

<https://doi.org/10.33003/jaat.2023.0904.07>

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

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

<sup>1</sup>Department of Animal Sciences, Federal University, Kashere, Gombe State

<sup>2</sup>Faculty of Fisheries and Food Science, Universiti Malaysia, Terengganu

<sup>3</sup>Department of Veterinary, Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Maiduguri, P.M.B. 1069, Maiduguri, Borno State, Nigeria.

<sup>4</sup>Department of Agriculture, Nasarawa Local Govt Area, Kano State.

Corresponding author's email/phone: [alkalindukku@gmail.com](mailto:alkalindukku@gmail.com) ; haalkali@fukashere.edu.ng

### 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 ( $\chi^2$ ) test. Results indicated that out of 1,157 animals examined, 538 (46.50 %) were found to be positive. The prevalence was found to be significantly higher in Sheep (39.54%) than in cattle (15.92) and goats (34.53%). The results further revealed that the prevalence of foreign bodies in female is higher than male with 38.97% and 20.46% respectively. Among the different age groups, a significantly ( $p < 0.05$ ) higher prevalence was recorded in older animals than in younger animals. The indigestible foreign bodies (IFBs) observed were polythene bags, ropes, sack threads, rag, Fruit seeds, solid mass and plastic with polythene having higher prevalence of 30.70%. The prevalence of indigestible foreign bodies in the study area is high and was influenced by several factors among which are specie, 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. Sikhweni 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 inappetence, 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, immunosuppression, bloat, indigestion, loss of condition and death (Mohammed and Fromsa, 2011; Ramaswamy and Sharma, 2011; Raoofi *et al.*, 2012; Abdelaal, 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  $10^{\circ} 17'N$ , and longitude  $11^{\circ} 10'E$  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

**RESULTS**

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

A total number of 1157 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

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.

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 mat 1.04%, fruit seeds 0.43% and Polybezoars (solid mass) 0.35%.

**Table 1: Frequency of IFBs Occurrence and their respective weights**

Polythene	1157(355)	30.7	71.76
Rope	1157(86)	7.43	5.11
Sack threads	1157(45)	3.89	3.50
Rag	1157(31)	2.94	3.93
Fruit seeds	1157(5)	0.43	0.17
Solid mass	1157(4)	0.35	0.30
Plastic	1157(12)	1.04	0.64
<b>Total</b>	<b>538</b>	<b>46.50</b>	<b>85.41</b>

### 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 Specie of Animals Slaughtered**

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

### 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,

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

Factors	Level Factor	Animals Examined	Positive Animals	Prevalence (%)	95%CL	X <sup>2</sup>	P-Value
Age	Young	460	87	18.9	1.90 – 3.24	46.06**	0.000
	Adult	697	268	38.5			
Sex	Male	518	106	20.5	2.03 – 3.54	49.73**	0.000
	Female	639	249	39.0			
BCS	Poor	263	163	62.0	49 -56	189.51**	0.000
	Moderate	281	97	34.5			
	Good	613	95	15.5			

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 part of the country is 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 Nuru 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:

- Abdelaal, A. M. (2014). Selected studies on foreign body impaction in goats with special reference to ultrasonography. *Veterinary World*, 7(7): 522–527.
- Abdullah, U. S., Usman, G. S. H. and Mshelia, T. A. (1984). Impaction of rumen with indigestible garbage in cattle and sheep reared within urban and sub-urban environment, *Nigerian Veterinary Journal*, 13, 89–95.
- Abebe F. and Nuru M. (2011). Prevalence of indigestible foreign body in ruminant slaughtered at Luna export Abattoir, East Shoa, *Ethiopia. Journal of Animal and Veterinary Advances*. 10(12): 1598-1602.
- Akinbobola, J. S.; Omeje, J. N.; Akinbobola, R. I.; Ayoade, R. I.; Ajagbe, O. A. and Okaiyeto, S. O. (2016). Prevalence of Indigestible Foreign Bodies in the Rumen of Cattle Slaughtered at Gwagwalada Abattoir, Abuja, Nigeria. *International Journal of Livestock Research*, 6(6): 25-31
- Alemneh, T., Tsegaye, A. and Mekuanint, S. (2017). Indigestible Rumen Foreign Bodies - Causes of Rumen Impaction in Cattle, Sheep and Goats Slaughtered at Addis Ababa Abattoir Enterprise, *Ethiopia Journal of Veterinary Science and Medicine*, 5(1); 472-479
- 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 Journal of Biology and Medical Sciences*, 2(4): 133–150
- Churko, B. U. and Elcho, T. N. (2017). Prevalence of rumen and reticulum foreign bodies in cattle slaughtered at Hawassa Municipal Abattoir Southern Ethiopia, *World Journal of Pharmaceutical and Life Sciences*, 3(1): 521–534, 2017.
- Engeldal, S.E.C., Subandriyo, Handiwirawan, E., Noor, R.R., 2013. Impact of sheep stocking density and breed on behaviour of newly regrouped adult rams. *JITV*, 18 (1), 1-8.
- Gatenby, R. M. (1991) In *Sheep: The tropical agriculturalist*. London and Basingstoke, MACMILLAN education ltd ACCT pp: 6-10.
- Hailat, N.S., Nouh, A., Al-Darraj, S., Lafi, F., Barakat, S. and Al-Majali, A., (1997). Prevalence and pathology of foreign bodies (plastics) in Awassi sheep in Jordan. *Small Ruminants Research* 24, 43-48.
- Igbokwe, I. O., Rolo, M. Y. and Egwu, G. O. (2003). Rumen impaction in sheep with indigestible foreign bodies in the semi-arid of Nigeria. *Small Ruminant Research* 49(2): 141–146. [http://dx.doi.org/10.1016/S0921-4488\(03\)00074-9](http://dx.doi.org/10.1016/S0921-4488(03)00074-9)
- Makhdoomi, D.; Gazi M and Parah, J. (2012). Foreign body syndrome- etiology, clinical symptoms, diagnosis and treatment: A review. *International Journal of Livestock Research*. 2(3): 48-52.
- Mekuanint, S., Alemneh, T. and Asredie, T. (2017). Indigestible foreign bodies cause of rumen impaction in cattle, sheep and goats slaughtered at Addis Ababa Abattoir Enterprise, Ethiopia, *Journal of Veterinary Science and Medicine*, 5(1):6
- Mohammed, N. and Fromsa, A. (2011). Prevalence of Indigestible Foreign Body Ingestion in Small Ruminants Slaughtered at Luna Export Abattoir, East

- Shoa, Ethiopia. *Journal of Animal Veterinary Advances*, 10(12): 1598–1602.
- Negash S, Sibhat B and Sherefaw D. (2015). A post mortem study on indigestible foreign bodies in the rumen and reticulum of ruminants, eastern Ethiopia. *Onderstepoort Journal of Veterinary Research*. 82 (1), Art. #881, 5 pages. <http://dx.doi.org/10.4102/ojvr.v82i1.881>.
- Ngoshe, A. (2012). Incidence of polythene bag ingestion by ruminant animals at Maiduguri central abattoir. *Ramat Journal for Management Science and Technology*, 1(4): 12-16.
- National Research Council, (2007). Nutrient requirements of small ruminants:sheep, goats, cervids and new world camelids, 1st edition. National Academies Press, Washington, DC, USA. Available from: [https://www.researchgate.net/publication/324689769\\_Net\\_mineral\\_requirements\\_for\\_the\\_growth\\_and\\_maintenance\\_of\\_Somali\\_lambs#fullTextFileContent](https://www.researchgate.net/publication/324689769_Net_mineral_requirements_for_the_growth_and_maintenance_of_Somali_lambs#fullTextFileContent) [accessed Nov 01 2023].
- Otsyina, H. R., Mbuthia, P. G., Nguhiu-Mwangi, J. Mogo, E. G. M. and Ogara, W. O. (2017). Gross and histopathologic findings in sheep with plastic bags in the rumen. *International Journal of Veterinary Science and Medicine*, 5(2): 152-158.
- Radostits, O. M., Gay, C. C., Hinchcliff, K. W., & Constable, P. D. (2006). *Veterinary Medicine: A Textbook of the Diseases of Cattle, Sheep, Pigs, Goats, and Horses* (10th ed.). Saunders.
- Rahel, M. (2011). Study on fore Stomach Foreign Body in Cattle Slaughtered Hawassa Municipal Abattoir, Ethiopia, DVM Thesis Gondar University, Faculty of Veterinary Medicine, Gondar, Ethiopia. p3-9.
- Ramaswamy, V. and Sharma, H. R. (2011). Research article plastic bags: threat to environment and cattle health: A retrospective study from Gondar city of Ethiopia. *Institute of Integrative Omics and Applied Biotechnology (IIOAB)*, 2(1): 7–12.
- Raofi, A.; Namjoo, A.; Hossein, A. and Alizadeh, M. A. (2012). study of clinical signs, hematological changes and pathological findings of experimental ingestion of soft foreign body (plastic rope) in goats. *Small Ruminants Research*, 105(1-3): 351–354.
- Remi-Adewunmi, B. D., Gyang, G. and Osinowo, O. A. (2004). Abattoir survey of foreign body, rumen impaction in small ruminants. *Nigerian Veterinary Journal*, 25(2): 32-38.
- Singh, B. (2005). Harmful effect of plastic in animals. *The Indian Cow*, 4(6): 10-18.
- Tesfaye, D. and Chanie, M. (2012). “Study on rumen and reticulum foreign bodies in cattle slaughtered at Jimma Municipal Abattoir, Southwest Ethiopia,” *American Eurasian Journal of Scientific Research*, vol. 7(4), pp. 160–167, 2012.
- Tiruneh R and Yesuwork H. (2010). Occurrence of rumen foreign bodies in sheep and goats slaughtered at the Addis Ababa Municipality Abattoir. *Ethiopian Veterinary Journal*. 14(1): 91-100