STUDY ON RUMEN AND RETICULUM FOREIGN BODY IN CATTLE SLAGHUTERED AT NEGELLE ARSI MUNICIPAL ABATTIOR

DVM THESIS (Since 2021)

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AUGUST, 2021
HAWASSA, ETHIOPIA

HAWASSA UNIVERESITY
FACULTY OF VETERINARY MEDICINE

Study on Rumen And Reticulum Foreign Body In Cattle Slaghutered At Negelle Arsi Municipal Abattior

Thesis Submitted to Faculty of Veterinary Medicine, Hawassa University, in Partial fulfillment of the requirements of the degree of doctor of veterinary medicine (DVM)

DVM Thesis

By: Mohammed Harun

Author : Mohammed Harun, Hissa Dingeta, Abe Reta

Abstract: A cross-sectional study was conducted from March 2021 to August, 2021 in Negelle Arsi town at Negelle Arsi municipal abattoir to determine the prevalence of rumen and reticulum foreign bodies, identify types of foreign bodies and associated risk factors for the occurrences of foreign bodies. Study animals were selected by using systematic random sampling method from the total slaughtered animals. Out of the total 395 cattle examined, 40 (10.12%) were found positive for the occurrence of indigestible foreign bodies in rumen and reticulum. Out of 40 positive cases of foreign body, 36 (9.11%) were occurred in rumen and 4 (1.01%) in reticulum. The types of foreign bodies detected were leathers (2.5%), clothes (50%), wires (10%) and ropes (12.5%). Among the considered risk factors, body condition score of animals found highly significantly associated ($p<0.05$) with the occurrence of foreign bodies. The finding of foreign bodies was lower in cross breed cattle 5 (1.27%) than that of the local breeds i.e., 35 (8.86%) but the difference was not statistically significant ($p=0.797$) To avoid the risk of ingesting indigestible materials in animals awareness creation activities must be implemented among livestock owners seems to be necessary. This could also help for the reduction of environmental pollution involving proper waste management practices eventually reducing the chance of animals ingesting foreign bodies.

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Keywords: *abattoir; body condition score; foreign bodies; prevalence; rumen*

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TABLE OF CONTENTS

Contents **Pages**
ACKNOWLEDGMENTS..... Error! Bookmark not defined.
TABLE OF CONTENTS **6**
LIST OF TABLES..... Error! Bookmark not defined.
1. INTRODUCTION **7**

2. MATERIALS AND METHODS **8**
2.1 Study Area **8**
2.2. Study Animals **8**
2.3 Study design **8**
2.4 Sample Size and Sampling Methods **8**
2.5 Study Methodology **9**
2.6 Data Management and analysis **9**
3. RESULTS **9**
3.1. Overall Prevalence of Foreign Bodies **9**
4. DISCUSSION **10**
5. CONCLUSION **11**
6. REFERENCES **11**

Abstract:
A cross-sectional study was conducted from March 2021 to August, 2021 in Negelle Arsi town at Negelle Arsi municipal abattoir to determine the prevalence of rumen and reticulum foreign bodies, identify types of foreign bodies and associated risk factors for the occurrences of foreign bodies. Study animals were selected by using systematic random sampling method from the total slaughtered animals. Out of the total 395 cattle examined, 40 (10.12%) were found positive for the occurrence of indigestible foreign bodies in rumen and reticulum. Out of 40 positive cases of foreign body, 36 (9.11%) were occurred in rumen and 4 (1.01%) in reticulum. The types of foreign bodies detected were leathers (2.5%), clothes (50%), wires (10%) and ropes (12.5%). Among the considered risk factors, body condition score of animals found highly significantly associated ($p<0.05$) with the occurrence of foreign bodies. The finding of foreign bodies was lower in cross breed cattle 5 (1.27%) than that of the local breeds i.e., 35 (8.86%) but the difference was not statistically significant ($p=0.797$) To avoid the risk of ingesting indigestible materials in animals awareness creation activities must be implemented among livestock owners seems to be necessary. This could also help for the reduction of environmental pollution involving proper waste management practices eventually reducing the chance of animals ingesting foreign bodies.

Keywords: *abattoir, body condition score, foreign bodies, prevalence, rumen*

1. INTRODUCTION

Ethiopia is resourceful country endowed with largest population of livestock in Africa. The country's livestock potential is huge with an estimated 70.3 million cattle, 52.46 million goats, and 42.9 million sheep (CSA, 2021). However, the development of this sector is hampered by different constraints and has not been fully exploited the benefit of indigenous livestock compared to its tremendous potential. Significant losses result each year from the death of animals as a result of lack of appropriate veterinary services, lack of attention from government, widespread endemic diseases and recurrent drought (Abdela and Jilo, 2016). Ingestible foreign body predisposed by environmental pollution is currently becoming a global health problem of ruminants and have been implicated as among common causes of sudden death (Radostits *et al*., 2007; Anwar *et al*., 2013). Cattle are more susceptible to foreign body syndrome than small ruminants; their lack of oral discrimination may lead to ingestion of foreign bodies which would be rejected by other species (Misk *et al.,* 2000). Different studies have shown that ruminants reared in urban and suburban areas have high probability to ingest indigestible materials such as plastic, cloth, wire, leather and metal (Abdullah *et al*., 1984; Remi-Adewunmi *et al.,* 2004). Ingestion of indigestible foreign bodies by animals is mainly associated with nutritional deficiencies, environmental pollution and poor feeding management (Negash *et al.*, 2015). Ingestion of foreign bodies is one of the major bottle necks to livestock development in the tropics (Gupta and Single, 2013; Fasil, 2016). In Ethiopia, ruminants are kept under an extensive type of management are likely to be exposed to the ingestion of indigestible garbage from various sources due to a widespread environmental contamination with plastic bags, absence of policy to protect environment and frequent occurrence of drought that predispose animals to nutritional deficiency and pica (Abebe and Nuru, 2011).

The occurrence of foreign bodies in the rumen and reticulum of cattle is commonly seen in developing countries primarily due to indiscriminate feeding habits, improper waste disposal in the environment, nutritional deficiency and poor management system around home (Singh and Nigam, 1981). Industrialization and mechanization further increased the incidence of foreign bodies in animals in urban and semi urban areas (Misk, 1999). Cattle kept in farm yards, stables close to human mechanical activities are predisposed to swallow metallic, plastic and non-plastic objects

such as nails and pieces of wires that have been carelessly left in their feeding areas. They are exposed to indigestible materials resulting in high economic losses (Misk, 1984; Jones, 1997; Semieka, 2010; Tesfaye and Chanie, 2012). Most of these foreign bodies were found mainly in the fore-stomachs and they are responsible for most pathological conditions (Tehrani, 2012). This may lead to various complications including ruminitis, rumen impaction, traumatic pericarditis and traumatic reticulo-peritonitis, even penetrate pleural cavity causing pleuritis and pneumonia, and into the pericardial sac causing pericarditis (Hailat *et al.*, 1996). It may ultimately lead to rumen distension, absence of defecation, reduced feed intake, failure of the absorption of volatile fatty acids, reduced rate of weight gain, internal injury, the perforation of the wall of the reticulum which allows leakage of ingesta and rumen microflora which contaminates the peritoneal cavity, resulting in inflammation of the peritoneum and consequently death (Abdullah *et al*., 1984; Igbokwe *et al*., 2003; Remi-Adewunmi *et al*., 2004). However, there is no published data regarding to rumen foreign body of cattle in Negelle Arsi area. Therefore, the objective of this study is to estimate the prevalence, identify the type of foreign bodies and associated risk factors for indigestible foreign bodies in rumen and reticulum of cattle in Negelle Arsi area.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted from March, 2021 to August, 2021 in Negelle Arsi town at Negelle Arsi municipal abattoir which is located in the West Arsi Zone of Oromia Regional State. The capital of the district, Negelle Arsi, is 225 km away from Addis Ababa. Geographically, it is located within grid coordinates of 70 08’ 00’’ N to 70 49’ 00’’N latitude and 380 24’ 04’’ E to 380 48’ 09’’E longitude and its altitude ranges from 1500 to 2300. The total population of the district is 264,314 (211,985 rural and 52,329 urban residents) (CSA, 2007).

2.2. Study Animals

The study was conducted on 395 male apparently healthy cattle slaughtered at Negelle Arsi municipal abattoir from March, 2021 to August, 2021. Animals were both local and cross breed cattle kept under extensive and semi-intensive farming systems. Even though, the study animals were kept under broad range of management, animals in most of the rural areas were kept to graze pasture on grassland and supplementary feedings of crop residue when pasture in scarce especially during long dry season. In Negelle Arsi town, semi-intensive management system was practiced and animals were fed with concentrate and hay.

2.3 Study design

A cross-sectional study was conducted from March, 2021 to August, 2021 to assess the prevalence of the rumen and reticulum foreign bodies and to identify the type of indigestible foreign bodies and their associated risk factors for the occurrence of foreign bodies. The study was carried out on 395 cattle which were kept under different management systems. Animals were selected from the study population by using systematic random sampling technique. Breed, age and body conditions were used as risk factor for occurrence of foreign bodies. During the study time the animals were categorized into two as young and adult age of studied animals were estimated based on dentition pattern (McCurin, and Basser, 2006)). The age of the animals was grouped as (≤ 5years), (5 and above years). Classification of the body condition of animals was made according to a method previously described by Nicholson and Butterworth, (1986) with scale ranging from poor, medium and good. During sampling age, body condition, and breed of animals were recorded.

2.4 Sample Size and Sampling Methods

Systematic random sampling technique was employed to select the study animals and rumen and reticulum of individual animals were examined. The sample size for this study would be calculated by considering 50% of the population about indigestible foreign body since there are no researches in the area before. The sample size will be determined using a method recommended by [Thrusfield, 2005]. In this study, with 95% confidence level, 5% desired absolute pricesion and 50% expected prevalence. To calculate the sample size single proportion formula was utilized.

$$n = \frac{Z^2 P_{exp}(1-P_{exp})}{d^2};$$

Where n=required sample size
$P_{exp=}$ expected prevalence
d^2 =desired absolute precision;
Z= is the value from the standard normal distribution reflecting the confidence level that will be used (1.96 for 95%); then
n= 1.96^2 x 0.5 (1-0.5) /0.05^2=384 animals were the sample size determined for this study.

2.5 Study Methodology

*Antemortem inspection***:** Animals presented for slaughter were subjected to ante-mortem inspection upon arrival at the abattoir. Ante-mortem inspection was conducted by applying a specific range of procedures that consider the behavior and appearance, as well as signs of disease in animals (FAO, 2009). Ante-mortem inspection of cattle took place in pens on the premises and each animal will be observed at rest and in motion for the general status. Only animals that were judged to be sufficiently rested was proceeding to slaughter. Each animal selected for the study was further identified by providing a unique identification number that would be used for the preceding postmortem examination. *Postmortem examination:* After slaughter and before flaying, slaughtered animals were identified by recording the code given at anti-mortem. Animals were visually inspected and their rumen and reticulum would be palpated immediately post slaughter. Then, the stomach was gently removed from the abdominal cavity and all the contents were examined carefully for the presence or absence of any foreign material. When the finding was positive, the site of fore stomach and type of the foreign bodies was recorded otherwise recorded as negative in postmortem record sheet. When foreign bodies were found, they were removed, washed, and identified.

2.6 Data Management and analysis

The data collected from the study were entered into MS excel spreadsheet 2010 program, filtered, and coded before analysis. Statistical analysis was made using STATA version 14.2 (StataCorp, 4905, Lakeway Drive, College Station, Texas, USA). Descriptive statistical analysis such as tables were used to summarize and present the data. The total prevalence of rumen and reticulum foreign bodies was calculated as percentage by dividing total number of positive cattle for foreign bodies to the total number of cattle 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. In this analysis statistical significance was set at $P < 0.05$.

3. RESULTS

3.1. Overall Prevalence of Foreign Bodies

Out of the total 395 cattle examined for the presences of any foreign bodies 40(10.12%) animals had foreign bodies in their rumen and/or reticulum. Of the 40 positive cases of foreign bodies, 36 (90%) occurred in rumen while 4(10%) were found in reticulum. The types of foreign bodies were wires, plastics, leathers, clothes and ropes. Clothes, plastics and ropes were the most common as observed in the positive cases. Other substances recovered from reticulum were wires of positive cases.

3.2. Occurrence of Foreign Bodies with Regard to Age

Study animals were grouped into two as young (< 5 years) and adult (5 and above years). Of the 40 positive cases, 9(15.25%) were found in young and 31(9.2%) were detected in adult age group. However, the statistical analysis showed that there was no significant difference between the two age groups (Fisher's exact=2.0038; *P>0.05*) in the occurrences of foreign bodies (Table 1).

3.3. Occurrence of Foreign Bodies with Regard to Breed

In this study, foreign bodies were detected in both local and cross breeds. Out of 40 positive cases 35 (10%) were local breed and 5 (10.8%) were cross breed. No significant variation (Fisher's exact=0.0316; *P>0.05*) was seen considering breed as a risk factor (Table 1).

3.4. Occurrence of Foreign Bodies with Regard to Body Condition Score

Most of the animals brought to Negelle Arsi Municipal Abattoir for slaughter exhibited good and medium body conditions. Of the 395 animals examined, 306 exhibited good body condition while the rest 89 had medium body condition. Out of 40 positive cases, 16 (5.2%) were in a good body condition status and 24 (26.9%) had medium body condition. Body condition score showed a significant association (χ^2=35.8; *P<0.05*) with the occurrence of foreign bodies (Table 1).

3.5. Prevalence of Foreign Bodies with Regard to Location Site

From 40 positive cases of foreign body, 36(90%) occurred in rumen while 4(10%) in reticulum. Prevalence of foreign bodies to these sites was highly statistically significant (p < 0.05).

Table 1: occurrence of foreign bodies and analysis of risk factors

Factor		Number examined	Number positive	Prevalence (%)	95% Confidence interval	χ^2; P- *value*
Age	Young	59	9	15.25	7.9 - 27.2	2.0038; 0.157
	Adult	336	31	9..2	6.5 - 12.8	
BCS	Good	306	16	5.2	3.2 - 8.38	35.79; 0.000
	Medium	89	24	26.9	18.6 - 37.3	
Breed	Local	349	35	10.0	7.2 - 13.6	0.0316; 0.859
	Cross	46	5	10.8	4.4 - 24.2	
Total		395	40	10.12	7.5 – 13.5	

Table 2: types and location of foreign bodies

Types of foreign Bodies	Location		Total	Occurrence (%)
	Rumen	Reticulum		
Clothes	20	0	20	50
Leathers	1	0	1	2.5
Plastics	10	0	10	25
Ropes	5	0	5	12.5
Wire	0	4	4	10
Total	**36**	**4**	**40**	

4. DISCUSSION

Ingestion of indigestible foreign materials by ruminants is a common problem reported worldwide (Ghurashi, 2009). The present study revealed an overall prevalence of 10.12% presence of foreign body in the rumen and reticulum of cattle slaughtered at Negelle Arsi municipal abattoir. The present finding is closer to the report of Rahel (2011) who recorded 17.07% prevalence of fore stomach foreign bodies in Hawasa Municipal Abattoir but lower than the report of Ismael *et al*. (2007) who reported (77.41%) in adult dairy cattle having indigestible foreign bodies suffering from recurrent rumen tympani in Jordan and also that of Jagos (1969) who reported higher overall 51% prevalence of foreign body in adult cows. These differences in the prevalence of foreign bodies between various areas might be due to differences in animal management systems and the extent of foreign body management both in the rural and/or urban areas and in the grazing areas. Ingestion of foreign bodies is associated with a shortage of forage as well as increased pollution of grazing lands with indigestible materials (Hailat *et al*., 1996; Tesfaye, 2012). If owners do not provide supplementary feed during feed shortages, their animals are likely to face a negative energy balance that will force them to ingest unusual materials including plastic, cloth, rope and even metallic objects (Hailat *et al*., 1996).
This study also revealed that the difference in prevalence of rumen and reticulum foreign bodies in between age groups was not significant. This is in a disagreement with the work of Rahel (2011) who reported a higher frequency of rumen

and reticulum foreign body in old age groups. This might be due to the management system in the study area that animals of all age groups have the chance to be exposed to indigestible foreign body.

This study also revealed that the occurrence of rumen and reticulum foreign bodies was not significantly different between breeds. This is in a disagreement with the work of Desiye and Mersha (2012) who found 70% in cross breed and 10.77% in local breed and Rahel (2011) who reported fore stomach foreign bodies with the high prevalence (58.82%) in cross breeds. This could be because of the number of slaughtered animals (most of them local breeds) and hence did not reveal the effect of breed in this study.

In this study, animals with medium body condition were found to be most affected with indigestible foreign bodies than those with good body condition and the difference was significant. This is in agreement with the report of Hailat *et al*. (1997); Fromsa and Mohammed (2011); Hailat *et al*. (1998); Tesfaye and Chanie (2012); Tiruneh and Yesuwork (2010) and Vanitha *et al*. (2010). Rahel (2011) also reported higher prevalence in animal having poor body condition followed by medium followed by good. This may be due to interference of the foreign body with the absorption of volatile fatty acids, causing reduced weight gain.

The highest frequency of occurrence of rumen and reticulum foreign bodies was detected in the rumen (90%). This finding was in general agreement with the findings of Abebe and Nuru (2011); Tesfaye *et al*. (2012b) and Roman and Hiwot (2010). This might be attributed to the larger rumen volume, the cumulative size/s and material composition of the foreign bodies and the types of materials, with metals and sharp objects tending to localize preferentially in reticulum (Radostits, 2007) and many ingested feeds go to the rumen. This study also indicated that all wires (metallic foreign bodies) were recovered from reticulum, while non-metallic foreign bodies were detected from rumen. All metallic foreign bodies were recovered from reticulum in this study may be due to retention of foreign bodies by the honey comb structure of the reticular mucosa.

5. CONCLUSION

The findings of this study indicated that littering the environment with plastic bags and other indigestible materials like clothes could pose health problems for free-ranging cattle unless people reduce disposal of plastics on pastures and begin to practice routine picking up and disposal of plastics from animal pastures. And also, the study revealed that rumen and reticulum foreign bodies have greater economic significance associated with reduced production and productivity of animals suffering from them. This study showed that there is association between body condition and prevalence of foreign bodies. The types of foreign bodies that found in rumen and reticulum of cattle were plastics, clothes, ropes, leathers and wires. More foreign bodies were found in the rumen (90%) than in the reticulum. Hence, body condition of animals is considered risk factors for the occurrence of foreign bodies.

Thus, based on the above conclusion the following recommendation are given; awareness for animal owners should be implemented to avoid the risk of foreign body ingestion by their animals, Environmental pollution should be reduced by proper management of waste which reduces the chance of ingesting foreign bodies, The cattle herders should be encouraged not to allow their cattle to freely wander in streets especially in the cities and populated towns.

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