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Popular Article

Approaches to Clinical Management of Ketosis in Goats

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Abstract

Ketosis or pregnancy toxemia is a metabolic disease of sheep and goats occurs in later stage of pregnancy. The clinical management of ketosis in goats involves the diagnosis, treatment, and prevention of the condition. Diagnosis can be done by measuring the blood ketone bodies, glucose and other biochemical parameters levels using a handheld device or a laboratory test and urine analysis using urine dip strips. Treatment aims to restore the glucose levels. This can be achieved by administering intravenous fluids containing glucose, Oral administration of glycerol, propylene glycol, or fructose can also help to increase the glucose levels. Additionally, supportive therapy such as dexamethasone, vitamin B complex. Phytotherapy can be use in treatment. Prevention of ketosis in goats requires proper nutrition and management of pregnant and lactating goats. Adequate energy intake, especially during the last trimester with balanced diet that contains sufficient protein, minerals, and vitamins is also important to maintain the health and productivity of goats.

Keywords: ketosis, goats, last trimester, clinical management, ketone bodies, Phytotherapy

Introduction

Goat is very important species of livestock specially in developing countries like India. According to 20th livestock census total Goat Population in the country is 148.88 million during 2019. Total Goat has increased by 10.14% over previous Livestock Census (2012). About 27.8% of the total livestock is contributed by goats. Goats contribute highly to agrarian economy, especially in low economical areas for dairy and crop farming and playing an important role in livelihood of small and marginal farmers. Ketosis also known as Pregnancy toxemia (PT) in goat is a metabolic disease in sheep and goats caused by negative energy balance in last trimester of Pregnancy. It is characterized by dullness, anorexia, grinding of teeth, torticollis, salivation etc. Ketosis is a condition consist of elevated concentration of ketone bodies in body due to incomplete

metabolization of fatty acids occurs during times of increased mobilization of fats during last trimester or after delivery. Risk factors include multiple number of fetuses, poor quality and low energy feed, genetic factors, obesity, lack of good body condition, high parasitic load, stress factors and multiple pregnancies (Hefnawy *et al.*, 2011). Mortality can be up to 100% due to irreversible organ damage. The disease has a significant economic impact on goat enterprises due to loss of goat and fetus. ketosis directly affect milk yield and related problems in animal. Ample amount of work had been done on ketosis in western and European countries compare to India where literature available in scattered manner may be due to pasture practices, lack of diagnosis and unavailability of facilities in most of rural and remote areas. Keeping this in the view there is requirement for conducting investigation on this wide and obscure field particularly in tropical countries like India.

2. Clinical Management

2.1. Diagnosis

Blood β -hydroxybutyric acid concentration (BHBA): Frequently used diagnostic approach. The blood β -hydroxybutyric acid (BHBA) can be determine by portable human blood ketone meter by drawing blood from ear vein (Pichler *et al.*, 2014) 0.8mmol/L is threshold for pregnancy toxemia up to 1.6mmol/L (Ismail *et al.*, 2008). Raising blood BHBA levels in pregnancy toxemia may be related to disruptions in the metabolism of fat and carbohydrates, which in turn promote tissue fat lipolysis and release of long-chain fatty acids, which are then transformed by hepatocytes into ketone bodies, (Rook, 2000)

Hematology: In case of ketosis, there is slight increase in values of hemoglobin, packed cell volume, red blood cells due to hemoconcentration and dehydration (Hefnawy *et al.*, 2011) Increased in lipolysis, ketogenesis and hypoglycemia in pregnancy toxemia which result into erythropenia, leukocytosis, lymphocytosis this could be due to increase in glucocorticosteroids (cortisol) in circulation (Abba *et al.*, 2015)

Serum biochemistry: Blood glucose can be determined by using digital glucometer. Blood glucose concentration decrease in goats with ketosis due to depletion of glycogen from liver. (Rani *et al.*, 2015). Hyperglycemia found in pregnancy toxemia with fetal death (Lima *et al.*, 2012). Decrease in serum calcium and serum total protein is due to liver damage (Aly and Elshahawy, 2016). Increase in BUN and creatinine denote severe kidney dysfunction due to acidosis resulting from higher number ketone bodies in circulation. Increase in value of Aspartate Aminotransferase (AST) and Gamma Glutamyltransferase (GGT) due to damage of liver parenchyma (Aly and



Elshahawy, 2016).

Urine analysis: Urine sample obtained from simple micturition analyze using reagent strips for detection of ketone bodies, glucose and protein in urine Urine analysis shows aciduria and ketonuria due to increased glucose demand resulting in the mobilization of long chain fatty acids from adipose tissue causing rise in noesterified fatty acids (NEFA) and ketone bodies in circulation which further descend down into urine (Albay *et al.*, 2014).

Radiography and Ultrasonography: Radiography helps in detection of pregnancy and fetal numbers. Ultrasonography shows changes in liver parenchyma having more echogenicity as compare to normal liver parenchyma.

2.2. Therapy

Abba *et al.*, (2015) reported to use Dextrose in treatment of pregnancy toxemia. Olfati *et al.*, (2013) used oral administration of glycerol or propylene glycol, intravenous glucose, intravenous 5% dextrose, 50% dextrose bolus and vitamin B complex. In advance stages of pregnancy, caesarean section is recommended to save does which are not responding to treatment due high glucose demand or in case of fetal death (Lima *et al.*, 2012). Cal-Pereyra *et al.*, (2015) used hypertonic glucose and glycerol as alternative to treat early stage pregnancy toxemia. Yadav *et al.*, (2018) use fructose 10%, dexamethasone and vitamin B for treatment of pregnancy toxemia.

Phytotherapy: *Phyllanthus niruri* (Amla) is very helpful in ketosis for correcting and regulating liver function (Vaidya, 2002). *Asparagus racemosus* (Shatavari) consisting of glucogenic property is beneficial in ketosis by increasing blood glucose level (Kumar *et al.*, 2010). Yadav *et al.*, (2018) use A/KPC/10 (Ketoroak by Ayurvet Limited, HP) which consist of *Tephrosia purpuria* (Sarpunkha) and *Asparagus racemosus* (Shatavari) which are containing anti-oxidant and free radical scavenging properties and glucogenic properties respectively.

Prevention

Prevention of ketosis in goats requires proper nutrition and management of pregnant and lactating goats. Adequate energy intake, especially during the last trimester of pregnancy and the peak of lactation, is essential to prevent the excessive breakdown of body fat. Feeding a balanced diet that contains sufficient protein, minerals, and vitamins is also important to maintain the health and productivity of goats. Furthermore, stress factors such as overcrowding, transportation, and adverse weather conditions should be minimized to avoid triggering ketosis. Feeding 0.5-1 kg of grains which are good source of available energy with high quality hay during last week of pregnancy will help in preventing pregnancy toxemia in ewe (Crnkic and Hodzic,



2012).Gordan(2012) suggested for feeding pregnant ewes with good quality hay and grain supplementation (begins with about 0.5lbs per day and increase to 1.5-2.0lbs per head per day until the time of parturition) with avoiding abrupt feed changes, providing adequate feeder space, monitoring and controlling parasitism for prevention pregnancy toxemia.The cracked corn was administered to sheep affected by sub-clinical pregnancy toxemia were able to restore normal concentration of glucose and β -hydroxybutyrate in blood within 60 hours of treatment(Cal-Pereyra *et al.*, 2015).

Conclusion

Ketosis in goat can be clinically managed by early diagnosis, efficient treatment and appropriate preventive measures. Diagnosis plays pivotal role in fate of disease and selection of suitable treatment and preventive measures. Diagnosis can be done easily by using digital ketone meter and urine strips and correlating results with history and clinical signs of susceptible dam. Treatment can be done according to severity of disease. Treatment can be done using glucose precursors like glycerol and propylene glycol, dextrose and fructose to conquer negative energy balance with supportive therapy consist of vitamin B and dexamethasone. Various Phyto therapeutic agents which are easily available can be use in treatment due to their glucogenic and oxidative properties. Preventive measures such as feeding high-energy feeds and reducing stress factors can help prevent further complications of the disease.

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