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PREVALENCE OF RUMEN AND RETICULUM FOREIGN BODIES IN CATTLE SLOUGHTERED AT HAWASSA MUNICIPAL ABATTOIR, SOUTHERN ETHIOPIA

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ABSTRACT

A cross-sectional study was conducted from November 2014 to April, 2015 at Hawassa Municipal Abattoir, SNNPRS, Ethiopia, with the objectives of assessing the prevalence of rumen and reticulum foreign bodies, identifying types of foreign bodies and associated risk factors for the occurrences of foreign bodies in cattle. Antemortem examination on individual animals was done for assessment of age, breed and body condition while postmortem examination was employed for the recovery of foreign body from rumen and reticulum. The study animals were selected by using systematic random sampling method from the study population. From total of 300 cattle examined, 55 (18.3%) were found positive for the occurrence of indigestible foreign bodies in rumen and reticulum. Prevalence of foreign body occurrence recorded in young, adult and old animal was 1 (5%), 47 (17.5%) and 7 (63.6%) respectively. There was a statistically significant difference in prevalence among age groups (P<0.05). The prevalence recorded in poor, medium and good body condition animals was 6 (54.5%), 37 (37%) and 12 (6.35%), respectively. A statistically significant difference (P<0.05) in prevalence among body conditions was also observed. On the other hand, the prevalence of foreign body in cross and local breed were 5 (50%) and 50 (17.3%), respectively. Similarly, prevalence differences between the breeds was statistically significant (P<0.05). The common types of foreign bodies detected were Clothes 30 (10%), Plastics 8 (2.7%), Leathers 6 (2%), Nails 3 (1%), Needles 2 (0.7%) and 2 Wires (0.7%).` Therefore, continued awareness creation should be instituted in to the animal health care services to avoid the risk of foreign body ingestion by animals. Most importantly, appropriate

solid waste disposal system need to implement in the study area, particularly where animals are reared, to prevent health risk for cattle and also to protect the environment.

KEYWORDS: Abattoir, Cattle, Foreign bodies, Hawassa, prevalence.

1. INTRODUCTION

Ethiopia is a home for many livestock species and believed to have the largest livestock population in Africa. An estimate indicates that the country is a home for about 54 million cattle, 25.5 million sheep and 24.06 million goats. From the total cattle population 98.95% are local breeds and the remaining are hybrid and exotic breeds. 99.8% of the sheep and nearly all goat population of the country are local breeds (CSA, 2013). Cattle play significant contribution in Ethiopian economy as source of meat, milk, drought prowler, income and foreign exchange. However, as other livestock in the country their contribution is below their expected potential due to prevalent livestock diseases, poor management system and poor genetic performance. Thus, the country is not utilizing this huge potential livestock resource and an improvement in this sector (Desiye and Mersha, 2012).

Environmental pollution is one of the growing problems for grazing animals due to absence of recycling industries, cleaning of environment cultures and improper disposal of plastic bags. Plastic bags are resistant to biodegradation and pollute the environment for decades and centuries and poses great risk to human health and environment (Ramaswamy and Sharma, 2011). Free grazing animals ingest plastic bags especially in towns and villages which are indigestible and their accumulation in the rumen of grazing animals may lead to adverse effect on health (Ghurashi *et al*., 2009). It was reported to be a condition of great economic importance as it causes loss of production and high mortality rates (Radostitis *et al*., 2000). In Jordan, an estimated loss of 25 million USD in productivity and health associated with plastic impaction has been reported (Hailat *et al.*, 1996).

Ingestion of foreign bodies is mainly related to nutritive deficiency and feeding management of the animals(Desiye and Mersha, 2012) and it may also occur during period of feed scarcity (Igbokwe *et al*., 2003). Feed shortage usually occurs at specific time of the year in most part of Ethiopia. Moreover, most owners do not provide supplementary feed to animals. These in turn may predispose the animals to negative energy balance and force them to feed on unusual materials including plastics, clothes, ropes and even metallic substances (Tesfaye *et al*., 2012).

Sheep and goats are highly selective feeder and ingest significantly less amount of foreign bodies as compared to cattle (Roman and Hiwot, 2010). Cattle are more susceptible to foreign body ingestion than small ruminants because they do not usetheir lips for prehension and are more likely to eat chopped feed; indiscriminate feeding habits in cattle may lead to ingestion of foreign bodies that would be rejected by other species (Mc Curin and Basser, 2006).

The ingestion of foreign bodies causes various problems 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 foreign body, the degree of obstruction that is caused as well as problems associated with the material of the foreign body. 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 cattle (Desiye and Mersha, 2012). 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 (Igbokwe *et al*., 2003).

Entrance and migration of metallic foreign bodies through the body tissues lead to many complication that differ according to the nature of the foreign body and the way of its entrance in to the tissues (Calfee and Manning, 2002). TRP is relatively common disease in cattle caused by the ingestion of foreign bodies. In the reticulum swallowed metallic objects such as nail or pieces of wire fall directly on the reticulum or pass into the rumen and subsequently carried over the rumeno-reticular folds into the cranioventral part of the reticulum (Rodostitis, 2007). The perforation of the wall of reticulum allows leakage of ingesta and bacteria which contaminates the peritoneal cavity, resulting in local or diffuse peritonitis (Cavedo *et al*., 2004).

The condition is serious in our country usually in urban and peri- urban areas where extensive building are carried out and proper plastic material disposal is not conditioned and so thrown on roads and near the fence or anywhere. Animal 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 (Ramaswamy and Sharama, 2011).

Therefore, the objectives of this study are:

❖ To estimate the current prevalence of foreign body in cattle slaughtered at Hawassa municipal abattoir.

❖ To identify the type of rumen and reticulum foreign bodies.

❖ To study the risk factors associated with the ingestion of those foreign bodies in cattle.

2. MATERIAL AND METHODS

2.1 Study Area

The study was conducted in Hawassa Municipal Abattoir. Hawassa is located at 275kms south of Addis Ababa in Southern Nations, Nationalities and people's Regional state. Hawassa is the capital city of Sidama zone and the region, is topographically located on the shore of the rift valley lakes at altitude of 7°4' N and a longitude of 38°31' E. The annual rainfall and temperature range of the town is 800-1000mm and 20.1-25°C respectively and lays an altitude of 1500-2000 a.s.l. The total livestock population of Sidama zone is estimated to constitute 2,096,120 cattle, 430,490 sheep, 236,416 goats, 68,388 horses, 1,189 mules, 54,093 donkey, 1,532,589 Poultry, and 88,728 beehives (CSA, 2013).

2.2 Study Population

The study was carried out on cattle that were brought around Hawassa areas from farmers and most of these animals are managed under extensive type of management. During the study different risk factors like age, breed and body condition of animals was considered.

2.3 Study Design

A cross-sectional study was carried out from November 2014 to April 2015 at Hawassa Municipal Abattoir to assess the prevalence of rumen and reticulum foreign body and identification of type of foreign bodies in the study area.

2.4 Sample Size Determination

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:

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

Where n= required sample size

P_e=expected prevalence (17.07%)

d = desired absolute precision

1.96= the value of Z of 95% confidence level.

Therefore according to the above formula, minimum of 217 animals should be sampled, but to increase the accuracy of the prevalence estimates, a total of 300 animals were sampled.

2.5 Sampling Method

A cattle slaughtered during each visit day were selected by systematic random sampling using regular interval to study the prevalence of foreign body and identification of types of foreign bodies in rumen and reticulum in cattle slaughtered at Hawassa Municipal Abattoir.

2.6 Data Collection

2.6.1 Ante mortem Examination

Ante mortem examination on individual animals was done for assessment of age, breed 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 De-Lahunta 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 spinus and transverse processes of the lumbar vertebrae described by Nicholson and Butterworth (1986) and breeds was classified as local and cross based on the species of animal brought to abattoir.

2.6.2 Post mortem Examination

In the postmortem examination, rumen and reticulum was examined. Immediately after slaughtered, in the evisceration stage the stomach was carefully removed from the abdominal cavity and open and explored for the prevalence of any foreign non dietary material by inspection and palpation. Any foreign bodies obtained during inspection was washed with water to remove adhering feed material and then identified. When the finding is positive, the location and type of the foreign bodies was recorded otherwise recorded as negative postmortem recorded sheet.

2.7 Data Management and Analysis

The data collected was entered and scored in Microsoft excel worksheet. Before subjected to statistical analysis, the data was thoroughly screened for errors and properly coded. For analysis, SPSS Microsoft software Version 17.0 was used. Descriptive statistical analysis

such as 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 ($\chi2$) test was employed to assess the existence of association between prevalence of the foreign bodies and different potential risk factors considered.

3. RESULTS

3.1 Occurrence of foreign body

From the total 300 cattle examined for the presences of any foreign bodies in their rumen and reticulum, 18.3% (55/300) of them were found positive. The types of foreign bodies were clothes, plastics, leathers, nails, needles, wires, hair, plastic and clothes, rope and stone. Metallic foreign bodies are frequently recovered from reticulum and non-metallic foreign body recovered from rumen.

3.2 Prevalence and frequency of foreign body among age group

From 20, 269 and 11 animals examined with the age of young, adult and old, 1 (5%), 47 (17.5%) and 7 (63.6%) were found positive for occurrence foreign bodies, respectively. Foreign bodies were more frequently encountered in old animals than other two groups. The stastical analysis also showed that there exist highly significant differences ($p < 0.05$) among the three age groups in the occurrences of foreign bodies (Table 1).

Table 1: Prevalence and frequency of foreign body among age group.

		Age		
Foreign body	**Young**	**Adult**	**Old**	**Total**
Negative for foreign body	19 (95%)	222 (82.5%)	4 (36.7%)	245 (81.7%)
Clothes	-	27 (10%)	3 (27.27%)	30 (3%)
Plastics	1 (5%)	6 (2.2%)	1 (9.27%)	8 (2.7%)
Leathers	-	6 (2.2%)	-	6 (2%)
Nails	-	2 (0.7%)	1 (9.1%)	3 (1%)
Needles	-	2 (0.7%)	-	2 (0.7%)
Wires	-	-	2 (18.2%)	2 (0.7%)
Rope	-	1 (0.4%)	-	1 (0.33%)
Stone	-	1 (0.4%)	-	1 (0.33%)
Plastic and leather	-	1 (0.4%)	-	1 (0.33%)
Hair	-	1 (0.4%)	-	1 (0.33%)
Total	20 (6.6%)	269 (89.7%)	11 (3.7%)	300 (100%)
Total positive	1 (5%)	47 (17.5%)	7 (63.6%)	55 (18.3%)

P-value =0.000 $\chi2=17.587$

3.3 Prevalence and frequency of foreign body among breed

Among the total of 300 animals examined, 290 (97%) were local breeds and 10 (3%) were cross breed. From this examined breeds of animal, 5 (50%) of cross breed and 50 (17.3%) of local breed were positive for occurrence foreign bodies and there was high stastically significant difference (p<0.05) among this group in the occurrences of foreign bodies (Table 2).

Table 2: Prevalence and frequency of foreign body among breed.

	Breed		
Foreign body	**Local**	**Crossed**	Total
Negative for foreign body	240 (82.7%)	5 (50%)	245 (81.7%)
Clothes	28 (9.6%)	2 (20%)	30 (10%)
Plastics	6 (2.1%)	2 (20%)	8 (2.7%)
Leathers	5 (1.75%)	1 (10%)	6 (2%)
Nails	3 (1%)	-	3 (1%)
Needle	2 (0.7%)	-	2 (0.7%)
Wires	2 (0.7%)	-	2 (0.7%)
Rope	1 (0.3%)	-	1 (0.33%)
Stone	1 (0.3%)	-	1 (0.33%)
Plastic and leather	1 (0.3%)	-	1 (0.33%)
Hair	1 (0.3%)	-	1 (0.33%)
Total	290 (96.7%)	10 (3.3%)	300 (100%)
Total positive	50 (17.3%)	5 (50%)	55 (18.3%)

P-value=0.008 $\chi 2$ =6.929.

3.4 prevalence and frequency of foreign body among body condition score

From 11, 100 and 189 animals examined with their respective poor, medium and good body condition, 6 (54.5%), 37 (37%) and 12 (6.35%) were positive for foreign body occurrence respectively. There was high stastically significant difference (p< 0.05) between different body condition scores and foreign body distribution in rumen and reticulum (Table 3).

Table 3: prevalence and frequency of foreign body among body condition score.

	Body condition			
Foreign body	**Good**	**Medium**	**Poor**	Total
Negative for foreign body	177 (93.6%)	63 (63%)	5 (45.4%)	245 (81.7%)

Clothes	5 (2.6%)	21 (21%)	4 (36.4%)	30 (10%)
Plastics	2 (1%)	5 (5%)	1 (9.1%)	8 (2.7%)
Leathers	3 (1.6%)	3 (3%)	-	6 (2%)
Nails	-	3 (3%)	-	3 (1%)
Needles	-	1 (1%)	1 (9.1%)	2 (0.7%)
Wires	1 (0.53%)	1 (1%)	-	2 (0.7%)
Plastic and leather	-	1 (1%)	-	1 (0.33%)
Stone	-	1 (1%)	-	1 (0.33%)
Rope	1 (0.53%)	-	-	1 (0.33%)
Hair	-	1 (1%)	-	1 (0.33%)
Total	189 (63%)	100 (33.3%)	11 (3.7%)	300 (100%)
Total positive	12 (6.35%)	37 (37%)	6 (54.5%)	55 (18.3%)

P value=0.000   χ2=51.037.

3.5 prevalence and frequency of Foreign Bodies with Regard to Site

From 55 positive cases of foreign body, 48 (87%) were occurred in rumen and 7 (13%) in reticulum. Prevalence of foreign bodies to these sites was highly statistically significant (p < 0.05). Metallic foreign bodies; wires 2 (28.6%), nails 3 (42.8%) and needles 2 (28.6%) were most frequently recovered from reticulum and non-metallic foreign bodies were recovered from rumen. Clothes 30 (62.5%), Plastics 8 (16.7%) and Leathers 6 (12.5%) were highly prevalent foreign body in the rumen (Table 4).

Table 4: prevalence and frequency of Foreign Bodies with Regard to Lodgments Site.

	Lodgment site			
Foreign body	**Number**	**Rumen**	**Reticulum**	**Total**
Negative for foreign body	245 (81.7%)	-	-	245 (81.75%)
Clothes	-	30 (62.5%)	-	30 (10%)
Plastics	-	8 (16.7%)	-	8 (2.7%)
Leathers	-	6 (12.5%)	-	6 (2%)
Nails	-	-	3 (42.8%)	3 (1%)
Needles	-	-	2 (28.6%)	2 (0.7%)
Wires	-	-	2 (28.6%)	2 (0.7%)
Rope	-	1 (2.1%)	-	1 (0.33%)
Stone	-	1 (2.1%)	-	1 (0.33%)
Plastic and leather	-	1 (2.1%)	-	1 (0.33%)
Hair	-	1 (2.1%)	-	1 (0.33%)
Total	245 (81.75%)	48 (16%)	7 (4.3%)	300

P value=0.00   χ2=3.000.

4. DISCUSSIONS

This study has shown an overall prevalence of 18.3% of rumen and reticulum foreign bodies in cattle in the study area. 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 and Radostits *et al*. (2007) showed the prevalence of 16% in a similar work. Hailat *et al*. (1996) from Jordan reported 25 million USD estimated loos 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, Remi- Adewumi *et al*., 2000) and Sudan (Ghurashi *et al*., 2009).

The present prevalence rate of foreign bodies is higher than the report of Rahel (2011), 17.07% of prevalence on rumen and reticulum foreign bodies. Similarly, the present report is higher than the report of Sileshi *et al*. (2013) from Gondar, 8.6% of prevalence on rumen and reticulum foreign bodies in ruminants. On the contrary, higher prevalence (77.41%) and (54.14%) was reported by Ismael *et al*. (2007) and Khurshaid *et al*. (2013) respectively. The difference in the prevalence rate may be due to differences in the origin of animals presented for slaughter and type of waste management system between the countries.

Highest prevalence (63.6%) of foreign bodies was detected in old cattle greater than ten year age. This finding is agree with the work of Ravindra *et al*. (2014), who reported the highest prevalence (93%) of foreign bodies in old cattle. Abebe and Nuru (2011) recovered foreign body at higher prevalence (81.25%) from the rumen and reticulum of old sheep and goats. The highest 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 undead animals to be positive.

The result of this study indicated that prevalence was higher in the cross breed cattle (50%) than local breeds (17.3%). The findings agree with the work of Rahel (2011) who reported forestomach foreign bodies with the prevalence of (58.82%) in cross breeds. Desiye and Mersha (2012) also reported that the prevalence of foreign bodies was higher in the cross breed cattle (70%) than local breeds (10.77%). Sileshi *et al*. (2013) reported that cross breed animals are more exposed for indigestible foreign bodies than local breeds. The higher prevalence in cross breed might be associated with their higher productivity which requires high demand of nutrition that enforces cattle to indiscriminately feeding and hence increased exposure to foreign bodies.

This study also identified the highest prevalence of rumen and reticulum foreign bodies were detected in animals with poor body condition (54.5%) followed by medium (37%) and good body condition (6.35%) score animals. This finding agree with the work of Desiye and Mersha (2012) who recovered foreign body at higher prevalence from the rumen and reticulum of poor body condition animal (72.72%) than medium (35.95%) and good (7.33%) body condition. In Similar study, the highest prevalence (54.5%) of foreign body in animal with poor body condition was reported by Khurshaid *et al*. (2013). Roman and Hiwot (2010) also reported the Prevalence of foreign body is higher in small ruminants with thin and emaciated body condition score than that of average, fat and obese. 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 and thus causes reduced weight gain.

The result of this study indicated metallic foreign bodies were most frequently recovered from reticulum. This finding in line with the finding of Radostits *et al*.(2007) who reported that in industrialized countries, metallic foreign bodies present in the reticulum up to 90% of normal animals. The present finding also agree with the report of Sileshi *et al*. (2012) who recovered metallic foreign bodies at highest prevalence from reticulum. In addition, Desiye and Mersha (2012) reported the highest prevalence (87.5%) of metallic foreign bodies from reticulum. The reason might be due to retention of these foreign bodies by the honey comb structure of the reticular mucosa and their heavy weight give chance to be attracted to the lumen of the reticulum due to gravitational attraction force of these heavy foreign bodies to the ventral part of the forestomach.

This study shown that of the total 55 foreign bodies encountered, 48 (87%) occurred in the rumen and 7 (13%) occurred in reticulum. The finding also agree with the work of Tesfaye *etal*. (2012) who reported the higher number of foreign bodies occurrence in the rumen (79.2%) than reticulum (20.8%). Khurshaid *et al*. (2013) also reported that most foreign bodies encountered in the rumen (58.45%) than reticulum (19.32%) of Achai Cattle. The higher prevalence foreign body in rumen may be due to the fact that many ingested feed goes to the rumen due to its larger size.

This study also showed clothes (10%), plastics (2.7%), leathers (2%), nails (1%), needles (0.7%) and wires (0.7%) were common type of foreign bodies recovered from rumen and reticulum of cattle in the study area. The finding agree with the previous work from Roman

and Hiwot (2010), Hailat *et al*. (1996), Igbokwe *et al*. (2003) and Remi- Adewunmi *et al*. (2004) who reported plastics, clothes, leathers, nails, wires and needles were the most commonly recovered foreign bodies from rumen and reticulum of ruminants. The occurrences of this 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 area of new construction site, shortage of feed during the long dry season and lack of awareness among livestock owners on the risk of ingestion of these foreign materials. The result of this study identified clothes were the most common cause of rumen impaction found in 30 (10%) of the study animal. This might considered as a result of their availability to be ingested by the animals from their grazing environment due to improper disposal of clothes in the area.

5. CONCLUSION AND RECOMMENDATIONS

The present study revealed an overall prevalence of 18.3% (n= 55) of rumen and reticulum foreign body in the study area. Old cattle, cross breed and animal with poor body condition are the most affected group compared to that of young cattle, local breed and good body condition animal. Hence, age, breed and body condition considered the potential risk factors for occurrence of rumen and reticulum foreign body and degree of association found highly statistically significant (p<0.05). Rumen harbored mostly non-metallic foreign bodies while reticulum was the major site for the retention of metallic objects. Clothes were recovered as the most common foreign bodies in the study area followed by plastics, leathers, nails, needles and wires. Therefore, based on the above conclusion the following recommendations are forwarded:

➢ Appropriate solid waste disposal system should be implemented.
➢ Creating awareness on the impact of careless disposal of foreign bodies in the health of animals.
➢ Periodical cleaning of these wastes in the grazing area.
➢ Keeping cattle away from the site of new construction and old and unclear grazing sites.
➢ Provide nutrient to meet mineral and vitamin requirements of the animals.
➢ Keeping cattle in intensified manner so that the owners could easily control their accessibility to foreign bodies.
➢ Since previous studies about foreign bodies in these areas are very few, further research should be made to emphasize the importance of the problem and address the prevention and control measures were recommended.

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