectively. The higher prevalence of

foreign bodies in crossbred animals might be due to high energy demand of crossbred animals and feed scarcity which makes them to ingest all material they encounter without selection, which increases the chance of exposure to foreign bodies.

Prevalence of foreign bodies with regard to origin: In contrary to other studies in the country, no statistically significance difference ($p>0.05$) in prevalence of foreign body with respect to origin of animals was found in the present study.

CONCLUSIONS

The present study revealed an overall prevalence of 15.90% of rumen and reticulum foreign body in the study area. The types of foreign bodies detected in this study were plastic and other indigestible materials (plastic, rope, leather and cloth) and metallic (nail and wire). Most of the plastic and other indigestible foreign bodies were found in rumen while metallic foreign bodies found in reticulum. In the present study, age, sex, body condition score and breed are found to be important risk factors and higher prevalence of foreign bodies was recorded in cross bred female animals with old age and poor body condition.

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REFERENCES

- Anwar, K., Khan, I., Aslam, A., Mujtaba, M., Din, A., Amin, Y. and Ali, Z. (2013). Prevalence of indigestible rumen and reticulum foreign bodies in Achai cattle at different regions of Khyber Pakhtunkhwa. *ARPNJ. Agric. Biol. Sci.* **8(8)**: 580-586.
- Berrie, K., Tadesse, E., Mossie, B. and Anteneh, B. (2015). Study on rumen and reticulum foreign body in slaughtered cattle at Gondar Elfora abattoir. *World J. Biol. Med. Sci.* **2(4)**: 133-150.
- DeLahunta, A. and Habel, R.E. (1986). *Applied Veterinary Anatomy*, WB Saunders Company, Philadelphia, Pennsylvania, US.
- Fromsa, A. and Mohammed, N. (2011). Prevalence of indigestible foreign body ingestion in small ruminants slaughtered at Luna export abattoir, East Shoa, Ethiopia. *J. Anim. Vet. Adv.* **10(12)**: 1598-1602.
- Ghurashi, M.A., Seri, H.I., Bakheit, A.H. and Ashwag, E.A. (2009). Effect of surgical removal of foreign body from goat's rumen with special reference to the prevalence of foreign body in goats in Southern Darfur. *AJBAS.* **3(2)**: 664-668.
- Hailat, N., Nouh, S., Al-Darraj, A., Lafi, S., Al-Ani, F. and Al-Majali, A. (1997). Prevalence and pathology of foreign bodies (plastics) in Awassi sheep in Jordan. *Small Rumin. Res.* **24(1)**: 43-48.
- Hayder, A.M., Bakhiet, A.O. and Mohammed, A.A. (2006). Retrospective study on the prevalence of foreign body in goats'

- rumen: Omdurman Province, Khartoum State, Sudan (1998–2002). *J. Anim. Vet. Adv.* **5(6)**: 449-451.
- Igbokwe, I.O., Kolo, M.Y. and Egwu, G.O. (2003). Rumen impaction in sheep with indigestible foreign body in the semi-arid region of Nigeria. *Small Rumin. Res.* **49**: 141–147.
- Ismail, Z.B., Al-Majali, A. and Al-Qudah, K. (2007). Clinical and surgical findings and outcome following rumenotomy in adult dairy cattle affected with recurrent rumen tympany associated with non-metallic foreign bodies. *Am. J. Anim. Vet. Sci.* **2(3)**: 66-71.
- Negash, S., Sibhat, B. and Sheferaw, D. (2015). A postmortem study on indigestible foreign bodies in the rumen and reticulum of ruminants, eastern Ethiopia. *Onderstepoort J. Vet. Res.* **82(1)**: 1-5.
- Nicholson, M.J. and Butterworth, M.H. (1986). A guide to condition scoring of Zebu cattle. International livestock center for Africa, Addis Ababa, Ethiopia.
- Radostits, O.M., Gay, C.C., Blood, D.C. and Hinchcliff, K.W. and Constable, P.D. (2007). *Veterinary Medicine: A text book of disease of cattle, horse, sheep, pig and goat*, Saunders Elsevier, London, England. pp. 112-522.
- Rahel, M. (2011). Study on fore stomach foreign body in cattle Slaughtered at Hawassa Municipal Abattoir. Ethiopia, DVM Thesis submitted to Gondar University, Faculty of Veterinary Medicine, Gondar, Ethiopia.
- Ramaswamy, V. and Sharma, H.R. (2011). Plastic bags–threat to environment and cattle health: a retrospective study from Gondar city of Ethiopia. *IIOAB J.* **2(1)**: 6-11.
- Reddy, Y.R., Latha, P.A. and Reddy, S. (2014). Review on metallic and non-metallic foreign bodies: A threat to livestock and environment. *JFAV.* **4**: 6-14.
- Sheferaw, D., Gebru, F., Asrat, M., Tesfaye, D. and Debela, E. (2014). Ingestion of indigestible foreign materials by free grazing ruminants in Amhara Region, Ethiopia. *Trop. Anim. Health Prod.* **46(1)**: 247-250.
- Tesfaye, D. and Chanie, M. (2012). Study on rumen and reticulum foreign bodies in cattle slaughtered at Jimma Municipal Abattoir, South West Ethiopia. *AEJSR.* **7(4)**: 160-167.
- Tesfaye, D., Yismaw, S. and Demissie, T. (2012). Ruminal and reticular foreign bodies in small ruminants slaughtered at Jimma Municipal Abattoir, Southwestern Ethiopia. *J. Vet. Adv.* **2(8)**: 434-439.
- Thrusfield, M. (1995). *Veterinary Epidemiology*, Blackwell Science Ltd. Edinburgh, UK. pp. 180-182.
- Tiruneh, R. and Yesuwork, H. (2010). Occurrence of rumen foreign bodies in sheep and goats slaughtered at the Addis Ababa Municipality Abattoir. *Ethiop. Vet. J.* **14(1)**: 91-100.
- Weaver, A.D. (2004). Lameness above the foot. In: *Bovine Medicine: diseases and husbandry of cattle*, Andrews, A.H., Blowey, R.W., Boyd, H. and Eddy, R.G. (Edts.) (2nd Edn.), Blackwell Science, Oxford, UK. pp. 435-467.