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Field investigation of pregnant does for pregnancy toxaemia

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Abstract
Periparturient mortality in goats have a great economic impact on the livelihood of marginal farmer. Pregnancy toxaemia in goats occur as a result of negative energy balance consequent to enhanced requirement for glucose by the developing foetuses in the last trimester (last 6 to 4 weeks) of gestation. The present study was carried out at Veterinary University Peripheral Hospital, Madhavaram Milk Colony, Chennai – 51, in 52 pregnant does (in their last trimester of gestation) brought with the history of off feed during the years 2016 and 2018. The pregnant does were subjected to blood β-hydroxybutyric acid (BHBA) concentration determination using a handheld portable blood ketone and glucose monitoring system and qualitative urinalysis using urine dip stick. Early reliable indicators for subclinical form of pregnancy toxaemia under field conditions include presence of ketone body in urine and blood β-hydroxybutyric acid concentration (≥ 0.8 mmol/L).

Keywords: ketone meter, urine dip stick, pregnancy toxaemia, goats, field condition

Introduction
Goat rearing play a pivotal role in the economics of farming community wherein they are reared for meat, milk and hide. Periparturient mortality in goats have a great economic impact on the livelihood of marginal farmers. Pregnancy toxemia also called as gestational ketosis, twin-lamb disease, ketosis of pregnancy, kid disease, lambing sickness, kidding paralysis and lambing or kidding ketosis (Rook, 2000) [10] is a metabolic disease affecting pregnant ewes and does after a period of negative energy balance (NEB) and impaired gluconeogenesis (Lima *et al.*, 2012) [8]. Pregnancy toxaemia normally occur in the last trimester (last 6 to 4 weeks) of gestation in goat and sheep as a result of negative energy balance consequent to enhanced requirement for glucose by the developing foetuses (Schlumbohm and Harmeyer, 2008) [11]. Risk factors include multiple fetuses, poor quality of ingested energy, decreased dietary energy level, genetic factors, obesity, lack of good body condition, high parasitic load, stress factors and multiple pregnancies (Hefnawy *et al.*, 2011) [6]. The disease is characterized by hypoglycaemia, low concentrations of hepatic glycogen, increased fat catabolism leading to high plasma concentration of non-esterified fatty acids (NEFA), high concentrations of ketone bodies (hyperketonaemia) and high mortality rate (Van Saun, 2000) [12]. The mortality rates can attain 100% even with the initiation of treatment due to severe irreversible organ damage. Hence field investigation for reliable indicators of negative energy balance in the primary stage of the disease are the need of the hour for better herd health management.

Materials and Methods
The present study was carried out at Veterinary University Peripheral Hospital, Madhavaram Milk Colony, Chennai and pregnant goats especially in their last 6 weeks of gestation brought with the history of off feed were screened for blood β-hydroxybutyric acid (BHBA) concentration using a hand held portable blood ketone meter (Free Style Optium Neo H – Abbott ®) (Fig. 1) and (Fig. 2) and qualitative urinalysis using urine dip stick (Multistix 10 SG reagent strips -Siemens Healthcare Private Limited, India) (Fig. 3). for the presence of ketone bodies. The pregnant does were radiographed for conformation of fetal numbers.

Blood β-hydroxybutyric acid (BHBA) concentration: The blood β-hydroxybutyric acid (BHBA) concentration were determined using a handheld portable human blood ketone monitoring system (Free Style Optium Neo H – Abbott ®) as suggested by Dore *et al.* (2013) [3] and Pichler *et al.* (2014) [9]. The ear vein was punctured with asterile 23 G needle and the

ketone meter attached with blood ketone strip was directed towards the drop of blood (Fig. 4). Sufficient quantity of blood droplet was absorbed at the tip of the strip by capillary action and within 10 seconds the blood β-hydroxybutyric acid (BHBA) concentration was displayed on to the digital meter.

Urine sample: Urine samples were obtained after a voluntary micturition or induced by covering the nose and the mouth of does for a few seconds (Albay *et al.*, 2014) [1]. The urine samples were analyzed using Multistix 10 SG reagent strips (Siemens Healthcare Private Limited, India) for the qualitative determination of ketone bodies, glucose and protein (Emam and Galhoom, 2008; Gurdogan *et al.*, 2014) [4, 5]. The test strips were dipped into the collected urine and immediately compared with the colour chart provided on the label of the urine test strip container to determine the presence of ketone, glucose and protein in the urine based on the clinical condition of pregnancy toxaemia (Fig 5).

Results and Discussion

In the present study the β – hydroxybutyric acid (BHBA) level in blood of non pregnant does ranged between 0.2 mmol/l to 0.6 mmol/l (Fig. 6), between 0.9 mmol/l to 1.5 mmol/l in subclinical form (Fig.7) and between 2.1 mmol/l to 7.9 mmol/l (Fig. 8). With respect to urinalysis presence of ketone bodies in urine indicated by colour change in the dip stick were observed in the subclinical form (Fig. 9) while presence of protein in urine indicated by colour change in the dip stick were observed in the clinical form of pregnancy toxaemic does (Fig. 10).

Andrews (1997) [7] reported β – hydroxybutyric acid (BHBA) level in different conditions namely, normal does (< 0.8 mmol/l), subclinical form of pregnancy toxaemia (0.8 – 1.6 mmol/l) and clinical form of pregnancy toxaemia (> 1.6 mmol/l).

Emam and Galhoom (2008) [4] reported qualitative analysis of urine in pregnancy toxaemic goats wherein the concentrations of ketone bodies in urine varied according to the degree of disease. Glucosuria was detected in mild and severe cases, while proteinuria was present only in severe pregnancy toxemic does which may be attributed to renal insufficiency and albuminuria.

The morbidity and mortality rates can reach 20% and 80% respectively during severe outbreaks (Van Saun, 2000) [12] thereby having a significant economic impact on goat and sheep enterprises due to the loss of fetuses, veterinary cost and loss of the dam. Prognosis of pregnancy toxemia is generally very poor and hence early detection is essential for its successful treatment, both to save the life of the dam and the fetuses (Ismail *et al.*, 2008) [7].

Fig 1: Portable Blood ketone monitoring system (Free Style Optium Neo H – Abbott ®)

Fig 2: Blood β - Ketone Test Strips

Fig 3: Urinalysis - Multistix 10SG reagent strip (Siemens Healthcare Pvt. Ltd.)

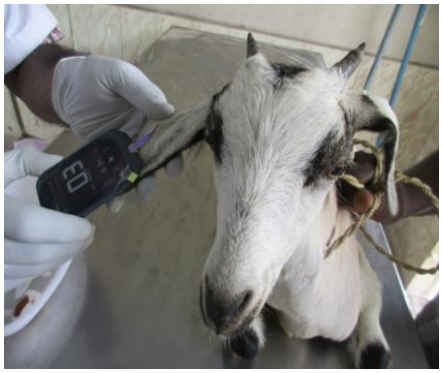

Fig 4: Recording of blood β – hydroxybutyric acid concentration using portable blood ketone monitoring system

Fig 5: Urinalysis using Multistix 10SG reagent strip

Fig 6: Blood β – hydroxybutyric acid concentration in healthy non pregnant does

Fig 7: Blood β – hydroxybutyric acid concentration in Sub Clinical pregnancy Toxaemic group

Fig 8: Blood β – hydroxybutyric acid concentration in Clinical Pregnancy Toxaemic group

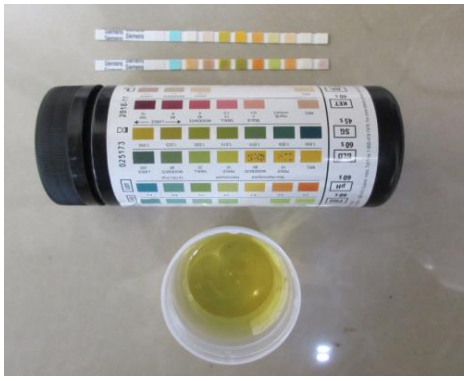

Fig 9: Urinalysis using Multistix 10SG reagent strip in sub clinical pregnancy toxaemic group

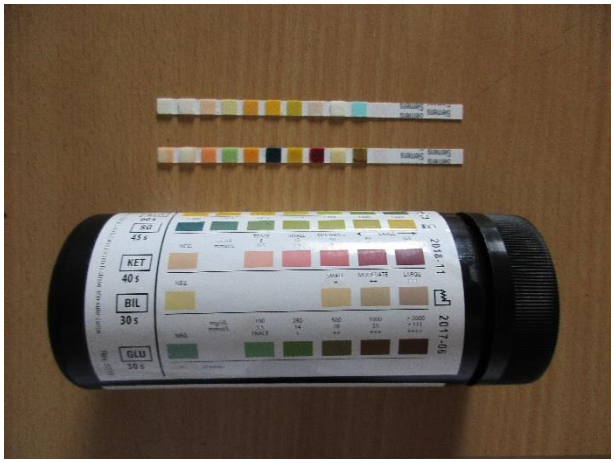

Fig 10

Conclusion

Early indicators of subclinical form of pregnancy toxaemia in does include the presence of ketone body in urine and blood β-hydroxybutyric acid concentration (≥ 0.8 mmol/l). Hence the determination of blood β-hydroxybutyric acid (BHBA) concentration using a hand held portable blood ketone meter and qualitative urinalysis using urine dip stick for the presence of ketone bodies are reliable indicators in the diagnosis of subclinical form of pregnancy toxaemia under field condition.

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