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Detection of indigestible foreign bodies in the Rumen and Reticulum of Cattle and Camels

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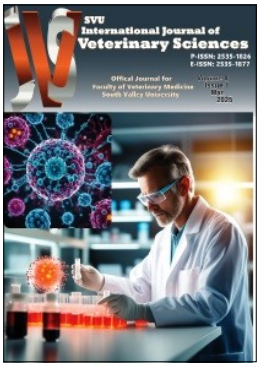

ABSTRACT

Foreign body lodgments in domestic animals' stomach as a result of pollution-related predispositions are becoming a big issue to livestock farming. Such lodgments have been implicated among common causes of sudden death in animals and its attendant economic losses. Many farmers in semi-arid region keep both cattle and camels together for multiple purposes, such as meat, milk and other functions. Although both species are at risk of foreign body ingestion syndrome, little was found in the literature about the foreign body ingestion in camel. The present study investigated foreign body ingestion syndrome in cattle and camels. A total of 400 cattle and 400 camels of both sexes slaughtered at Maiduguri abattoir were randomly selected and used for the current study. The fore stomachs of both species were opened and all contents were thoroughly scrutinized for the presence of foreign bodies. According to the survey, there were 24.9% of foreign bodies' altogether in both cattle and camels fore-stomachs. In the rumen and reticulum of cattle, 25.8% and 9.5% of the total foreign bodies were recovered while in the camels, 17.8% and 4.5% of the total foreign bodies were recovered from the rumen and reticulum respectively. The predominant foreign bodies in both species were polythene leather 6.3% in cattle and 4.3% in camels. This finding is of great concern because of the serious impacts on economic losses resulting from attendant high morbidity and mortality rates. The most common types of foreign bodies discovered in the rumen and reticulum of afflicted cattle and camels were polythene leather, plastic, and pieces of cloth, different seeds, hardwood, and ropes. Overall detection percent of foreign bodies recovered was higher in cattle compared to camel. This was attributed to differences in their feeding habits. However foreign body lodgments and distribution pattern in rumen and reticulum were similar in both species. It was concluded that foreign body ingestion syndrome exists in both cattle and camel populations in this region and that cattle carry more risk factor compared to camel. The current study's findings indicate that plastic bags and other indigestible items pollute the environment, resulting in health problems for camels and animals that roam freely.intended for breeding.

Keywords: *abattoir, foreign body, camel, cattle, semi-arid*

INTRODUCTION

In animals, particularly ruminants, foreign body ingestion syndrome is a predominant clinical condition with significant economic implications. Because of feed insufficiency, promiscuous feeding habits are to blame for foreign body ingestion (Igbokwe et al., 2003). It's been linked to nutrient insufficiency and disequilibrium in animals, particularly minerals and

trace elements including copper, iron, cobalt, and manganese, along with selenium (Sadan et al., 2020). Complications have been described, such as traumatic reticuloperitonitis, in which sharp foreign materials pierced the alimentary system and clog the digestive tract (Braun et al., 2018, Priyanka and Dey, 2018). Because of the high rates of morbidity and death, foreign ingestion has a range of detrimental consequences on animal health in addition to causing overall economic losses (Radostits et al., 2007, Ramin et al., 2008).

Many farmers keep both cattle and cattle together for multiple purposes, such as meat, milk, draught power, source of income and other function (Sikhweni et al., 2013, Soji et al., 2015). Feed scarcity and droughts are common phenomenon in semi-arid desert areas where cattle and camels are reared under free grazing or poor farming conditions which predisposes such animals to foreign body ingestion. Majority of the incidences of foreign bodies were reported to be found mainly in the fore-stomach (Tehrani et al., 2012).

Figure 1: Map of Maiduguri showing the location of the Abbatoir (Source: Google Map)

Earlier studies have described the consumption of foreign substances in cattle and small ruminants in other places (Igbokwe et al., 2003, Semieka, 2010, Mushonga et al., 2015). Plastic, sack thread, ropes, rubber, leather, hair, and bed linens and plant fibers are among the non-penetrating foreign items regularly detected in cow forestomachs, according to recent investigations (Anwar et al., 2013). Metallic wire, needles, nails, and sharp stones are among the most penetrating foreign bodies (Ramaswamy and Sharma,

Camels are similar to cattle with regard to having fore stomach rumen, reticulum and omasum and both having active microbial fermentation in the stomach and the capacity to regurgitate food (Holler et al., 1989). Nevertheless, the camel's stomach only has three compartments, as opposed to the four-compartment compound stomach of typical ruminants like cattle. The three compartments are the rumen, reticulum and the abomasum popularly referring to as compartment

1(C1), compartment 2 (C2) and compartment 3 (C3) respectively (Vallensa et al., 1971; Singh et al., 1996). Considering resemblance of cattle rumen and reticulum to the camel fore stomach, camel reared in the same environment as cattle may suffer the same fate regarding foreign body ingestion syndrome. Considering their ubiquity, there is little information in the literature about camels ingesting foreign bodies.

To the best of our knowledge, no investigations was performed on the commonness of foreign substances in cattle and camels reared under similar semi-arid circumstances in North Eastern Nigeria have been conducted. Therefore, the objective of this study was to determine the detection rate of foreign bodies in the foreguts of cattle and camels, in addition to give a general overview of alien entities and their patterns of detection as well as to localize the alien entities in the stomach's numerous compartments.

Figure 2: Assorted foreign bodies found in the stomach of camels and cattle

MATERIALS AND METHODS

The study area and climate characteristics

The study area, Maiduguri Central Abattoir is located in Maiduguri, the capital city of Borno State, Nigeria. It is located between Latitude 1105" North and Longitude 1305" East at an altitude of 354 m above the sea level and falls within the Sahel Savannah Zone of Africa. The climate is characterized by two distinct seasons, yearly, with a unimodal rainfall pattern as long dry season of about 6-8 months, and a short rainy season of about 4-6 months. The dry season usually starts from November to April while the rainy or wet season starts from May to October. The climate is generally hot with annual rainfall between 1500 mm - 1750 mm per year. The hottest months are March and April with a mean temperature of 37oC to 40 oC as described by Carter (1994) and Mortmore (1998).

Ethical Statement

The investigation was carried out in compliance with the regulations and ethics governing the use of animals. Throughout the investigation, rigorous adherence to standards for the appropriate treatment and management of animals was maintained. The study was permitted by the ethical committee of Faculty of Veterinary Medicine, University of Maiduguri. With the help of certified and experienced meat investigators, the fore-stomach inspection processes were carried out. Animal proprietors and abattoir authorities were notified of the study's goals and methods, and they gave their agreement before any study techniques were performed on the animals.

Sampling

ANIMAL POPULATION

A total of 400 cattle and 400 camels, representing both sexes, were randomly selected and slaughtered at the primary abattoir in Maiduguri for this study. The study was carried out throughout four months period, spanning from February to May 2019. During this time, the cattle and camels used for sampling were brought to the abattoir. These animals were sourced from Maiduguri Metropolis, the surrounding local government areas of Borno State, as well as from Yobe State and the neighboring countries of Chad and Niger Republics.

Procedure

Data were collected from the abattoir from 6 am to 10 am on Sundays, Wednesdays and Fridays, corresponding peak market days. Following slaughter, devouring, and cutting, the rumen and reticulum, which make up the fore-stomach, were carefully removed from the abdomen and placed aside in a container to prevent the contents from spilling out of the various compartments. Each chamber was opened and thoroughly examined by visual inspection and palpation with the assistant of qualified meat inspectors. Every item was carefully inspected for the

Table 1: Detection of foreign bodies in the fore stomach according to species

Species	Number of animals examined	Number of positive animals	Detection (%)	95% Confidence interval
Cattle	400	127	31.8	27.4, 36.5
Camel	400	72	18.0	14.6, 22.1
Total	800	199	24.9	22.0, 28.0

*N=total number of animals examined for each species. *values in the bracket represent detection percent of the corresponding values of the parameters

presence of foreign objects, and if any were found, they were further dissected to ensure that the components were correctly recognized. All foreign bodies in each chamber were washed, counted, classified and recorded according to their types. This process continued for four months and the data collected were subjected to statistical analyses.

DATA ANALYSIS

A Microsoft Excel worksheet was used to enter and handle the generated data. Descriptive statistics were used to examine and compile the data into tables. Using VassarStats for the confidence interval, the detection rate of foreign bodies was determined.

RESULTS

Detection of foreign bodies from the total of 400 cattle and 400 camels examined for the presence of foreign body showed that 24.9 % (199) of all the animals had foreign bodies in their rumen and/or reticulum (Table 1). A total of 127 cattle representing 31.8% of the total number of cattle examined had foreign bodies, while that of camel was 72 representing 18% of the total number of camels examined (Table 1).

The type of foreign bodies recovered and their frequency of detection with regards to the two species is presented in Table 2. The types of foreign bodies observed in the animals studied most commonly were wire, hard wood, keys, plastic bags, robes, hairballs, stones, cassette-tape ribbons, polythene leather, assorted seed, bones, metal, Polythene leather, plastic bags and pieces of cloth, these represents 152 (38%) of the total foreign bodies in cattle (Table 2). In camel, assorted seed, hardwood, plastic bags and polythene leather were the most common types of foreign bodies representing 72 (18%) of the total foreign bodies (Table 2). The predominant foreign bodies in both species were polythene leather 25(6.3%) in cattle and 17(4.3%) in camels (Table 2).

With regard to the distribution in rumen and reticulum, 25.8% of the total foreign bodies in cattle were lodged in the rumen and only 9.5% lodged in reticulum (Table 3). Similarly in camel, 17.8% of the total foreign bodies were lodged in the rumen and only 4.5% lodged in reticulum (Table 3).

DISCUSSION

In the present study both cattle and camels showed positive evidences of foreign body ingestions and lodgments. The study showed an overall detection of foreign bodies in both cattle and camels fore-stomachs to be 5.8%. Results of earlier studies on ingestion of foreign bodies in cattle has been reported elsewhere (Tesfaye et al., 2012, Anwar et al., 2013, Mushonga et al., 2015, Nongcula et al., 2017) and also in camels (Eljalii et al., 2014, Smith, 2015, Sadan et al., 2020).

In the current study, the most common type of foreign bodies found in the rumen and reticulum of the affected cattle camels were polythene leather, plastic bags, and pieces of cloth, assorted seed, hardwood and ropes. This is consistent with report of Nongcula et al. (2017) in cattle who observed that the majority of the foreign bodies were plastics and pieces of cloths. Also with regard to camels, Sadan et al. (2020) reports are similar to the present. However, high detection rate of hard wood and assorted seeds as observed in the present study has not been reported elsewhere. The difference may be due to nature of environment from which the animals were sourced. The semi-arid environment in which the present study was carried out is characterized by hard shrubs and hard seed type which are usually indigestible.

The study found that although the pattern of distribution in the rumen and reticulum is comparable

Table 2: Detection of foreign bodies in camels and cattle fore-stomach according to type

Type of the foreign bodies	Detection (%)		Overall detection (%)	95% CI	95% CI
	Cattle (*N=400)	Camel (*N=400)		Cattle	Camel
Wire	5 (1.3)	2(0.5)	7(1.8)	0.5, 2.9	0.1, 1.8
Cloth	15(3.8)	5(1.3)	20(5.0)	2.3, 6.1	0.5, 2.9
Hard wood	10(2.5)	15(3.8)	25(6.3)	1.4, 4.5	2.3, 6.1
Keys	2(0.5)	0(0)	2(0.5)	0.1, 1.8	0.0, 0.9
Plastic bags	17(4.3)	13(3.3)	30(7.5)	2.7, 6.7	1.9, 5.5
Ropes	14(3.5)	7(1.8)	21(5.3)	2.1, 5.8	0.9, 3.6
Hairballs	13(3.3)	1(0.3)	14(3.5)	1.9, 5.5	0.04, 1.4
Stones	3(0.8)	0(0.0)	3(0.8)	0.3, 2.2	0.0, 0.9
Cassette-tape	7(1.8)	0(0.0)	7(1.8)	0.9, 3.6	0.0, 0.9
ribbons	18(4.5)	12(3.0)	30(7.5)	2.9, 7.0	1.7, 5.2
Polythene leather	25(6.3)	17(4.3)	42(10.5)	4.3, 9.1	2.7, 6.7
Assorted seeds	9(2.3)	0(0.0)	9(2.3)	1.2, 4.2	0.0, 0.9
Bones	8(2.0)	0(0.0)	8(2.0)	1.0, 3.9	0.0, 0.9
Metal	6(1.5)	0 (0.0)	6(1.5)	0.7, 3.2	0.0, 0.9
Total	**152 (38)**	**72 (18)**	**224 (56)**	**33.4, 42.9**	**14.6, 22.1**

*N=total number of animals examined for each species. *values in the bracket represent detection percent of the corresponding values of the parameters

in both species, the total detection rate of foreign materials in cattle is comparatively higher than in camels. Since cattle do not use their lips for chewing, they are more likely than camels to consume foreign materials because they consume more minced feed, which may contain foreign items. This may explain why the detection of extraneous substances in cattle is rising relative to cattle. The high detection rate of foreign bodies in both cattle and camels as revealed in our present study is worrisome because of the serious impacts on economic losses resulting from attending high morbidity and death rates as reported by Radostits et al., (2007) and Ramin et al., (2008).

Foreign bodies when ingested by animals mostly get lodged in the rumen and reticulum thereby compromising ruminal and reticular space and interfering with normal physiological functions of the rumen and reticulum leading to illness, weight loss or death. Other pathological conditions associated with this include tympany, traumatic reticulo-pericarditis, immuno-suppression (Rao and Charjo, 1995, Kumar and Dhar, 2013). Sadan et al. (2020) found that camels with foreign body deposits had significantly lower blood electrolyte levels of potassium, sodium, and chloride. They attributed this to anorexia and rumenal hypomotility.

Ingestion of foreign bodies is associated with culture of open grazing and poor farming management, poor waste disposal management, and shortage of forage as well as increased population of grazing lands with indigestible materials (Chafe, et al., 2008, Semieka, 2010, Tesfaye et al, 2012). This predisposes the animals to search for food in odd unfamiliar sites, consuming any available feed and other indigestible materials. According to the study's findings, free-ranging cattle and camels may suffer major health issues if plastic bags and other indigestible items are left in the environment. The clinical signs observed in the current study in these species of animals after ingestion of foreign bodies were variable. However, emaciations and impaction are predominant.

CONCLUSIONS

High percentage of the cattle and camel investigated have foreign body ingestion syndrome. This is of great concern because of the serious impacts on economic losses resulting from attendant high morbidity and mortality rates. Overall detection

percent of foreign bodies recovered was higher in cattle compared to camels. This was attributed to differences in their feeding habits. However foreign body lodgments and distribution pattern in rumen and reticulum were similar in both species. The most common type of foreign bodies found in the rumen and reticulum of the affected cattle and camels were polythene leather, plastic, pieces of cloth, assorted seed, hardwood and ropes. According to the study's findings, free-ranging cattle and camels may have health issues as a result of plastic and other indigestible items being left in the environment, and cattle are more at risk than camels. It is suggested that communities avoid indiscriminate disposal of plastics and leather on pastures and embrace proper and routine waste disposal habit. As a fall out from this study, appropriate authorities should consider legislation to ban the use of plastic bags for packaging in retail shops in order to curb the menace of indiscriminate disposal of plastics and leathers.

CONFLICT OF INTEREST

The authors declare that they have no competing interest.

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