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Prevalence of Sub-Clinical Ketosis in Goats of Guwahati, Assam

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Abstract: Objective of the present study was to know the prevalence of sub-clinical ketosis in goats of Guwahati and nearby area of Assam. Blood samples from pregnant and lactating goats were collected to measure ketone and glucose level with the help of ketone meter and commercially available kit respectively for classifying animal as ketotic or non-ketotic. Goats having blood ketone (β-hydroxybutyrate) >0.4 mmol L^{-1} and glucose <30 mg dL^{-1} were considered positive for sub-clinical ketosis. The overall prevalence was 14.29%. Higher prevalence was recorded during pregnancy (15.48%) than lactation (10.91%). During pregnancy higher prevalence was found during winter (22.97%) than monsoon (8.64%). During lactation higher prevalence was found during post-monsoon (12.50%) than pre-monsoon (9.68%). The highest prevalence was observed in goats of 3-4 year (36.11%). The prevalence of sub-clinical ketosis was found to be highest in Beetal (58.33%). Sub-clinical ketosis was recorded mostly in pregnant animals than lactating animals.

Key words: Goat, sub-clinical ketosis, pregnancy, lactation, prevalence

INTRODUCTION

Goat is one of the oldest domesticated animals. It is a multifunctional animal that forms an important component of livestock industry. India possesses not only numerous breeds and varieties of goats but also having large population, 157 million and total goat population of Guwahati is 0.064 million. Out of various metabolic diseases of goats, pregnancy toxemia or ketosis or twin lamb disease is an important multi factorial disorder of energy of metabolism. Pregnancy toxaemia is one of the most common diseases affecting small ruminants in the last month of gestation. Goat appears to be more resistant than cow or ewe to ketosis. Peri-parturient metabolic diseases in ewes and does are caused by the animal to have their nutritional requirement met during late pregnancy and/or early lactation (Brozos *et al*., 2011). Sub-clinical ketosis occurs predominantly in prolific breed of goat (Smith and Sherman, 2009; Sargison, 2007). Pregnancy toxaemia is usually common in the last six week of gestation in goat (Gupta *et al*., 2008). Pregnancy ketosis is encountered in sheep and goat carrying two or more foetuses and more common than lactational ketosis (Smith and Sherman, 2009). Fatty liver occurs in conjugation with pregnancy toxaemia in ewes and does during the last month of gestation (Pugh, 2002). The disease is uncommon in maiden does because of their low fecundity and increases in prevalence up to parity three (Radostits *et al*., 2009).

Few reports of sub-clinical ketosis in goat are available worldwide including a report in India. In Uttar Pradesh, the prevalence of subclinical ketosis in goats was reported to be 10.89 % (Gupta *et al*., 2008). It was also reported that prevalence of sub clinical ketosis in goat is higher in the months of January-February in comparison to that in the months of July-August during pregnancy (Gupta *et al*., 2007, 2008). Haemato-biochemical change occurs in sub-clinical ketotis and ketotis of goat (Gupta *et al*., 2007; Ismail *et al*., 2008; Ramin *et al*., 2005; Hefnawy *et al*., 2011; Albay *et al*., 2014). Prepartum hyperketonemia can be defined in dairy goats using subsequent risk of pregnancy toxaemia or mortality during the last month of pregnancy (Dore *et al*., 2015, 2013; Souto *et al*., 2013).

A number of predisposing factors namely, type of birth, kids and dam's weight, age and breed, lactation number, feeding status, environmental stress, transportation and managemental variation have an impact on the occurrence of disease (Gupta *et al*., 2007, 2008). Sub-clinical ketosis could be detected by estimation

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of the blood glucose level and estimation of blood ketone level during pregnancy and lactation period (Smith and Sherman, 2009). Some reports of successful estimation of goat blood β-hydroxy butyrate were reported with the help of human hand-held ketone meter (Dore *et al*., 2013, 2015; Pichler *et al*., 2014). The systematic studies on subclinical ketosis in goat in this region could not be found.

The main objectives of this study were to derive seasonal, stage wise, breed wise, age wise and overall prevalence of subclinical ketosis in goat. Goats under the study were mostly from the individual family, deworming and vaccination records were available. Goats of the organized farm received a daily concentrate ration of 300 g. Goats reared by the individual family were not given any type of concentrated ration just were given rice gruel. Animal under study were either in the latter part of pregnancy, i.e., 120-135 day or in early lactation, i.e., first week of lactation and were apparently healthy with normal appetite. By using preliminary data of this study, prophylactic measures can be taken in future for protecting productive animal and economic loss.

MATERIALS AND METHODS

Study area and sample collection: The study was carried out in and around Guwahati, Assam (26.1833° N, 91.7333° E). Blood sample from the pregnant and lactating goat were collected aseptically in the early morning prior to feeding from Goat Research Station, Assam Agricultural University and private farm for 1 year (July 2014 to June 2015).

The estimation of blood β-hydoxybutyrate was done by using commercial available β-ketone meter (Nova Biomedical Pvt. Ltd). Two to three drops of blood was applied to end strip of the β-ketone meter. The concentration of β-hydroxybutyrate was read and display on screen of the devices. Results were expressed in mmol/l.

The estimation of blood glucose was carried out by commercially available kit (Aspen Laboratories). Results were expressed in mg/dl.

Meterological data based on distribution of season in a year: The whole study was conducted for a complete year comprising of four seasons according to the Meteorological Research Centre, Govt. of India, Guwahati-14. The seasons are as follows:

- Pre-Monsoon season (March, April and May)
- Monsoon season (June, July, August and September)
- Post-Monsoon season (October and November) and
- Winter Season (December, January and February)

Statistical analysis: All the data obtained were subjected to standard statistical procedures using Split Plot (repeated over time) design and with the help of software viz., SPSS 15.0 and jmp 10.0 of SAS 9.3. Software available at Biostatistics Unit, CVSc, Khanapara under NAIP (Comp-1), ICAR, Govt. of India.

RESULTS AND DISCUSSION

Goats having blood β-hydoxybutyrate level >0.4 mmol L^{-1} and blood glucose level <30 mg dL^{-1} were considered positive for sub-clinical ketosis (Pugh, 2002). A total of 210 samples were screened of which 30 were found to be positive for sub-clinical ketosis (14.29%). (Table 1).

Seasonal prevalence: During pregnancy higher prevalence was found during winter than monsoon. During lactation higher prevalence was found during post-monsoon than pre-monsoon (Table 2). In the present investigation, the variation in prevalence rate of sub-clinical ketosis was found between seasons. The prevalence of sub-clinical ketosis was found to be higher in Winter, i.e., from December to February than in monsoon, i.e., June to September. During lactation, higher prevalence was found during post-monsoon season, i.e., October and November than Pre-monsoon season, i.e., March to May. Prevalence rate of sub-clinical ketosis in pregnant goats in first kidding season was reported to be 40.54 and 15.63% in the months of January and February, while in second kidding season, it was found to be 10.53% and 9.09% in the months of July and August and in lactating goats, 10.12 and 6.85% in the months of September and March, respectively as reported by Gupta *et al*. (2007, 2008). Higher prevalence in Winter season during pregnancy may be attributed to the influence of cold climatic condition, reduced grazing time and scarcity of pasture feed that might have caused scarcity of carbohydrate leading to sub-clinical ketosis. Almost similar prevalence during both the

Table 1: Prevalane of sub-clinical ketosis in goats in and around guwahati

Stage of animal	Total No. of goat screened	No. of goat positive	Prevalence (%)
Pregnant	155	24	15.48
Lactation	55	6	10.91
Total	210	30	14.29

Table 2: Season-wise prevalance of sub-clinical ketosis in goats

Stages	Seasson	No. of goats examined	No. of goats affected	Prevalence (%)
Pregnant	Winter	74	17	22.97
	Monsoon	81	7	8.64
Lactation	Post monsoon	24	3	12.50
	Pre monsoon	31	3	9.68
Total		210	30	14.29

Table 3: Age-wise prevalence of sub-clinical ketosis in goats

Age group (years)	No. of goats examined	No. of goats affected	Prevalence (%)
1-2	40	3	7.50
2-3	70	8	11.43
3-4	36	13	36.11
4-5	29	3	10.34
5-6	35	3	8.57
Total	210	30	14.29

Table 4: Breed-wise prevalence of sub-clinical ketosis in goats

Breeds	No. of goats examined	No. of goats affected	Prevalence (%)
Local goat	140	15	10.71
Crossbred of local and beetal	58	8	13.79
Beetal	12	7	58.33
Total	210	30	14.29

season of lactation was also reported by Gupta *et al.* (2007, 2008). This finding may be attributed to decreased climatic stress and sufficient amount of green pasture avaibility.

Age-wise prevalence: The highest prevalence was observed in goats of 3-4 year (Table 3). The higher prevalence of subclinical ketosis in goat in the age group of 3-4 year may be due to increase fecundity and production (Radostits *et al.*, 2009). Similar result were also reported by Gupta *et al.* (2007).

Breed-wise prevalence: The prevalence of sub-clinical ketosis was found to be highest in Beetal followed by cross bred and then local goat (Table 4). Higher prevalence in Beetal is due to heavier size and higher milk production ability and the number of Beetal included in the study was also less. Similar view in regard to higher prevalence rate of sub-clinical ketosis was reported in heavier sized and high milk producing breed of goats by Gupta *et al.* (2007, 2008). Smith and Sherman (2009) reported that pregnancy toxemia commonly occurs in the prolific breeds.

Overall prevalence: Over all prevalence was found to be 14.29% (out of 210 goats screened 30 were positive). Higher prevalence was found during pregnancy than lactation. Earlier worker has reported 10.89% prevalence rate of sub-clinical in Northern India, Gupta *et al.* (2007, 2008). Overall prevalence rate was higher in this region may be because most of the animal under study were reared by individual families not practising scientific rearing of goats. These were let loose for grazing in the general field which contains insufficient grasses. The balanced diet or concentrate was not given and were given tree leaves during rainy season and had no access to grass field in such season. Though such animals maintained their normal health in general but with such feeding of energy deficient feeds during late gestation and during lactation cannot be ignored making them susceptible to sub-clinical ketosis in a considerable number of animals with twin or single pregnancy.

CONCLUSION

Though good management practices established, this study revealed the higher prevalence rate of sub-clinical ketosis in goat in this region of country. Negative energy balance increases during the winter when the animal is pregnant. This occurred because scarcity of green grass, diminished grazing period the demand for energy increases at the time of pregnancy and lactation.

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