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ABSTRACT

Indiscriminate disposal of solid wastes does not only pollute the environment, but also have adverse effects on the health of ruminants which serve as sources of disease to their consumers. **Purpose:** The purpose of this paper is to assess the method of waste disposal and also investigate the prevalence of foreign bodies in the stomach of ruminants slaughtered in Gwagwalada and Minna abattoir, with the view to providing information on the conditions of the meat people consumed.

Methodology: The study employed the use of questionnaire to elicit information on waste disposal practices and Physical examination of the contents of the ruminants' stomach. The abattoirs were visited for six days, all the animals slaughtered during these days were considered for this study. The identified foreign bodies were sorted, weighted and computed in percentages.

Findings: Findings showed that the waste composition includes food remains and agricultural waste amount (23%), papers and cartons (24.4%),tins and cans (9.3%), bottles/glasses (7.6%), plastics and polythene (15.8%), while metals/iron and others accounted for 5.7% and 14.2% respectively. These wastes are mostly openly disposed-off and rarely evacuated. Investigations also revealed that contents in the stomach of the ruminants showed the presence of foreign bodies though not in all the animals, these include undigested Plants/seeds, pieces of clothes, nylons, plastics substances, stones among others.

Recommendation: It is recommended that grazing should either be done on range land or in the bush, and proper wastes disposals should be practiced, above all there is need for public enlightenment campaign to sensitize the people. Further studies on the effects of the foreign bodies on the quality of products from the ruminants is also recommended.

Keywords: *Environmental contamination, Plastic waste, Pollution, Public health, Ruminant, and Toxic chemicals*

INTRODUCTION

The open dump system in Federal Capital Territory (FCT) is a huge menace to the well-being of the people and wondering animals. People discard wastes in polythene and plastic bags, and animals in the course of searching for food consume the plastic, along with the leftover food materials. Vagrant cows and bulls are observed on backyard and roads, eating away the contents in nylon and plastic bags along with their containers as food. The plastic gets accumulated in their rumens and becomes hard. These animals look healthy, but in the real sense dying slowly in pain death. The ingested polythene hinders the process of fermentation and mixing of contents leading to indigestion.

Grazing of livestock is a means of deriving food and income from lands which are generally unsuitable for arable farming but it is observed that cattle roam all over the settlement, farms destroying cultivated crops; for instance, in the United States, about 85% of grazing land is not suitable for crops [1]. Cattle are a source of high-quality protein (meat and milk) and also contribute to the economic wellbeing of the people by providing them with hides, skins, their dungs as manure used in cultivation in the northern parts of the country, especially in southern Kaduna where Ginger is massively cultivated.

The plight of animals has become a major concern in our society today, since man depends on them for variety purposes. The dairy and cattle owners are responsible for the plights of cows after extracting the milk in them in the morning; they allow the cows to grace in human settlements finding available foods in dumps of wreckages around. The proliferation of plastics use coupled with poor waste management, has resulted to widespread, persistent plastics pollution. About 6,300million tonnes of plastics waste are been generated between 1950 and 2015, of which only 9% were recycled, and 12% incinerated, leaving nearly 80% to accumulate in landfills or the natural environment [2]. The harmful effects include, reduced beef quality, reduced feed intake, reduced rate of weight gain failure to absorb volatile fatty acids, internal injury which may results to death due to the obstruction of the intestinal tract [3,4].

Due to the inability to separate food remains from other wastes materials, animals feed on plastic waste materials such as polybags and plastic covers [5]. In most developing countries, especially in urban areas, animals are left to graze freely to open areas. Animals in these areas graze on indigestible materials (non-biodegradables) such as plastic, leading to the development of ruminal impaction due to plastic materials. As these plastic materials are indigestible, they are lodged in the rumen and then move to reticulum and omasum [6]. Ruminal impaction due to plastic materials is a condition, in which indigestible plastic foreign bodies accumulate in the rumen leading to ruminal impaction, indigestion, recurrent tympany, and death [7]. The plastic bags cannot be digested or passed as such through faeces by an animal. They stay in the gut causing pain and death. When dead animal decay, the bags are freed and often eaten again by other animals and this cycle may continue for many years to come. The toxic contents of plastic may also enter in man through milk produced by such cows.

Depending on the type and amount of plastic waste ingested, type of material in plastic waste, duration of plastic waste accumulated in fore stomach, and location of this plastic foreign body in gastrointestinal tract, various pathological conditions are encountered in animals. It was stated by [8], that indigestion, impaction, tympany, polybezoars, traumatic reticulopericardtis, chemical

leaching and immunosuppression are the pathological conditions encountered in animals with ruminal impaction due to plastic materials. Apart from these, there is possibility of occurrence of certain other conditions such as heavy metal toxicities, endocrine disruption, carcinogenicity, teratogenicity, and urolithiasis due to ruminal impaction with plastic materials in ruminants.

In Jordan an estimated loss of $25 million in ruminant productivity and health associated with plastic impaction was reported [9]. In Ethiopia, the occurrence of foreign bodies in ruminants has been investigated and reported in Amhara region [10], at eastern Ethiopia [11], in Jimma municipal abattoir in Southwestern Ethiopia [12], at Lunna export abattoir in East Shoa [13], and at Addis Ababa Municipal Abattoir [14]. It was recorded that out 95% of urban vagrant cattle in India are suffering from various ailments due to hazardous material inside their abdomen, 90% of them are plastic bags. Plastic bag waste disposal is one of the most critical problems that threaten the sustainability of the natural resources, life support systems, social harmony, human rights, economic growth and people's participation in making decisions affecting lives [15].

It is against this background that this study was set up to assess the waste management practices in the study area, investigate the types of waste generated in the area, the prevalence and types of foreign bodies especially plastics commonly consumed by cattle slaughtered at Gwagwalada abattoir, with the view of safeguarding the consumption of the meats.

METHODOLOGY

Study area

Gwagwalada is located about 55km south west of the Capital City, along the Lokoja-Kaduna road. It is the administrative headquarters of Gwagwalada Area Council. The town, which was the second largest settlement within the FCT, as at the time of the creation of the Territory in 1976, is situated between Lat. 8°55' and 8°60' North, and Long. 7°05' and 7°11' East. Gwagwalada Abattoir is located between latitude 8º55'59''N, 8º55'55''N and longitude 7º03′54′′E, 7º03'50′′E. It is located at New Kutunku, beside one of the tributary streams of River Usuma, which drains through the town. It is a high density residential area, with an aerial extent of about 118km², an elevation of between 142.2m and 213.3m in the southern and northern parts of the town respectively. The town has a mean annual temperatures range of 30°C to 37°C, and total annual rainfall of about 1650mm. Relative humidity range from about 25% to 50% in the dry and rainy seasons respectively.

Minna town is the state capital of Niger state, it lies on latitude 9°3'N and longitude 6°3'E. The abattoir is located in Tayi Village, along Bosso Road, Minna. The abattoir is divided into 3 main sections namely; the slaughtering section, the processing section (skin and bone removal/skin burning) and the waste dumping site. (Figure 1)

Figure 1: Map of Niger State and FCT Showing the study Areas

Source: Modified by the authors from diverse sources.

Types and Sources of Data

The data for this research work was obtained from two sources, which include primary and secondary sources. The primary data are information obtained from the field, this includes the questionnaire, abattoir wastes from ruminants slaughtered at the two abattoirs, while the secondary data is the information from past studies in journals and other publications.

Sample size and Sampling Procedure

In order to elicit for information on waste management, a sample population of 377 households was obtained by adopting the Krejcie & Morgan, (1970) model for sample size determination.

In each of these areas a list of all the identified households were compiled during reconnaissance survey. The first household was selected at random and the subsequent ones systematically selected at an interval of 52 until the 377th number was obtained. The questionnaire was administered to each head of the household.

Gwagwalada and Minna abattoir were used for this study. The animals used for the study included cattle, sheep and goats slaughtered during each day of visit. The animals slaughtered for both abattoirs were sampled after every 4 days (Gwagwalada periodic market days) for consecutive six visits. From the daily slaughters, every animal was considered for the study. A total of 324 and 310 animals for Gwagwalada and Minna abattoir respectively were used for this study. The contents of each stomach were collected, washed, dried, sorted and weighted. The results were computed and presented in tables and charts. The prevalence of foreign bodies was determined as a proportion of affected animals out of the total animal examined.

RESULTS AND DISCUSSIONS

MANAGEMENT OF DOMESTIC SOLID WASTE

Types of waste generated

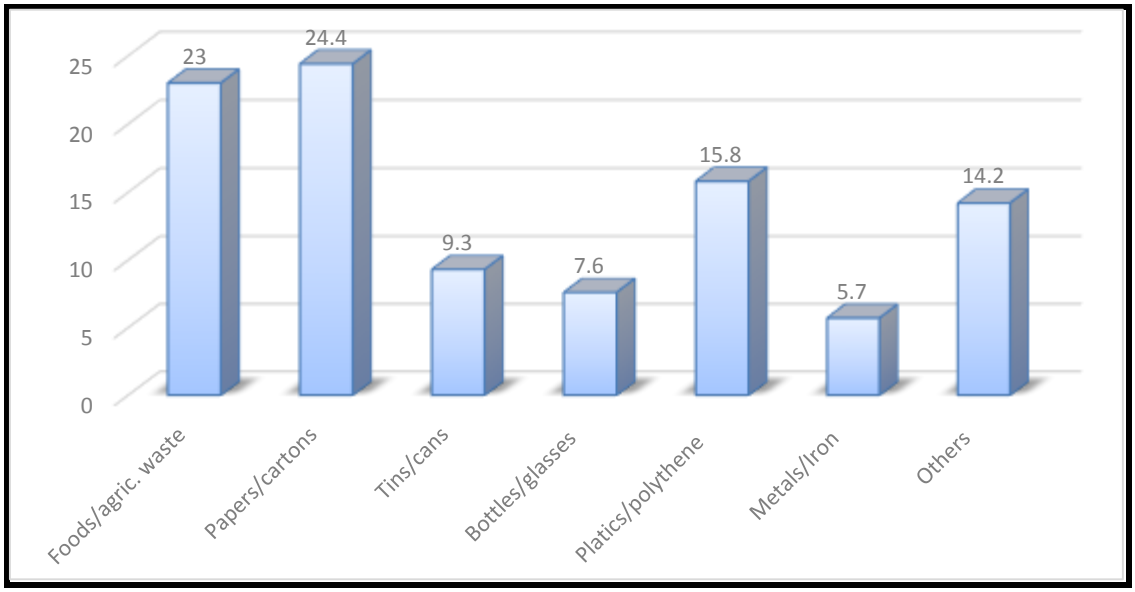

Figure 2: Type of wastes generated

Source: Field Survey, 2020

Figure 2 shows that food remains and agricultural waste amount to 23% of the total wastes generated in the study area. Waste papers and cartons represents 24.4%, Tins and cans accounted for 9.3%, bottles/glasses 7.6%, plastics and polythene amount to 15.8%, while metals/iron and others accounted for 5.7% and 14.2% of the waste respectively.

Frequency of Solid Waste Generation in the Study Area

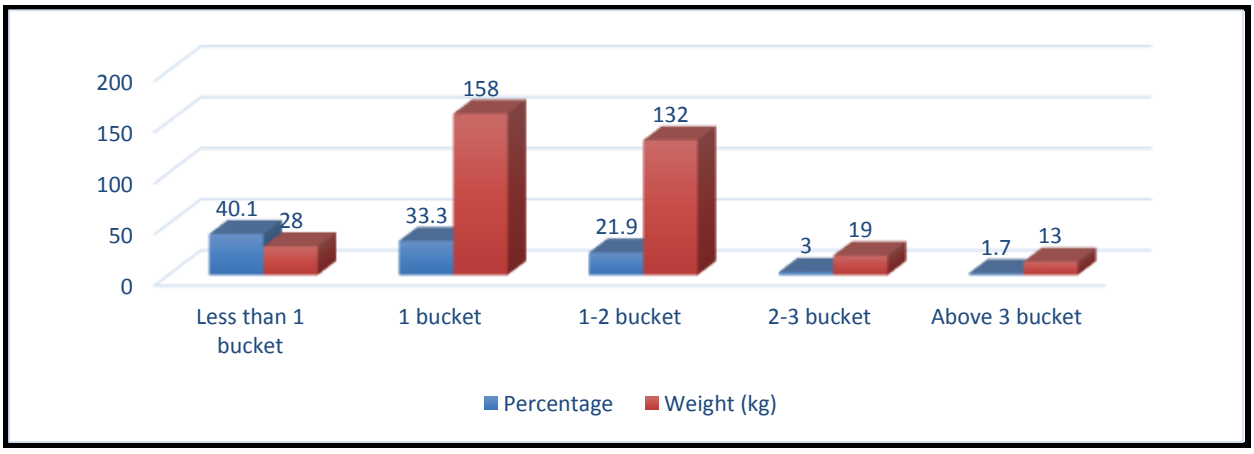

Figure 3: Average daily rate of domestic solid waste generation per household

Source: Field Survey, 2020

Figure 3 revealed that the respondents do generate 350kg of domestic solid waste daily, we can therefore deduced that , one household generates about 1.3kg of domestic waste daily.

Methods of Waste Disposals

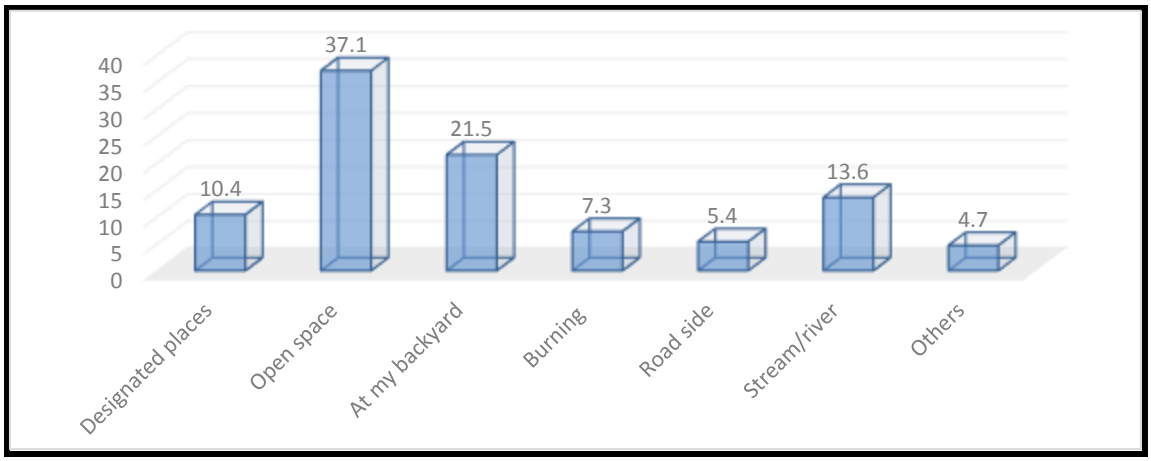

Figure 4: Methods of Waste disposals

Source: Field Survey, 2020

The respondents were asked of their methods of waste disposal and the responses are as follows; 10.4% disposed their waste at the official designated places, 37.1% dumped their wastes on any open space they see; these spaces could be undeveloped plots, uncompleted buildings or reserved areas among others. 21.5% disposed theirs at their backyards, 7.3% do burnt their wastes, 5.4% dumped their wastes by the road side, whereas 13.6% dumped theirs by the stream/river banks and 4.7% dumped theirs at different places (Figure 4).

Frequency of Solid Waste Collection

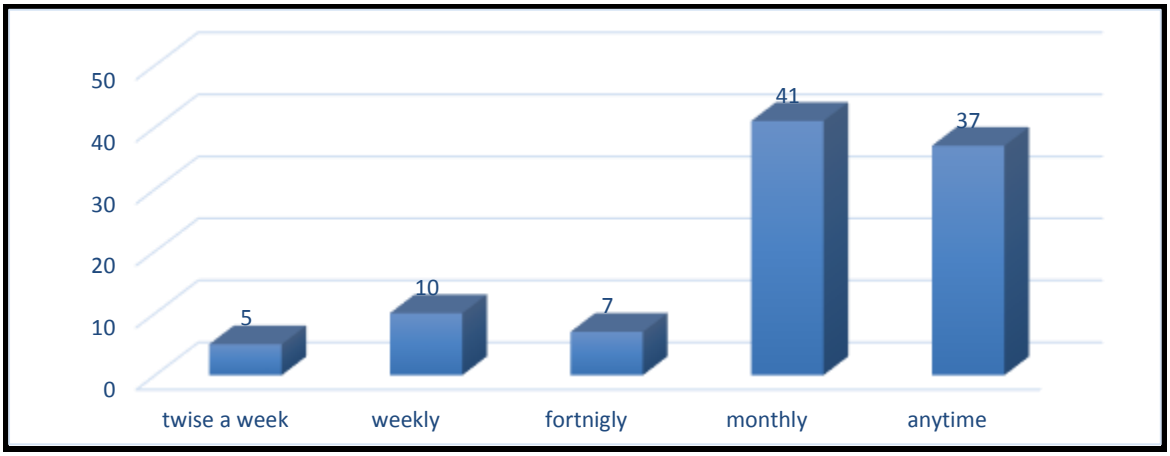

Figure 5: Frequency of waste collection.

Source: Field Survey, 2020

Furthermore, the frequency of waste collection was also sorted and the results presented on Figure 5. Result shows that only 5% of the respondents indicated that their waste is been collected twice weekly, 10% of the respondents said their waste is collected weekly, 7% of them indicated that their waste is collected fortnightly, while the same 41% have their waste collected monthly and 37% said their waste have no definite collection time and this late collection makes the environment very un-conducive to live around. The longer the wastes stayed without been evacuated, the more it attracts the ruminant invading the area looking for food. In that process consume non digestible substances. This result implies that there is ineffective waste management practices in the area.

Respondents' opinion on waste Management

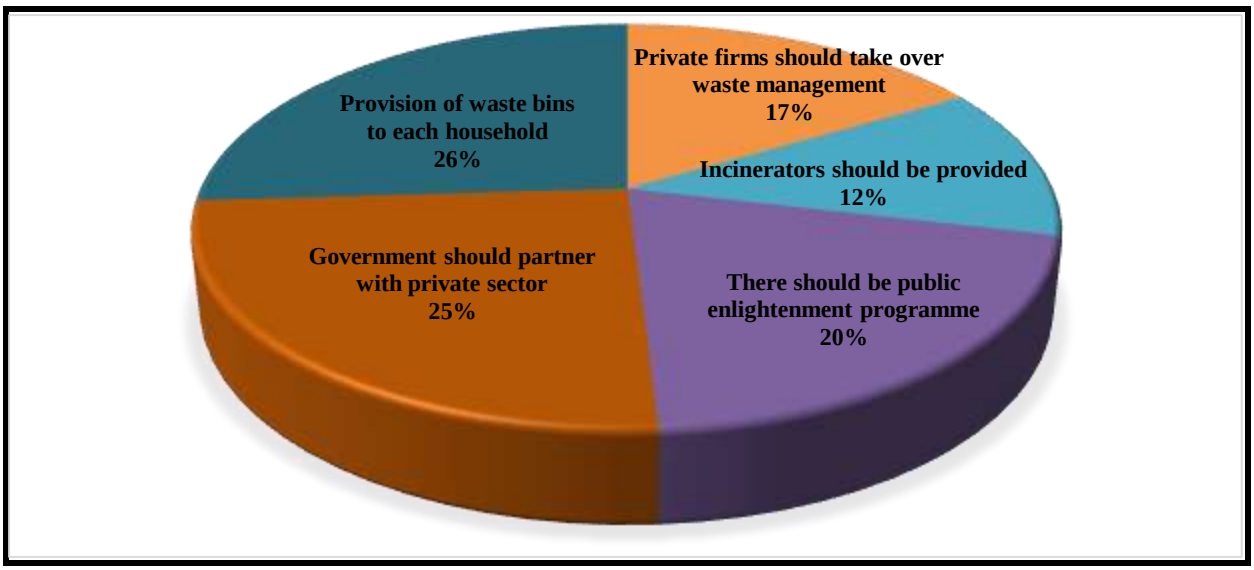

Figure 6: Opinion on wastes Management

Source: Field Survey, 2020

Figure 6 presents the people perception of waste management strategies that can be taken to attain an effective waste management practice in the study area. 17% of the respondents are with view that Private firms should take over waste management. 12% of them said that Incinerators should be provided. About 20% indicated the need for public enlightenment programme. While 25% said it is proper for government to partner with private firms and 26% of the respondents call for the distribution of Waste bin to every household for easy waste collection.

FOREIGN BODIES IN THE STOMACH OF RUMINANTS.

Table 1: Number and occurrence of indigestible foreign bodies in animals slaughtered at Gwagwalada and Minna abattoir.

Sampled days	No. of slaughtered animals		No. of Animals with foreign bodies		Percentage	
	G/lada abattoir	Minna abattoir	G/lada abattoir	Minna abattoir	G/lada abattoir	Minna abattoir
Day 1	55	61	37	13	67.3	21.3
Day 2	56	57	26	12	46.4	21.1
Day 3	54	52	33	10	61.1	19.2
Day 4	51	96	31	14	60.8	14.6
Day 5	53	70	20	14	37.7	20.0
Day 6	55	72	39	12	70.9	16.7
Total	324	310	186	75		

Source: Field Survey, 2020

Table 1 presents the number and occurrences of indigestible foreign bodies in animals slaughtered at Gwagwalada and Minna abattoir. The results show that the animals slaughtered ranges between 51 and 56 with cattle being about 70% each day in Gwagwalada and between 52 and 96 animals, with cattle being about 85% each day in Minna. A total of 324 animals slaughtered in Gwagwalada, out of which 186 animals were found with foreign bodies in them and 310 animals slaughtered in Minna, out of which 75 were found with foreign bodies in them. This implies that a good number of animals do consumed indigestible items which could not only posed treat to their health but to those who consumed their product and or meats.

Table 2: Occurrence of foreign bodies by weight

Nature	Weight of foreign bodies (kg)		Percentage	
	G/Lada abattoir	Minna abattoir	G/Lada abattoir	Minna abattoir
Clothing materials	2.07	0.4	13.3	7.02
Undigested Plants & seeds	6.04	1.8	38.76	31.6
Nylons	3.16	0.4	20.3	7.02
Hairballs	0.03	0.0	0.2	0.0
Leather materials	0.05	1.3	0.3	22.8
Metals	0.01	0.5	0.06	8.8
Plastic	0.81	0.0	5.2	0.0
Ropes	1.2	0.6	7.7	10.5
Stones	0.9	0.0	5.8	0.0
Others	1.3	0.7	8.3	12.3
Total	**15.6**	**5.7**	**100**	**100**

Source: Field survey, 2020

Table 2 presents the composition of the indigestible materials in the stomach of the ruminants and their weights. Results shows that apart from indigestible plants, the weight of the foreign bodies found in the animals at Gwagwalada abattoir are in the following order: leather materials > nylon > clothing materials > ropes > stones > plastics > leather materials > hairballs > metals substances, whereas at Minna abattoir are in the following order: nylon > ropes > metals = metals > clothing materials and no stones, plastics and hairballs. There are other mixtures of foreign bodies unspecified.

SPATIAL ANALYSIS OF THE OCCURRENCES OF FOREIGN BODIES IN RUMINANTS AT GWAGWALAADA AND MINNA ABATTOIR

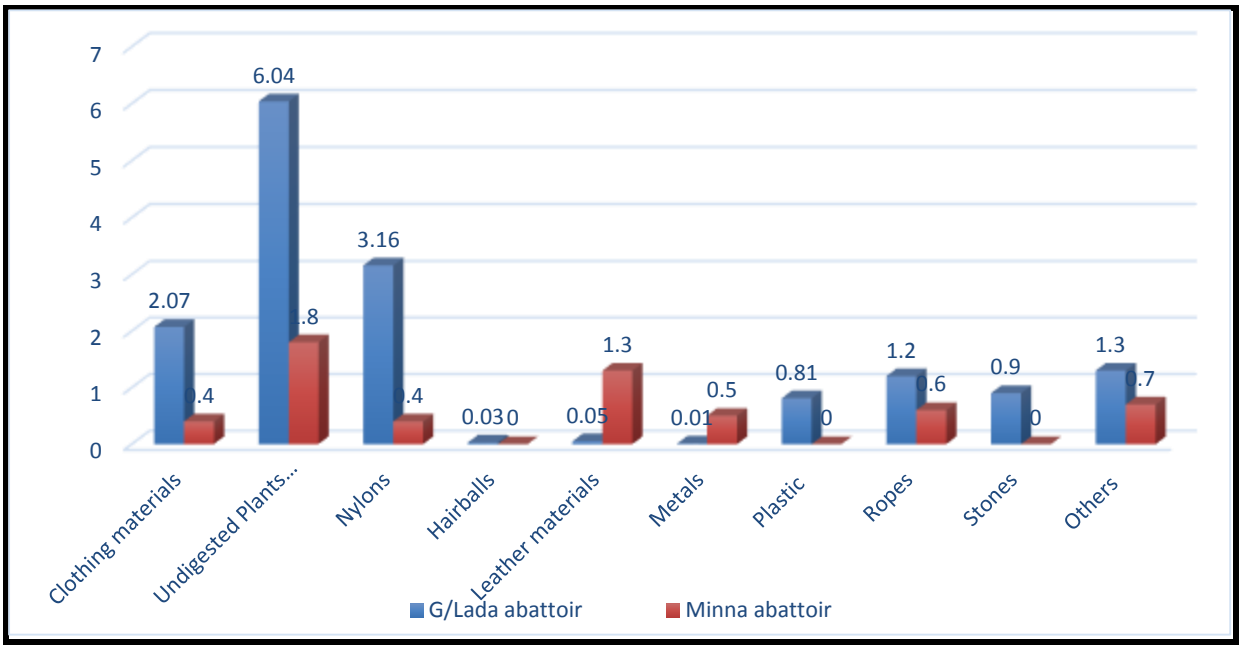

Figure 7: Spatial Analysis of Foreign Bodies animals at Gwagwalaada and Minna Abattoir

Source: Field survey, 2020

Figure 7 presents the results of foreign bodies in animals investigated at Gwagwalaada and Minna Abattoir. It shows that of all the foreign bodies investigated, only leather materials and metals were discovered higher in Minna than Gwagwalada. The data was further subjected to statistical analysis and the results is presented Table 4.

Table 4: Results of t-test analysis comparing the weight of foreign bodies between Gwagwalada and Minna.

Variables	Mean diff	Std. error	t	df	Sig. (2-tailed)	Decision
G/lada -Minna	0.8973	0.525	1.709	10	0.1749	Rejected

Source: Field Survey, 2020

Comparison of the weight of foreign bodies between Gwagwalada and Minna results revealed that the calculated t-test is greater than the critical value of 0.1749, we therefore reject the hypothesis that states "There is no significant difference in the mean weight of the foreign bodies found in the ruminants slaughtered in the two abattoirs" and accept the alternative, then conclude that "there is significant difference in the mean weight of the foreign bodies found in the ruminants slaughtered in the two abattoirs". This implies that the difference between the weight of foreign bodies from the two abattoirs have significant differences. This might probably be due to the increase in urban grazing where there are lots of development and increase in the level of pollution.

DISCUSSION OF RESULTS

This study showed that there are cases of indiscriminate dumping of refused in the study areas. This was observed from the types of wastes generated, their disposal methods, and the frequency of the evacuation. This situation led to poor environmental sanitation. In the study area, you observed that nylons, Plastic bags, plastics takeaway containers were the most frequently encountered indigestible foreign substances in the study areas.

Cattle have poor selective grazing adaptation as such the rate of ingesting foreign bodies become common [16]. This finding is in agreement with previous studies in Ethiopia; [11,17, 18,19] in Rwanda by [18] by [19] in Gwagwalada, Nigeria, in Tanzania by [11,17,18,19,20,21,22]. Nylons and plastic bags are commonly used for packaging of different items, in the absence of better means of wastes disposal, they are been thrown on any open space where they scatter all over the environment. When cattle and other smaller ruminants grazed in such contaminated environments, chances of picking them are very high as we observed in this study (Table 1 and plate 1 at appendix).

The presence of hairballs though in minute quantity was as a result of excessively licking themselves or persistent sucking of pen mates [21,22]. This might be due to skin disease characterized by itching such as pediculosis or scabies. Swallowed hairs are formed into oval bodies as a result of churning and rolling movements of the rumen once ingested by cattle, and these might cause choke during regurgitation of the cud in adult cattle or obstruction of the pylorus and small intestines in calves [24].

The prevalence of indigestible foreign body in this study is 57.4% for Gwagwalada and 24.2% for Minna, which are greater than the one reported by [21] in Gwagwalada, Nigeria for about five times (12%), [25] in Maiduguri, Nigeria (38.6%), [10,17] in Ethiopia (41.8% & 43.4% respectively). and [20] reported in Rwanda (17.4%), [3] (20.7%), except that of Minna and similar to [17] in Ethiopia who reported 56.5% and 59.3% in sheep and goats respectively. It is very gloomy to note a sharp increase in the level of prevalence in Gwagwalada within the period of five years from 2015 (12%) to 2020 (57.4%). The high prevalence rate in this study can be attributed to the poor waste management system and increase in urban grazing.

CONCLUSION

Following the forego discussions, It is concluded that management of waste disposal in the study areas is very poor. This has resulted to the ingestion of indigestible foreign substances being very common in cattle and smaller ruminants slaughtered at Gwagwalada and Minna abattoir. This might be a good source of diseases for people who might consumed their products (meat and milk).

RECOMMENDATIONS

Therefore, the study recommends that; appropriate solid waste management, especially waste disposal should be well practiced. The government should as a policy, implement range programme, this will not only improve the health of the animals but also reduce the communal crises between farmers and herdsmen. There is need for the herdsmen to be enlightened on the dangers of urban grazing and encourage them to practice forage production. The study also recommends further studies especially on the level of meat and dairy contaminations from the infected animals.

REFERENCES

1 The Environment and Cattle Production (2008): *Cattlemen's Beef board. Archived from the original (PDF). Fact Sheet,*

2. Geyer, R., J. Jambeck and K. Law (2017), "Production, use, and fate of all plastics ever made", *Science Advances*, Vol. 3/7, p.

3. Igbokwe, I.O., Rolo, M.Y. & Egwu, G.O., (2003): Rumen impaction in sheep with indigestible foreign bodies in the semi-arid of Nigeria. *Small Ruminant Research* 49, 141–146. http://dx.doi.org/10.1016/S0921-4488(03)00074-9

4. Radostits, O.M., Gay, C.C., Hinchcliff, K.W. & Constable, P.D., (2007): *Veterinary medicine:* A textbook of the diseases of cattle, horses, sheep, pigs and goats, 10th edn., Saunders Elsevier, London.

5. Ramaswamy, V. and Sharma, H.R. (2011): Plastic bags– threat to environment and cattle health: A retrospective study from Gondar City of Ethiopia. *IIOAB*, 1: 7-12

6. Ghurashi, M.A., Seri, H.I., Bakheit, A.H. and Ashwag, E.A. (2009): Effect of surgical removal of foreign body from goat's rumen with special reference to prevalence of foreign body in goats in southern Darfur. Aust. *J. Basic Appl. Sci.*3: 664-668

7. Priyanka, M., & Dey, S. (2018): Ruminal impaction due to plastic materials - An increasing threat to ruminants and its impact on human health in developing countries. *Veterinary world*, *11*(9), 1307–1315. https://doi.org/10.14202/vetworld.2018.1307-1315,

8. Singh, B. (2005): Harmful effect of plastic in animals. *Indian Cow*, 4: 10-18

9. Hailat, N., Nouh, S., Al-Darraji, A., Lafi, S., Al-Ani, F. & Al-Majali, A., 1996, 'Prevalence and pathology of foreign bodies (plastics) in Awassi sheep in Jordan. *Small Ruminant Research*. 24, 43–48.

10. Sheferaw, D., Fikreysus, G., Metenyelesh, A., Tesfaye, D. & Etana, D., (2014): Ingestion of indigestible foreign materials by free grazing ruminants in Amhara Region, Ethiopia. *Tropical Animal Health and Production.* 46, 247–250.

11. Tesfaye, D., Daba, D., Mekibib, M. & Fekadu, A. (2012a): The problem of environmental pollution as reflected in the fore stomach of cattle: A postmortem study in Eastern Ethiopia. *Global Journal of Environmental Research.* 6 (2), 61–65.

12 Tesfaye, D., Yismaw, S. & Demissie, T., (2012b), 'Ruminal and reticular foreign bodies in small ruminants slaughtered at Jimma Municipal Abattoir, Southwestern Ethiopia', *Journal of Veterinary Advances* 2(8), 434–439.

13. Abebe, F. & Nuru, M., (2011): Prevalence of indigestible foreign body ingestion in small ruminants slaughtered at Luna export abattoir, East Shoa, Ethiopia. *Journal of Animal and Veterinary Advances* 10(12), 1598–1602. http://dx.doi.org/10.3923/ javaa.2011.1598.1602

14. Roman, T. & Hiwot, Y., (2010): Occurrence of rumen foreign bodies in sheep and goats slaughtered at the Addis Ababa Municipality Abattoir. *Ethiopian Veterinary Journal* 14(1), 91–100.

15. Lange, N.C., Inganga, F., Busienei, W., Nguru, P., Kiema, J and Wahungu, G. (2018): The prevalence of plastic bag waste in the rumen of slaughtered livestock at three abattoirs in Nairobi Metropolis, Kenya and implications on livestock health, *Livestock Research for Rural Development, vol. 30, No. 11, Article 182.*

16. Westwood, C.T., (2011):'Optimising the intake of feed by pasture-fed sheep and cattle' Proceedings of the 26th *Annual Conference of the Grassland Society of NSW*, 88–98.

17. Negash, S. Sibhat, B. and Sheferaw, D. (2015): A postmortem study on indigestible foreign bodies in the rumen and reticulum of ruminants, Eastern Ethiopia. *Onderstepoort Journal of Veterinary Research*, vol. 82, no. 1.

18. 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,* vol. 2, no. 4, pp. 133–150.

19. Mekuanint, S. Alemneh, T. and Asredie, T. (2017): Indigestible foreign bodies causes of rumen impaction in cattle, sheep and goats slaughtered at Addis Ababa Abattoir Enterprise, Ethiopia," *Journal of Veterinary Science and Medicine*, vol. 5, no. 1.

20. Mushonga, B. Habarugira, G. Musabyemungu, A. Udahemuka, J. C. Jaja, F. I. and Pepe, D. (2015): Investigations of foreign bodies in the fore-stomach of cattle at ngoma slaughterhouse, Rwanda. *Journal of the South African Veterinary Association.* Vol. 86, no. 1,

21. Akinbobola, J. S. Omeje, J. N. Akinbobola, R. I. Ayoade, R. IAjagbe, . 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*, vol. 6, no. 6, pp. 25–31.

22. Bwatota S.F., Makungu M. & Nonga H.E., (2018): Occurrences of indigestible foreign bodies in cattle slaughtered at Morogoro Municipal Slaughterhouse, Tanzania. *Journal of Veterinary Medicine* 2018, 1–6.

23. Abutarbush S. M. and Radostits, O. M. (2004): Obstruction of the small intestine caused by a hairball in 2 young beef calves," *Canadian Veterinary Journal*, vol. 45, pp. 324-325.

24. Constable, P. D. Hinchclif, K. W. Done, S. H. and Grunberg, W. (2017): *Veterinary Medicine:* A Textbook of Diseases of Cattle, Horses, Sheep, Pigs, and Goats, Elsevier, St. Louis, Missouri, 11th edition.

25. 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.

APPENDIX

Plate 1: Pictures of different contents of foreign bodies from slaughtered animals