PREVALENCE OF INDIGESTIBLE FOREIGN BODIES (IFBs) IN RUMINANTS SLAUGHTERED IN GOMBE METROPOLITAN ABATTOIR

1Alkali, H.A., 2Ahmad, Y.A., 3Maaruf, B.S., 4Saidu, A.S. and 4Ghude, M. I.

1Department of Animal Sciences, Federal University, Kashere, Gombe State
2Faculty of Fisheries and Food Science, Universiti Malaysia, Terengganu
3Department of Veterinary, Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Maiduguri, P.M.B. 1069, Maiduguri, Borno State, Nigeria.
4Department of Agriculture, Nasarawa Local Govt Area, Kano State.

ABSTRACT

The study was conducted in Gombe Metropolitan abattoir to assess the prevalence of indigestible foreign bodies (IFBs) and to determine the association of prevalence with predisposing factors in slaughtered ruminants. The study was laid in a completely randomized design. Sampling of animals was carried out using systematic random sampling. The prevalence of indigestible foreign bodies was computed and analyzed using Chi Square (χ²) test. Results indicated that out of 1,157 animals examined, 538 (46.50 %) were found to be positive. The prevalence of indigestible foreign bodies in the study area is high and was influenced by several factors among which are species, age and body condition score. The variation in IFB prevalence across species underscores the importance of species-specific management and prevention strategies.

KEYWORDS: Foreign bodies, impaction, indigestible, ingestion, prevalence, rumen

INTRODUCTION

The extensive livestock management system adopted by many smallholder farmers in Nigeria has contributed to the rumen impaction due to indiscriminate disposal of waste which include plastics, wood, papers, nails, rubber, and ropes. Ingestion of these materials has a wide range of implications on ruminant animals (Akinbobola et al., 2016). Many farmers in urban and semi urban areas keep their animals under extensive system without adequate feeding and this forces the animals to search for food in unfamiliar sites thereby consuming any available material including improperly disposed litter. Sikkhweni and Hassan (2013) revealed that ruminants, especially sheep, often roam and scavenge in profoundly polluted areas and this consequently to death of the animals. Ruminants reared in urban and sub-urban areas are more exposed to indigestible materials. The presence of these materials in the forestomach hinders absorption of nutrients, decreases feed intake and fattening (Sing, 2005). This causes rumen impaction which ultimately interfere with the flow of ingesta leading to rumen distension and the absence of defecation (Abdullah et al., 1984; Igbokwe et al., 2003; Remi-Adewunmi and Osinowo 2004). It also leads to internal injury and death due to the obstruction (Igbokwe et al., 2003). The frequently encountered clinical signs are in-appetence, vomiting, diarrhoea, lethargy, loss of body condition and abdominal pains (Makhdoomi et al., 2012).

An established reason why animals consume indigestible materials is forage scarcity and mineral deficiency in their diets (Gatenby, 1991). Hence, when under such circumstances, animals become exposed to litter and consequently consume such indigestible foreign objects. None of these materials can be digested by ruminants and the consequences of these objects entering the digestive tract may include sudden death, poly bezoars, traumatic reticulo-pericarditis, immuno-suppression, bloat, indigestion, loss of condition and death (Mohammed and Fromsa, 2011; Ramaswamy and Sharma, 2011; Raoofi et al., 2012; Ab德拉al, 2014). The present study determined the prevalence, types and association of IFBs with various predisposing factors such as age, sex and body condition among ruminant animals slaughtered in Gombe Metropolitan abattoir, Gombe State, Nigeria.

MATERIALS AND METHODS

Study Area

The research was conducted in Gombe metropolitan abattoir, Gombe State, Nigeria. The town is located between latitude 10° 17’N, and longitude 11° 10’E on altitude range of 400m-500m above sea level. This falls within Sudan savanna ecological zone which is characterized by two well-defined seasons: Rainy season (April - October) and Dry season (November - March). The mean annual rainfall is 850mm. It is bordering with Adamawa and Taraba State to the South, Bauchi State to the West, Borno...
State to the East and Yobe State to the North. It covers a total land area of 20,265 square kilometers.

**Sample Size and Selection of Study Animals**

Animals sampled per day were determined by number of animals slaughtered for each of the three species considered (Cattle, Sheep, and Goat). Sampling was carried out using systematic random sampling. One animal was sampled at an interval of five animals slaughtered across the three species. Every fifth slaughtered animal was selected for ante mortem and examinations/inspections. Examination for IFBs was conducted on daily basis, which lasted for sixty days. During the study, different risk factors predisposing the animals to IFBs such as species, sex, age and body condition of the animals were considered and recorded accordingly.

**Ante Mortem Examination**

Ante mortem examination of individual animals sampled was carried out. Animals were assessed based on species, age, sex and body condition. Age was categorized into two; above four years and below four years for cattle, while in small ruminants, age was categorized based on above or below two years. Age was determined using dentition eruption as described by Gatenby, (1991). Body condition of the animals was recorded as poor, moderate, and good based on appearance of the animal.

**Postmortem Examination**

Rumen of all sampled slaughtered animals were examined for presence of IFBs. Immediately after slaughter at evisceration stage, the stomach was carefully removed from the abdominal cavity and explored for the presence of any foreign non-dietary material by visualization and separation. Foreign bodies obtained during postmortem were washed with water. Findings were recorded as either positive or negative. Isolated IFBs were grouped into metallic objects, polythene bags, rags, ropes, sack threads and fruit seeds as described by Alemneh et al., (2017). Weight of all IFBs isolated was recorded per animal.

**Experimental Design and Statistical Analysis**

The research was laid in a Completely Randomized Design (CRD) with species serving as treatments, individual animals as replications. All data generated was entered into Microsoft excel (2016) before subjecting it to statistical analysis. The data was thoroughly screened for errors and properly coded for analysis using Statistical Package for Social Science (SPSS Version 23). The prevalence of indigestible foreign bodies was computed and analyzed using Pearson Chi Square ($\chi^2$) test, to assess the existence of association between prevalence of the foreign bodies and different potential risk factors.

**RESULTS**

**Frequency of IFBs Occurrence and their respective weights**

<table>
<thead>
<tr>
<th>IFBs</th>
<th>IFB Positive</th>
<th>Prevalence (%)</th>
<th>Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>115</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Animals were sampled between August and September 2022 out of which 538 (46.50%) animals were positive for different IFBs. The most prevalent IFB was polythene with a frequency of 355 representing about 30.7% of the total occurrence with a total weight of 71.67kg (Table 1). This is followed by ropes having 7.43% and a total weight of 5.11kg. Other IFBs recorded were: sack threads 3.89%, rags 2.94%, plastic material 1.04%, fruit seeds 0.43% and Polybezoars (solid mass) 0.35%.

**Table 1: Frequency of IFBs Occurrence and their respective weights**
Frequency of IFBs Occurrence in Relation to Species of Animals Slaughtered

The frequency of IFBs occurrence in relation to species of animals slaughtered is presented in Table 2. A significant difference (p<0.05) was recorded across the three species. The prevalence was significantly higher (p<0.05) in sheep with 164 occurrence representing 34.54% of the animals sampled followed by goats and cattle with 138 (39.54%) and 53 (15.92%) respectively.

### Table 2: Frequency of IFBs Occurrence in Relation to Species of Animals Slaughtered

<table>
<thead>
<tr>
<th>Species</th>
<th>Number of Animals Examined</th>
<th>Number of Animals Positive</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>333</td>
<td>53</td>
<td>15.92</td>
</tr>
<tr>
<td>Sheep</td>
<td>349</td>
<td>164</td>
<td>39.54</td>
</tr>
<tr>
<td>Goat</td>
<td>475</td>
<td>138</td>
<td>34.53</td>
</tr>
<tr>
<td>Total</td>
<td>1157</td>
<td>538</td>
<td>46.50</td>
</tr>
</tbody>
</table>

Effects of Age, Sex and Body Condition Score on the Prevalence of IFBs

### Effects of Age on the Prevalence of IFBs

The prevalence of indigestible foreign bodies (IFBs) was influenced by the age of the animals (Table 3). Out of the 1157 animals that were examined, 697 (60.2%) were categorized as adults, while 460 (39.8%) were classified as young. In cattle, the distribution was 122 (36.64%) adults and 211 (63.36%) young animals. The age of the animals significantly impacted on the prevalence of IFBs with 31 (25.4%) of adults tested positive while only 22 (10.4%) of the young animals tested positive. Regarding sheep, there was significant difference (P<0.05) on the prevalence of the IFBs between the adult and the young animals. The prevalence was higher in adult sheep. The examination involved 93 (26.65%) young sheep and 256 (73.35%) adults. Among the adults, 101 (39.6%) tested positive, while among young sheep, only 37 (39.8%) showed positive results. In the case of goats, 319 (67.16%) were identified as adults, and 156 (32.84%) were classified as young. Similarly, there was a notable difference (p< 0.05) in the prevalence of IFBs between the adult and young goats, with 136 (42.6%) and 28 (17.9%) respectively.

### Effect of Sex on the Prevalence of IFBs

Gender of the animals had also influenced prevalence of IFBs across all the species (Table 3). In cattle, gender of the animals had influenced the prevalence of the IFBs. A total of 333 were examined, out of which 159 (47.75%) were males and 174 (52.25%) were females. In male cattle only 11 (6.9%) were positive while in females 42 (24.1%) were positive for IFBs. In the sheep subgroup of 349 examined, 148 (42.41%) were males, and 201 (57.59%) were females. Animals tested positive for this group were 33 (22.30%) and 105 (52.2%) in male and females respectively. In the case of goats, a total of 475 animals were examined, comprising of 211 males (44.42%) and 264 females (55.58%). A notable difference (p < 0.05) in the prevalence of IFBs between male and female goats was recorded, with 62 (29.4%) testing positive in males and 102 (38.6%) were positive in females.

### Effect of Body Condition Score on the Prevalence of IFBs

The body condition score (BCS) have influenced the prevalence of the IFBs across the three specie of animals under investigation (Table 3). The BCS was classified into three categories: Poor, Moderate, and Good. Among the total of 1157 animals examined, 263 animals representing 22.7% were determined to have poor body condition, while 281 (24.3%) were in the moderate category, 218 (18.8%) were in the moderate category, while 193 (16.6%) were in the poor category.
and the majority, 613 (53.0%) exhibited good body condition score. The Prevalence was significantly higher in animals with poor body condition score with up to 62.0%.

### Table 3: Effects of Age, Sex and Body Condition Score on the Prevalence of IFBs

<table>
<thead>
<tr>
<th>Factors</th>
<th>Level</th>
<th>Animals Examined</th>
<th>Positive Animals</th>
<th>Prevalence (%)</th>
<th>95% CL</th>
<th>X²</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Young</td>
<td>460</td>
<td>87</td>
<td>18.9</td>
<td>1.90 - 3.24</td>
<td>46.06**</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Adult</td>
<td>697</td>
<td>268</td>
<td>38.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>518</td>
<td>106</td>
<td>20.5</td>
<td>2.03 - 3.54</td>
<td>49.73**</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>639</td>
<td>249</td>
<td>39.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCS</td>
<td>Poor</td>
<td>263</td>
<td>163</td>
<td>62.0</td>
<td>49 - 56</td>
<td>189.51**</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>281</td>
<td>97</td>
<td>34.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>613</td>
<td>95</td>
<td>15.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Between poor and moderate, \( X^2 = 109.72, P = 0.000 \); Poor and good, \( X^2 = 385.27, P = 0.000 \); moderate and good \( X^2 = 419.49, P = 0.000 \)

### DISCUSSION

The prevalence of indigestible foreign bodies (IFBs) in livestock, particularly in ruminants, has been of significant concern in veterinary medicine and animal husbandry. IFBs are materials that animals inadvertently ingest, which can lead to various health issues (Radostits, 2006). A wide range of IFB prevalence was reported from different parts of the country in agreement with the findings of Igbokwe (2003); Remi-Adewunmi, (2004), Ngoshe(2012) and Akinbobola (2016). The present study established high (46.50%) prevalence of IFBs in the study area which varies based on several factors, including species, age, and body condition score. The finding is significantly lower than prevalence rate of 77% by Remi-Adewunmi et al., (2004) in many urban cities of Nigeria. The variation is attributed to seasons in which the research was conducted, as fresh feeds are readily available when compared to dry season. Other factors that may bring about this variation are the different husbandry practices, improper disposal of polythene bags in many urban centers which predisposes the animals to the IFBs. Polythene was the most prevalent IFB recorded with 65.79% (71.76Kg) while the least encountered IFB was solid mass with an overall prevalence of 0.75% and a total weight of 0.30Kg. This agreed with the report of Ngoshe (2012) from Maiduguri, Nigeria that polythene is the most frequently encountered indigestible foreign material associated with ruminants. This observation also supports with the reports of Igbokwe et al. (2003) and Remi-Adewunmi et al. (2004) from other parts of Nigeria. The high prevalence of polythene is attributed to the fact that it is the most commonly used in various aspects of modern agriculture, including packaging, wrapping, and equipment (Gatenby, 1991). They are readily available and widely used in farming and daily life, leading to increased exposure to ruminants.

In the present study the prevalence of IFBs is higher in sheep compared to cattle and goat. This is because sheep have a more selective and often aggressive feeding behavior compared to cattle or goats. They are known to graze closer to the ground. This increases the likelihood of ingesting small, indigestible objects like wire, stones, or pieces of metal (Engeldal et al., 2013). The higher incidence of IFBs in small ruminants is probably due to the fact that, farmers live in close proximity to their animals, and this increases the risk of such animals ingesting indigestible materials disposed as waste (Tiruneh and Yesuwork, 2010). However, The prevalence in sheep and goat in this study was less than 56.5% and 59.3% reported by Negash et al., (2015) in sheep and goats respectively. This might be as a result of season (rainy) in which the research was conducted, as fresh feeds are readily available when compared to dry season. Furthermore, Remi-Adewunmi et al., (2004) reported a much higher prevalence of 97% in small ruminants brought from urban centers for slaughter. Hailat et al. (1998) attributed the variation observed across the three species considered to the differences in origin of the animals under consideration.

The study further revealed that there was significant difference in the prevalence of IFBs between male and female animals. This finding is in agreement with previous reports of Otsyina et al. (2017) and Tiruneh and Yesuwork (2010). Their reports indicated that females were more affected than males because female animals are maintained longer in herd/flock than males, and have increased nutritional requirements during pregnancy and lactation, and are therefore more susceptible to ingestion of IFBs. The current study also established that most cases of IFBs occur in older animals. The prevalence is higher in older animals than in younger animals. This may be due to prolonged exposure to the contaminated environment. Previous studies by Tesfaye and Chanie (2012), Berrie et al. (2015), Churko and Elcho (2017), Mekuanint et al. (2017) have also reported higher prevalence in older animals than in younger ones.
The relationship between body condition score and the prevalence of IFBs obtained in this study is in line with previous reports of Igbokwe et al., 2003, Remi-Adewunmi et al., 2005, Abebe and Nur 2011 and Negash et al., 2015 who reported higher incidence of IFBs in animals with poor body condition score. The result further supported report of Rahel (2011) who reported a higher prevalence in animals having poor body condition. Animals with poor BCS might be more prone to forage aggressively and explore their environment for alternative food sources, which can lead to the ingestion of IFBs. Malnourished animals may seek unconventional sources of nutrition especially those lacking minerals (NRC, 2007). The gastrointestinal tract's ability to adequately digest and absorb nutrients may be impacted by the presence of IFBs in the animal.

CONCLUSION

In conclusion, the prevalence of indigestible foreign bodies in the study area is high and is influenced by several factors, including species, age, diet, and body condition score. The variation in IFB prevalence across species underscores the importance of species-specific management and prevention strategies. Preventative measures, such as improving feeding practices, maintaining clean environments, and reducing access to potential IFBs, are essential for mitigating the risk and reducing the prevalence of IFBs in animals.

REFERENCES:


Mohammed, N. and Fromsa, A. (2011). Prevalence of Indigestible Foreign Body Ingestion in Small Ruminants Slaughtered at Luna Export Abattoir, East...


