



Original Article

Incidence of Phytobezoars in Sheep Reared on Natural Pasture

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ABSTRACT

This study was carried out at Kordofan region, West Sudan during 2013. It's aimed to identifying the real causes of the herbal balls (phytobezoars) and find out the prevalence of sheep phytobezoariasis in the region. 30 samples of phytobezoars were collected randomly from slaughtered sheep at abattoirs of El Khuwei, Abuzabad, Gebeash for chemical characterization and plant classification, and samples from *Ipomoea cordofana* and *Merrimia emarginata* (*Tabar*) plants that had shown to initiate formation and retention of this ball has been taken. The results of the laboratory analysis showed that the proteins content of phytobezoars and the suspected plants were on an average of (8.73% and 10.38%), respectively. A detected ether extract signed (0.00% and 0.60%) for phytobezoars and *Tabar*, respectively. The results showed that phytobezoars and *Tabar* plant had higher contents of heteropolysaccharits as cellulose and hemi cellulose of (47.5, 29.11%), (28.6%, 12.16%) in both, respectively. The percentage of lignin was on an average of (28.6%, 14.34%), and tannin recorded values of (2.05%, 0.025%) in phytobezoars and *Tabar*, respectively. The study predicted that the plant (*Tabar*) *Merrimia emarginata* was caused an incidence of phytobezoars in sheep. Results showed that phytobezoars and *Tabar* plant had higher fiber contents of (cellulose, hemi cellulose, lignin and tannins), that may affects the formation of phtyobezoars.

Keywords: phytobezoars, Sheep, Natural Pasture.

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INTRODUCTION

Sudan is the largest country with an area of 1.88 million square kilometers. It has a human population of 39.27 million people (CBS, 2014). MARF (2010) provided official estimates of the size of Sudan's livestock populations currently are of 51.56-52.08 million sheep, 43.27-43.44 million goats, 41.56-41.76 million cattle and 4.52-4.62 million camels (MARF, 2005). Kordofan is the homeland for Sudanese Desert sheep that is accounted for 65% of the national herd of the species and the main export ecotype from the country (Jadalla and Mekki, 2012). In kordofan region the livestock studies showed that there were 15%, 10%,

21% and 36% of the nation cattle, sheep, goats and camels respectively and all traditional livestock types are found in Kordofan (Farah, 2006). The major problem of the rangeland as degradation included over's loading and grazing leading to certain ecological disaster to little lands (El hag *et al.*, 2012). In Sudan, animals farm were suffer from serious constraints. The most important it's the shortage of feedstuffs, particularly at the dry season. Because the most of Sudanese herds depend on range and pasture so they will be affected by their conditions when its poor and nutrients are not enough to cover maintenance and productive requirements of the animal that will decreased the total amount of production. Foreign material of plant and/or animal origin as (bezoars) has been reported to cause impaction of the digestive tracts domestic and wild animals (Bath and Bergh, 1979). Trichobezoars (Hairballs) are common in cats (Ryan and Wolfer, 1978) and young ruminants (Jubb *et al.*, 1985). Although some authors (Ryan and Wolfer, 1978) doubt the pathological importance of bezoars, and others (Bath and Bergh, 1979 and Schneider and Hugo, 1980) have indicated that they cause abomasal impaction manifested by anorexia and heavy mortality in young ruminants. In highlands some African countries many lambs manifest anorexia and die without the cause being established (Njau *et al.*, 1988). Degree of incidence cause and mode of formation of those phytobezoars were not yet fully investigated (Jadalla and Mekki, 2012). In other parts of the tropics phytobezoars together with other foreign bodies are well known cause of losses in small ruminants (Radostitis *et al.*, 2000). Phytobezoars in sheep have assumed importance recently in Kordofan due to the fact that some plant species have shown to initiate formation and retention of these ball-shaped bodies in ruminants leading to mortality. Among these nutritional constraints was pointed out recently by producer is the prevalence of phytobezoars that causes high mortality rate and serious losses of weight, production and reproductivity. So the objectives of this study are to determine the degree of incidence of phytobezoars in sheep raised on natural rangelands in Kordofan region. Also for better understanding of the formation mechanisms of the Bezoars through chemical analysis and determination of constituents of the bezoars and the plant that suspected it had been responsible for initiation of the formation of the phytobezoars was done.

MATERIALS AND METHODS

Study Area

This study was conducted in greater Kordofan (North and South) to investigate the cause of incidence of Bezoars and degree of phytobezoars in El Khuwei, Abu Zabad and Aldebaibat. All areas are within Kordofan region which located between latitudes 9 :30' and 16 :30' North and longitudes 24 and 32 :25' East. The region consists of North and South states forming a total area of 380,000 Km² (90 million Fadden).

Field surveys and Sampling

The information data of this study was obtained from three areas and markets for sheep in Kordofan: the El Khuwei, Abu Zabad and Aldebaibat. 30 samples of phytobezoars were collected randomly from locality of El Khuwei, Abuzabad, Gebeash for chemical characterization and plant classification. To assess the prevalence of incidence by phytobezoars among animals brought to abattoirs, an examination to diagnose the incidence of phytobezoars was done by palpation before slaughtering the animals.

Collection of Phytobezoar Samples

After the slaughter, and immediately after removal of the viscera, animal digestive organs were removed carefully to detect the phytobezoars and herbal balls that located in digestive system. Samples of phytobezoars and herbal balls were collected from slaughterhouses and classified according to the plants and grasses that the animals ingested and then analyzed

chemically to determine their fiber content, crude protein, organic matter, ether extract, minerals and tannin.

Inventory and Classification of Plants Causing Phytobezoars

To identify the species of plants that is believed causing the herbal Balls (phytobezoars), samples were collected covering the three study areas and then subjected to identification and classification, by experts from forests specialist.

Chemical analysis of phytobezoars

Samples of phytobezoars were analyzed by used approximate method to determine the contents of crude protein, crude fiber, dry matter, ether extract, moisture, ash and tannin. From different Families of *Tabar* two species (*Ipomoea cordofana*, *Merrimia emarginata*) were also analysed and their physical structure were figure out and the chemical composition was also determined.

Methods of Proximate Analysis

According to AOAC (1984) the standard methods used routinely in animal nutrition laboratory are described in this manual. The bulk of the manual focuses on the laboratory producer in a simple step by step approach with more emphasis on methods used in evaluating feed resources.

RESULTS AND DISCUSSION

Chemical Composition of the Phytobezoars

Chemical analysis of phytobezoars in table (1) showed that the percentages of the Cellulose, Hemicelluloses and lignin were of 47.06, 23.96 and 28.97 respectively. This higher percentage of non digestive heteropolysaccharides may be the main causes of phytobezoars, which there fibrous materials would accumulated in the rumen and rolling around and from forming the shape of balls (De Toledo *et al.*, 2012). Chisholm *et al.*, (1992) stated that a phytobezoar is a type of bezoar, or trapped mass in the stomach, that consists of components of indigestible plant material, such as fibers, skins of seeds. Percentage of crude protein was obtained in this study on an average of 8.73%. Ash content on an average was 6.6%. Other study showed that Ash, nitrogen, phosphorus and zinc concentrations in both bezoars and plant material were similar (Botha and Vorester, 2002). Similar results were reported by Veeraiah *et al.*, (2008) who stated that the Phytobezoars consisted of plant materials, polythenes and mineral deposits. Phytobezoar consisted of 8.22% moisture, and 5.58% crude protein, 5.80% crude fiber and 80.40 % total ash on chemical analysis. The percentage of tannin was high on an average 2.05%. Similar results were stated by Makkar *et al.*, (1988); Mueller and McAllan, (1992); McAllister *et al.*, (1994) and McSweeney *et al.*, (2001) whom confirmed that the tannins can react with microbial (both bacterial and fungal) enzymes, inhibiting their activity similar numerous articles exist on the ability of tannins to reduce the digestibility of the diet. Whoever Kumar *et al.*, (1982) stated that tannins mainly exert this effect on proteins, but they also affect other feed components to different degrees. Other result of tannin showed that the main effect on proteins is based on their ability to form hydrogen bonds that are stable between pH 3.5 and 8 (approximately). These complexes stable at rumen pH dissociate when the pH falls below 3.5 (such as in the abomasum, pH 2.5-3) or is greater than 8 (for example in the duodenum, pH 8), which explains much about the activity of tannins in the digestive tract (Mueller and McAllan, 1992; McLeod, 1974 and Mangan, 1988).

Table 1: Chemical Composition of phytobezors

Region	Sample	DM	C.P	E.E	C.F			Ash	Tannin
					C	H.C	Lignin		
El khuwi	1	98.12	8.75	0.00	47.06	23.96	28.97	7.09	2.03
		98.10	8.73	0.00	47.03	23.99	28.97	7.05	2.01
	2	97.7	8.40	0.00	47.93	23.90	28.17	6.14	2.10
		97.5	8.35	0.00	47.90	23.91	28.19	6.12	2.08
	3	97.7	9.10	0.00	47.81	23.87	28.32	6.59	2.08
		97.6	9.07	0.00	47.77	23.88	28.35	6.54	2.06
Abuzabad	4	98.12	8.40	0.00	47.65	23.92	28.43	6.70	1.98
		98.09	8.38	0.00	47.70	23.90	28.40	6.66	1.99
	5	97.52	8.55	0.00	47.38	23.95	28.67	7.38	2.12
		97.4	8.52	0.00	47.33	23.97	28.70	7.34	2.10
	6	97.4	8.67	0.00	47.70	23.90	28.70	6.46	2.09
		97.4	8.60	0.00	47.65	23.92	28.67	6.41	2.06
Ghebaish	7	97.16	8.73	0.00	47.77	23.88	28.35	5.84	2.07
		97.10	8.70	0.00	47.81	23.87	28.32	5.81	2.04
	8	97.6	8.55	0.00	47.03	23.99	28.97	7.01	2.03
		97.5	8.49	0.00	47.06	23.96	28.97	7.00	2.06
	9	97.3	9.05	0.00	47.90	23.91	28.19	7.04	2.07
		97.2	9.01	0.00	47.93	23.90	28.17	7.02	2.05

DM: dry mater, C.P: crude protein, E.E: ether extraction, C.F: crude fibre , C: cellulose, H.C.: hemicelluloses

Table 2: Chemical composition of the plants (*Tabar*)

Plant	DM%	C.P%	E.E%	C.F%			ASH%	Tannin%
				C	H.C	Lignin		
<i>Ipomoea cordofana</i>	95.92	10.50	0.64	41.86	13.96	12.98	7.90	0.00
<i>Merrimia emarginata</i>	93.86	10.15	0.57	15.86	10.44	15.05	7.19	0.04
<i>Ipomoea emarginata</i>	93.80	10.23	0.63	16.26	10.36	15.07	7.23	0.04

DM: dry mater, C.P: crude protein, E.E: ether extraction, C.F: crude fibre, C: cellulose, H.C.: hemicelluloses

The percentage of the cellulose, hemicelluloses and lignin were of 28.9%, 12.2% and 14.7% respectively. The percentage of tannin is 0.00% in *Ipomoea cordofana*, and 0.04% in *Merrimia emarginata*. Barry and Duncan (1984); Chiquette *et al.*, (1988); Leinmüller *et al.*, (1991) and Schofield *et al.*, (2001) reported that tannins mainly exert effects on proteins, they also have effects on carbohydrates, particularly hemicellulose, cellulose, starch and pectins. For a long time, the effect of tannins on the degradation of fiber was seen as a secondary anti-nutritional effect. However, several studies have shown that fiber degradation in the rumen can be drastically reduced in animals that consume tannin-rich feeds (e.g., Barry and Duncan, 1984; McSweeney *et al.*, 2001; Hervás *et al.*, 2003). Other study about tannin reported by Wiener *et al.*, (1983) who stated that it is important to point out that intoxications caused by tannins usually only occur when animals are obliged to eat tannin-rich feed because of the lack of alternative plant sources.

CONCLUSION

Phytobezoars occurs main commonly and increased in autumn and winter because abundance of grasses and plants in the pasture. The results obtained from analysed phytobezoars showed that the bezoars contains high level of undigested fiber which may affect the formation of this herbal ball. Results also indicated that plant *Tabar* (*Ipomoea cordofana* and *Merrimia emarginata*) is number one suspected plants that caused incidence of phytobezoars.

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