STUDIES ON CLINICAL AND SUB-CLINICAL KETOSIS IN GIR COWS

ABSTRACT

*Keywords*: Gir cattle, sub-clinical ketosis, non-esterified fatty acids, β-Hydroxybutyric acid, ketosis, somatic cell count, fat to protein ratio.

Dairying is a vital source of income for millions of rural families and cattle are mostly raised as dairy animals for milk and other dairy products in India. Gir is a famous high yielding milch cattle breed of Saurashtra region of Gujarat. Ketosis is a common metabolic disease of high yielding dairy cows, mostly in early lactation characterized by increased levels of ketone bodies in blood, urine and milk. Ketosis may have a clinical or subclinical presentation in dairy cows. Besides production losses ketotic animals also have higher risk for other secondary diseases like displaced abomasum, mastitis, milk fever, hypomagnesaemia and impaired reproductive performance. Serum BHBA is considered as gold standard but is expensive test especially for screening herd for sub-clinical ketosis. Early and economic detection of the disease is warranted. Hence the present study was designed with the objectives to detect ketone bodies in serum, milk and urine of Gir cattle during early lactation, to study association of ketosis with haematological and antioxidant parameters and finally to develop a cost effective and sensitive method for detection of ketosis in Gir cattle. The present study was undertaken with prior approval by IAEC working under the CPCSEA at College of Veterinary Science and Animal Husbandry, Junagadh during year 2017-18 on sixty Gir cows in early lactation (3-5 weeks). Blood, milk and urine was collected in their respective vials for the study.

The animals were categorized in 3 groups based on serum BHBA concentration of Gir cows during 3-5 weeks of lactation, namely, healthy (< 1.2 mM), sub-clinical ketotic (1.2-3.0 mM) and clinical ketotic (> 3.0 mM). The incidence of sub-clinical and clinical ketosis was 20% and 13%, respectively. All hematological
parameters like Hb, PCV, TEC, TLC, DLC, MCV, MCH and MCHC were estimated using automated hematology analyzer and found in normal physiological range in healthy, sub-clinical ketotic and clinical ketotic animals. ALT, LDL, GSH and Protein prolifke including; total protein, albumin, globulin, albumin to globulin ratio were found non-significant among the groups. The body condition score, serum glucose, cholesterol and HDL levels were found significantly decreased whereas AST, GGT, NEFA, triglycerides and catalase levels were found significantly increased in ketotic cows compared to healthy cows. Somatic cell count and fat to protein ratio in the milk of Gir cows were significantly increased in clinical ketotic animals compared to healthy. A solid phase single reagent test has been developed and found more sensitive than Rothera’s or Ross test for detection of sub-clinical ketosis qualitatively. Quantitative detection of ketone bodies in urine has been achieved by standardization of a modified nitroprusside test with a highly significant correlation with serum BHBA.

In conclusion, the hematological parameters and protein profile are not associated with ketosis. The body condition score, cholesterol, HDL and glucose are negatively correlated and Triglycerides, somatic cell count, fat to protein ratio, AST, GGT, NEFA and urine ketone bodies are positively correlated with serum BHBA. Hence, these parameters can be used to screen the animals for ketosis. Solid phase single reagent test is an economical and sensitive alternative to other tests for detection of ketosis in animals. Modified nitroprusside test is an accurate quantitative test to detect and differentiate sub-clinical ketosis with clinical ketosis.