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Effect of Surgical Removal of Foreign Body from Goat's Rumen with Special Reference to the Prevalence of Foreign Body in Goats in Southern Darfur

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Abstract: Foreign body prevalence in the rumen of living and slaughtered desert goats, together with the prevalence of foreign body in the other species of goats in Nyala town was investigated in the current study. Also, the impact of surgical removal of foreign body from the rumen of desert goats on some physiological parameters was investigated. The percentages of goats harbouring foreign body either in live or slaughtered animals were found to be 87% and 84% respectively, while the prevalence of foreign body in Nyala town was found to be 81% and 85% in the years 2006 and 2007, respectively. Surgical removal of the foreign body resulted in no significant change ($P \leq 0.05$) in respiratory rate, heart rate and body weight. After removal of foreign body significant decrease ($P \leq 0.05$) in rectal temperature and significant increase ($P \leq 0.05$) in haemoglobin concentration (Hb) was also observed. It is concluded that, surgical removal of the foreign body did improve the health of the animals under investigation.

Key words: desert goats, foreign body, rumenatomy, Sudan.

INTRODUCTION

It may be predicted that foreign bodies would be a growing problem for grazing animals in Sudan, as grazing lands become more and more polluted with plastics, ropes, hair, wool and metals (Mohammed, H.A., 2004). Most of goats in South Darfur state, especially those found in town perform natural free grazing and they are not reared in farms. In the last few years a change in the habits of Sudanese peoples took place which was shown by usage of plastic bags (Fig. 1) instead of homemade bags (Fig. 2) which have been used in the past. Due to absence of recycling industries and absence of cleaning of environment cultures, these plastic bags are usually not disposed in a correct manner, and hence they were eaten by the free grazing animals (Fig. 3) especially in towns and villages. These plastic bags are of indigestible nature (Igbokwe, I.O., M.Y. Kolo, 2003), their accumulation in the rumen may lead to adverse effect (Hailat, N., A. Al-Darraji, 1998; Hailat, N., S. Nouh, 1996) and this might be reflected negatively on the animals' health.

Fig. 1: plastic bags

Foreign body incidence is responsible for many deaths per year in Sudan (Mohammed, H.A., 2004). The prevalence of foreign body in caprine rumen during the hot dry season ranged from 10-32% during the years 1998-2002 and declined in winter from 3-11% during the same period (Mohammed, H.A., A.O. Bakhiet, 2006).

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Fig. 2: homemade bags

Fig. 3: animals eating plastic bags

In Sudan, goats with foreign body represented 5-30% of clinical cases presented to clinics (Abdel-Majeed, A.B., B. Abbas, 1991). Ruminal indigestion in goats was attributed to foreign bodies and progressive toxicity was proposed to be the cause of death in goats (Fouad, K., B. Musa, 1980).

The present study was carried out to outline the prevalence of foreign body in the rumen of desert goats and to study the effect of surgical removal of foreign body on some health parameters including, respiratory rate, heart rate and rectal temperature. Body weights together with some blood parameters were also examined.

MATERIALS AND METHODS

The presence of the foreign body in the living animal was examined by external palpation of the rumen during the period May to July 2008 in Nyala town, South Darfur state, Sudan. The presence of foreign body in the slaughtered animal was also examined in the slaughter house by opening of the rumen.

The experimental part of this study was carried out using eight mature desert goats more than two years of age. All the animals were suffering from presence of foreign body in the rumen which was diagnosed by external abdominal palpation (confirmed later by surgery). The observation period of the study extended over 10 weeks. The animals monitored for 4 weeks as preoperative period, 2 weeks following the surgical operation was performed (surgical period) and another 4 weeks under observation after the period of recovery (post operative period).

The foreign bodies were removed from the rumens of the animals under investigation surgically by performing rumenatomy under general anaesthesia using the protocol of Diazepam 0.5mg/kg + ketamine 4mg/kg.

The individual animal body weight is measured at the beginning of the experiment and at a week interval throughout the duration of the experiment using spring balance.

Respiratory rate, heart rate and rectal temperature were monitored using standard methods (Kelly, W.R., 1984), and Blood parameters which include haemoglobin concentration (Hb); white blood cells count (WBCs) were measured using standard methods (Jain, N.C., 1986) at a week interval during the period of observation before and after the surgical operation.

The foreign bodies removed from the rumen, were weighed immediately after their removal and their components were determined.

The prevalence of the foreign body in the living animals and in the slaughter animals was obtained by dividing of the affected individuals by the total number examined multiplied by hundred.

The prevalence of the foreign body in goats rumen in Nyala town obtained by dividing the number of foreign body operation by the total number of surgical operation carried out in Nyala veterinary hospital multiplied by hundred.

Analysis of variance (ANOVA) was used to compare the raw data obtained and the least significant difference was used to determine the significant difference between the means of each parameter.

RESULTS AND DISCUSSION

Table (1) show that the external abdominal palpation revealed 87% of the living goats examined were affected by presence of foreign body in the rumen. Examination of rumen in the slaughter house showed that 84% of the slaughtered goats examined were affected by foreign body. Consulting the records of Nyala veterinary hospital for the prevalence of foreign body operations was found to be 81% and 85% in the year 2006 and 2007 respectively as shown in table (2). As shown in table (3) surgical removal of the foreign body did not affect the heart rate significantly ($P \leq 0.05$). Comparison of the respiratory rate before and after surgical removal of the foreign body revealed non-significant changes ($P \leq 0.05$) as shown in table (3).

Table 1: Prevalence of foreign body in living and slaughtered animals

Method	No. animals examined	No. of animals with F.B.	Prevalence %
External palpation	100	87	87%
Examination of rumen	100	84	84%

Table 2: Prevalence of foreign bodies in goats' rumen at Nyala town

Year	Total No. surgical cases conducted in goats	No. of foreign bodies present in rumen of goat	Prevalence %
2006	33	27	81%
2007	67	57	85%

Table 3: Effect of surgical removing of foreign body on heart rate, respiratory rate and rectal temperature.

Parameter	1(W)	2(W)	3(W)	4(W)	5(W)	6(W)	7(W)	8(W)
Heart rate	67.5±5.1[a]	76.7±5.1[a]	69.7±5.5[a]	79.1±5.9[a]	69.0±5.9[a]	65.0±5.9[a]	66.0±5.9a	69.8±5.9[a]
Respiratory rate	21.7±1.1[a]	23.3±1.1[a]	20.1±1.2[a]	22.5±1.2[a]	21.3±1.3[a]	21.3±1.3[a]	22.3±1.[3a]	20.3±1.3[a]
Rectal temperature	38.1±0.2[a]	37.6±0.2[a]	38.0±0.[2a]	37.9±0.3[a]	37.0±0.3[b]	36.3±0.3[b]	36.3±0.3[b]	36.9±0.3[b]

Different letters in the same raw indicate significant difference ($P \leq 0.05$)

After surgical removal of the foreign body a significant drop ($P \leq 0.05$) in rectal temperature was observed from week 5 up to week 8 as shown in table (3). As shown in table (4) non significant increase ($P \leq 0.05$) in the mean body weight of examined animals was observed after surgical removal of the foreign body. As shown in table (4) a significant increase ($P \leq 0.05$) in haemoglobin concentration was observed in week 8. Table (4), show that surgical removal of the foreign body resulted in significant change ($P \leq 0.05$) in the total white blood cell count. The mean weight of the foreign bodies removed was found to be 1.0 ± 0.5 kg and they are composed mainly of plastic bags and plastic ropes as shown in fig. (4).

Table 4: Effect of surgical removing foreign body on body weight, haemoglobin concentration and white blood cell count (WBCs)

parameter	1(W)	2(W)	3(W)	4(W)	5(W)	6(W)	7(W)	8(W)
Body wt	23.7±3.9[a]	24.5±2.5 [a]	23.7±1.4 [a]	23.3±1.5 [a]	23.6±4.6 [a]	24.8±3.9 [a]	24.3±4.4 [a]	26.5±2.2 [a]
Hb	41.8±8.8[a]	42.7±4.5[a]	45.8±5.0[a]	44.8±5.2[a]	47.1±7.1a	47.0±6.9[a]	46.6±6.7[a]	53.5±5.7[b]
WBCs	8225±5727[a]	8743±1380[a]	8550±4792[a]	6770±2655[a]	11783±5110[b]	10225±3250[b]	13133±2640[b]	10641±4036 [b]

Different letters in the same raw indicate significant difference ($P \leq 0.05$)

Small ruminant industry contributes positively in the economy of rural people especially in South Darfur state. The present work reports on the prevalence and effects of foreign body lodged in the rumen of goats in South Darfur state and Nyala town.

Our investigation revealed that the foreign bodies are quite prevailing among goats in the state as 87% and 84% of the living and slaughtered goats were harbouring foreign bodies, respectively. The prevalence of foreign body in Nyala town was found to be 81% and 85% in the years 2006 and 2007 respectively. The prevalence of foreign bodies reported in this study was found to be greater than that reported in Nigeria by

Fig. 4: foreign body after its surgical removal

(Igbokwe, I.O., M.Y. Kolo 2003; Remi-Adewunmi, B.D., E.O. Gyang, 2004) and in Jordan (Hailat, N., A. Al-Darraji, 1998). In Sudan, the prevalence of foreign body in sheep is substantially high (Bakhiet, A.B., 2008) compared to previous studies (Hailat, N., S. Nouh, 1996; Mohammed, H.A., A.O. Bakhiet, 2006; Radostitis, O.M., D.C. Blood,1994). This is most likely due to the increased pollution of grazing lands by plastics. The high prevalence of the foreign bodies reported in this study might be attributed to the fact that most of the animals are grazing freely, also may be due to the shortage of forages in the dry seasons. It has been reported that this condition may be associated with shortage of feed especially minerals and vitamins (Hailat, N., S. Nouh, 1996; Rossow, N., Z. Horvath, 1985).

In this study the age of the experimental animals selected is more than two years and in the other studies age was considered as a factor in those studies which might lead to increase in the prevalence of foreign body reported in this study.

In the present study surgical removal of foreign body resulted in progressive non- significant increase ($P \leq 0.05$) in the body weight, which could be attributed to increase in the appetite, bearing in mind that foreign body was reported to cause anorexia (Igbokwe, I.O., M.Y. Kolo, 2005). The retard of appetite might be due to the physical presence of the foreign body mass in the rumen which stimulate ventromedial hypothalamus which stimulate the satiety centre leading to loss of appetite (Reece, O.W., 2005).

Pathological studies indicated that the presence of foreign body in the rumen specially plastic materials lead to pathological changes such as sloughing, haemorrhage, congestion and stunning of papillae (Hailat, N., S. Nouh, 1996), irregular distribution of papillae, thinning of the rumen wall (Hailat, N., A. Al-Darraji, 1998), also these change might affect the digestive and absorption function of the rumen.

Sheep with plastics had low RBC, PCV, Hb and MCV. MCH and MCHC were increased (Bakhiet, A.B., 2008) suggesting a microcytic hypochromic type of anaemia (Coles, E.H., 1986; Hailat, N., A. Al-Darraji, 1998; Hailat, N., S. Nouh, 1996) The significant increase ($P \leq 0.05$) in haemoglobin concentration in week eight may be attributed partially to the healing process which is expected to take place in the rumen wall and papillae after removal of the plastic materials, also the increase in these two parameters may be due to progress in appetite which expected to take place following the operation since the foreign body was reported to cause pathological changes and also it cause anorexia as mentioned above.

Regarding the results of the respiratory rate and heart rate, it seems that the presence of the foreign body does not affect the respiratory rate and heart rate significantly ($P \leq 0.05$), according to our knowledge there were no available data in the literature to support or to contradict with our results and we think there is no direct relationship between the presence of the foreign body and respiratory rate and heart rate, except for the physical pressure exerted by the foreign body on the chest.

Concerning the white blood cell counts (WBCs) and body temperature reported in this study, the removal of the foreign body resulted in significant decrease ($P \leq 0.05$) in rectal temperature from week 5 up to the end of the observation period, also surgical removal lead to increase in the WBCs count from week 5 up to the end of the experiment , these two results and according to the literature available are contradicting each other because the factors which usually lead to increase in the WBCs count are inflammation (due to healing process) and also infection is also supposed to lead to increase body temperature (Coles, E.H., 1986) but we found that there was a significant increase ($P \leq 0.05$) in WBCs count accompanied by a significant drop ($P \leq 0.05$) in body temperature so we think that the picture here is a pit confusing and it might be in need of more investigation.

Although the economical impact of the foreign body in animal production in South Darfur state or Nyala town was not studied in details we think that our study give an indication that there might be a great economical loss at least on meat production level as a result of foreign body, considering the large population of goats in the state.

It is concluded that surgical removal of foreign body did improve the health of animals under investigation and hence we could recommend that further studies are required to study the economical impact of foreign body together with the effect of foreign body on different lines of production and reproduction including milk, meat production and kidding rate in different animal species.

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