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Incidence of Indigestible Foreign Bodies and Major Risk Factors in Cattle Slaughterd at Sagure Town Abattior, Digalu-tijo Werada, Arsi Zone, South East Ethiopia

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Abstract: A cross sectional study was conducted from July, 2021 to September, 2021 on 384 cattle in Sagure town abattoir, Digalu-Tijo woreda. The objectives of this study were to assess the prevalence, identify different types of indigestible foreign bodies and potential risk factors associated with the occurrence of indigestible foreign bodies in cattle slaughtered at the abattoir. Each compartment of stomach was opened carefully and through visual inspection was made for the presence of indigestible foreign bodies. Out of 384 examined cattle heads, 65 (16.9%) had indigestible foreign bodies in their fore stomach. Foreign bodies collected were of different types including cloth 24 (37%), leather 4 (6%), rope 6 (9.2%), wire 2 (3%), calcified body 1(1.5%), plastic 16 (24.6%), plastic and cloth 7 (10%) and plastic and rope 5 (7.6%). There was a significant association for the prevalence of indigestible foreign body with sex (X2= 3.8, *P?*0.05) and body condition (X2=16.3, *P?*0.05). From the three age groups of cattle examined, the prevalence was higher (23%) in animals in the old age group than the adult (10.8%) and the young groups (21.4%) (χ^2= 7.6; *P*<0.05). There are statistically significant association between the prevalence and age group of animals. Similarly, the frequency of occurrence of IFB was significantly high (*P?*0.05) in cross breed cattle (45.8%) compared to local breeds (15%). This study showed that presence IFB is a common problem in cattle slaughtered at Sagure town Slaughter house and may significantly cause poor production and mortality in affected animals. Therefore, appropriate solid waste disposal should be implemented.

Key words: Abattoir · Cattle · Foreign Body · Stomach · Sagure

INTRODUCTION

Ethiopian's livestock population is often said to be the largest in African. Excluding the Afar and Somali regions there were approximately 45.57 million cattle, 26.1 million sheep, 21.7 million goats, 2.1 million horses and mules, 5.6 million donkeys, 1 million camel and 39.6 million poultry. For the latter two regions, estimated numbers vary greatly between conventional and aerial censuses, but total less than 15% of the no nomadic regions. Ethiopia has great potential for increased livestock production, both for local use and for export. In adequate information on how to improve animal breeding, marketing and processing. Thus, the country is not utilizing this huge potential livestock resource and an improvement in this sector. Therefore, has the potential to contribute significantly to national income and to the welfare of the majority of rural families. The high concentration of animals in the high lands, together with the fact that cattle are often kept for status, reducing the economic potential of Ethiopia livestock [1].

Cattle plays a significant contribution in Ethiopian economy as source of meat, milk, drought prowler, income However and expansion was constrained by inadequate nutrition, disease, lack of support services 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 [2].

Traumatic reticuloperitonitis, or TRP, is a relatively common disease in adult cattle caused by the ingestion and migration of a foreign body in the reticulum. The typical foreign body is a metallic object, such as a piece of wire or a nail, often greater than 2.5 cm in length [3].

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A large number of adult dairy cattle have metallic foreign bodies in their reticulum without signs of clinical disease. It is likely that a predisposing factor in otherwise normal cows, such as tenesmus or a gravid uterus, causes migration of the foreign body into the reticular wall [4].

Ingestion of foreign body (IFB) in cattle is result a condition of great economic importance and causes severe loss of production and high mortality rate. The ingestion of foreign body is mainly related with nutritional deficiencies and feeding management and cause various problem 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 the foreign body, the degree of obstruction that is caused as well as problems associated with the material of the foreign bodies [5].

Nonmetallic foreign bodies in the reticulo-rumen cause recurrent rumen tympani in adult dairy cattle, over a period of time, these materials, form large tight balls inside the rumen leading to anorexia decreased production and progressive loss of body condition [6].

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. The perforation of the wall of the reticulum allows leakage of ingesta and bacteria which contaminates the peritoneal cavity, resulting in local or diffuse peritonitis is the swallowed objects can also penetrate pleural cavity causing pleuritis and pneumonitis and into the pericardial sac causing pericarditis [7].

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 no conditioned and so thrown on roads and near the fence or anywhere and that is way our dairy cattle are dying mainly associated with foreign bodies [8].

In Ethiopia information regarding the magnitude and occurrence of fore stomach foreign bodies is very limited. The fact that rumen impaction by these foreign bodies is mainly 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 [9].

Therefore the objectives of this study were:

- To determine the prevalence of rumen and reticulum foreign bodies in cattle slaughtered at Sagure town Abattoir,
- To identify the type of rumen and reticulum foreign bodies and to assas the putative risk factors associated with the ingestion of those foreign bodies in cattle.

MATERIALS AND METHODS

Study Area: The study was conducted at Sagure town abattoir, Digelu-Tijo woreda, of Arsi Zone, from July to September 2021. Sagure is found at south-eastern Ethiopia. Located in the Arsi zone of the Oromia region, this town has a latitude and longitude of 07°45'N 39°09'E with an elevation of 2568 meters above sea level. The woreda is bounded by Shirka woreda in East, Lemu-Bilibilo woreda in south, Munesa woreda in south west and Tiyo woreda in North. It is the administrative center of Digelu-Tijo woreda. Digalu-Tijo woreda has an estimated total population of 146, 219 of whom 74755 were men and 71464 were women. Sagure is located 198Km south East of Addis Ababa at an altitude of 2500-3560 meter above sea level The area is characterized by bimodal rainfall occurring from March to April (short rainy season) and July to October (long rainy season) with average annual rainfall of 2000 mm. The farmers in the area practice mixed crop-livestock farming system [10].

Study Animals and Methods: The study animals were both local and cross breed cattle, which originated from various localities and kept at different management system. Age, Origin, sex, body condition and breed were considered as the risk factor for the occurrence of foreign bodies and recorded during ant-mortem examination. During the study time the animals were categorize into three based on age $\leq$ 5 year(young), 5-10year (adult) and $\geq$10 year (old) and also grouped based on body condition as poor, medium and good [9].

Sample Size Determination: Simple random sampling technique was employed to select the study animals; rumen and reticulum of individual animals were examined. The sample size for this study was calculated by considering 50% expected prevalence since there are no researches conducted in the area before.

The sample size was determined according to Thursfield [11] using 95% confidence interval and 0.05 absolute precision. This is calculated by using the following formula:

$N = 1.96^2 x P_{exp} (1-P_{exp})/ d^2$

where,
N = Required sample size.
P_{exp} = Expected prevalance
d = Desired absolute precision (0.05)

Therefore, the sample size of the study was calculated to be 384.

Postmortem Examination: Immediately after slaughter in the evisceration stage, for stomach (comprising the rumen and reticulum) was carefully removed from abdominal cavity and placed in container in such a way as to minimize spillage of contents from different chambers. Post-mortem examination involved visual inspection, palpation and making incision of rumen and reticulum to look for the presences of indigestible foreign body in rumen and reticulum. All the contents were examined thoroughly for the presence of foreign bodies. When foreign bodies were found, they were removed, washed and identified and photographed. Any foreign bodies were obtained during inspection washed with water to remove adhering feed material and identify type of foreign bodies. When the finding was positive, the location and type of the foreign bodies was recorded otherwise recorded as negative in postmortem record sheet. In addition to these gross lesions associated with these foreign bodies were documented.

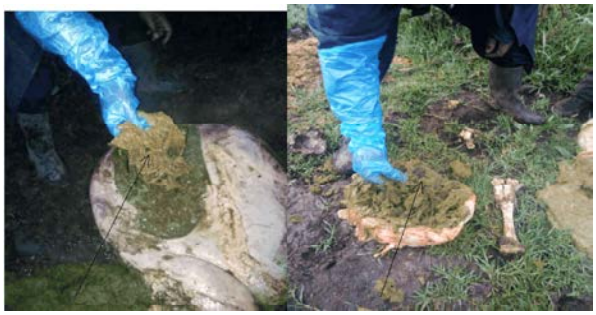
Data Analysis: Data was entered into Microsoft excel spreadsheet and summarized using descriptive statistics. For data analysis, SPSS software (version 16) was used. Pearson chi-square (X2) test was calculated to know the association between prevalence and potential risk factors. The significant level was set at 0.05.

RESULTS

Overall Prevalence of Foreign Body: Of total of 384 cattle (295 male and 89 female) examined for the presences of any foreign bodies in their rumen and reticulum, 16.9% (65/384) of them were found positive. The types of foreign bodies were wires, plastics, leathers, clothes and ropes which were encountered alone and/or with other foreign bodies (Table 1). These comprise cloth 24 (37%), leather 4 (6%), rope 6 (9.2%), wire 2 (3%), calcified body 1 (1.5%), plastic 16 (24.6%), plastic and cloth 7 (10%) and plastic and rope 5 (7.6%). Representative images of foreign bodies recovered from rumen and reticulum of cattle are shown (Figure 1).

Table 1: Types and frequency of IFB discovered during study period

Types of IFB discovered	Numbers of IFB(%)
Cloth	24(37%)
Leather	4(6%)
Rope	6(9.2%)
Wire	2(3%)
Calcified body	1(1.5%)
Plastic	16(24.6%)
Plastic and cloth	7(10%)
Plastic and rope	5(7.6%)



(a) (b)

Fig. 1: The above arrow shows image of indigestible foreign bodies from cattle slaughtered at Sagure abattoir. A) Plastic bag recovered from rumen, B) cloth

Association of Foreign Bodies Based on Sex: Out of total 295 (76.8%) male and 89 (23.2%) female animals, 43 (14.5) % and 22 (24.7%)were positive for indigestible foreign bodies respectively with statistically significant (P<0.05) variation.

Association of Foreign Bodies Based on Age: Animals in this study were categorized into three age groups as (young ≤ 5 years), (adult 5-10 years) and (old ≥10 years) consisting of 56, 185 and 143 number of animals respectively. Age wise prevalence of IFB was 12(21.4%), 20(10.8%) and 33(23%)in young, adult and old animals respectively with no statistical significant (P>0.05) difference (Table 2).

Association of Foreign Bodies Based on Body Condition: Of the total examined animals, 94, 205 and 85 were with poor, medium and good body conditions respectively. A prevalence of 28 (29.7%), 30 (14.5%) and 7(7.8%) were recorded in poor, medium and good body conditioned animals, respectively. There were statistically significant differences (P<0.001) among animals with different body conditions and foreign body distribution in rumen and reticulum (Table 4).

Table 2: Prevalence of foreign bodies based on sex

Gender	Number of examined	Prevalence (%)	X^2	P-value
Male	295(76.8%)	43(14.5%)	3.8	0.048
Female	89(23.2%)	22(24.7%)		
Total	384(100%)			

Table 3: Prevalence of foreign bodies based on sex

Factor	Group	Number of examined	Prevalence (%)	X^2	P-value
Age	Young	56(14.5%)	12(21.4%)	7.6	0.08
	Adult	185(48.2%)	20(10.8%)		
	Old	143(37.2%)	33(23%)		

Table 4: Prevalence of foreign bodies based on body condition

BCS	Number of examined	Prevalence (%)	X^2	P-value
poor	94(24.5%)	30(31.9%)	16.3	0.001
medium	205(53.3%)	28(13.6%)		
Good	85(22.1%)	7(8.2%)		

Table 5: Prevalence of foreign bodies with regard to breed.

Factor	Group	Number of examined	Prevalence (%)	X^2	P-value
Sex	Local	360 (76.8%)	54(15%)	1.3	0.012
	Cross	24 (23.2%)	11(45.8%)		
Total		384 (100%)			

Association of Foreign Bodies with Regard to Breed: Among the total 384 animals examined, 360 were local breeds and 24 were crosses. In this study foreign bodies were detected in both local and cross breeds of animals with prevalence of 54 (15%) and 11(45.8). The prevalence of IFB was higher in cross breed cattle 45% than that of local breed 54 (15%) and there was statistically significant difference (P<0.05).

DISCUSSION

Ingestion of indigestible foreign materials by ruminants is a common worldwide problem previously reported from Jordan [3, 12], Ethiopia [13, 14], Tanzania [15], Nigeria [16-18] and Sudan [19].

This study showed an overall foreign body prevalence of 16.9% (65/384) in cattle slaughtered at Sagure town abattoir. The result obtained from this preliminary work is in agreement with the reports of previous researchers [14, 20], who reported the prevalence of 17.5, 17.07%at Nekemte municipal abattoir and Hawasa municipal abattoir, respectively. The prevalence in current study was slightly higher than the prevalance report of 13.2% by Desiye and Mersha [9] at Jimma Municipal Abattoir, South West Ethiopia and Teshome *et al*. [21], who reported 14% of indigestible foreign bodies in rumen and reticulum of cattle slaughtered at Asella Municipal abattoir.

The higher prevalence was reported than this study by Kebede *et al*. [13], Bwatota *et al*. [15] and Hailemicha *et al*. [22], with prevalence rate of 24.03%, 40.90%, 37.5% in Tanzania, Kombolcha, Amhara regional state of Ethiopia and Assosa municipal abattoir western Ethiopia respectively. The difference might be due to sample size, environmental condition, feeding habit and management system.

Feed shortage usually occurs at specific time of the year in most parts of Ethiopia. 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 [3]. Moreover, most owners do not provide supplementary feed to animals. This in may predispose the animals to negative energy balance and force them to feed on unusual materials including plastics, clothes, ropes and even metallic substances [3]. Wide spread use and improper disposal of plastics that are used for packing of goods could also contribute for the occurrence of foreign bodies in the rumen and reticulum Tesfaye *et al*. [23].

The types of foreign bodies detected in this study were wire, plastic, leather, rope calcified body, cloth. Jebessa *et al*. [14] also detected clothes, leather, rope, wire, plastic, calcified bodies and the combination of both plastic and clothes and plastic and rope. In the present study the prevalence of cloth 24 (37%), is higher followed by plastic 16 (24.6%) and plastic and cloth 7 (10%) among

the rest examined foreign body (Table 1). In the current study the prevalence rate was compared among sex and the prevalence rate was higher in male 43(14.5%) than female 22(24.7%) with statistically significant (P<0.05) variation.

The highest frequency of occurrence of IFB foreign bodies were detected in animals greater than 10 years 33(23%) followed by 5-10 years 20 (10.8%) and less than 5 years 12 (21.4%). This finding is in agreement with Hailat *et al*. [3]. who reported prevalence rate of 59.14% foreign bodies in rumen and reticulum in older cattle. Old dairy cattle are the most commonly affected group [24]. Similarly, highest prevalence (81.25%) of foreign bodies was detected in cattle greater than 10 year age Khurshaid *et al*. [25].

Regarding body condition score, the highest frequencies of occurrence of IFB were detected in poor 30(14.5) followed by medium 28 (29.7) and good 7(8.2) body conditioned cattle and the difference was statistically significant (p<0.05). This result was in disagreement with the finding of Tesfaye and Chanie [26], reported prevalence of 72.7%, 36% and 7.3% in poor, medium and good body condition score, respectively at Gondar Elfora abattoir. 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 to indigestible materials [27]. In the current study the prevalence rate of IFB was compared among breeds of cattle and higher prevalence of was observed in cross cattle.

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CONCLUSION AND RECOMENDATIONS

In conclusion, the ingestion of IFB is common in cattle slaughtered at Sagure town abattoir. Different types of foreign materials were encountered during the study period amongst cloth constituted the major part followed by plastics. The risk factors such as sex and body condition of animals were found significantly related to the prevalence of IFB in the study area. Poor body conditioned animals were found the most affected group followed by medium whereas good body conditioned animals were least affected. This finding indicates that there were suitable grounds for exposure of the animals to IFB, thus pose a huge problem for the production and reproduction efficiency of the animals in the area. Therefore, based on the above conclusion the following recommendations are forwarded.

- Appropriate solid waste disposal should be implemented.
- Public awareness should be created on careless disposal of plastic bags, rope and leather and as well as the periodical cleaning of these wastes in the grazing area.
- The government should advise a policy concerning the manufacturing and usage of plastic bags.
- Further study should be conducted to assess the production and economic effects of foreign body accumulation.
- The animal's owners should be advised to keep their cattle in intensified manner so that the owners could easily control their accessibility to foreign bodies.

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