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# Biochemical Alterations in Subclinical Ketosis in Cattle

**Mukesh Nigam, P. C. Shukla, Amita Tiwari, R. P. S. Baghel**

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**Abstract** Sub clinical ketosis is defined as elevated concentrations of circulating ketone bodies in absence of clinical signs. It could be identified by establishing a biochemical examination to detect the presence of hypoglycaemia, ketonemia, ketonurea and ketone bodies in milk. Thus, the present study was conducted with the aim to estimate blood glucose, blood ketone bodies, milk and urine pH in animals suffering from subclinical ketosis. Results revealed lowered glucose levels, higher blood ketone bodies and lowered milk and urine pH in affected animals.

**Keywords** Subclinical ketosis, Glucose, Ketone bodies.

## Introduction

Most of the animals in developing countries including India are fed on agriculture by-products and low quality crop residues, which have got inherent low nutritive value and digestibility. The shortage of feed resources coupled with their poor nutritive value is of major concern to low productivity of dairy animals. Among metabolic diseases, subclinical ketosis holds a significant role in reducing the production potential of milch animals. Sub clinical ketosis is defined as elevated concentrations of circulating ketone bodies in absence of clinical signs. A threshold value of 1400 µmol/L beta hydroxyl butyric acid (BHBA) in blood has been described to distinguish between cows with and without sub clinical ketosis [1]. The ketosis could be identified by establishing a biochemical examination to detect the presence of hypoglycaemia, ketonemia, ketonurea and ketone bodies in milk. Thus, the present study was planned to know the blood biochemical parameters as well as presence of ketone bodies in urine and milk in the cattle affected from subclinical ketosis.

## Materials and Methods

The study was conducted in six healthy animals and six animals suffering from subclinical ketosis. The confirmation of the ketosis was done using Rothera's test in milk and urine of the suspected animals. For the estimation of various biochemical parameters, 5 ml of blood in heparinized vials, 10 ml of mid stream urine and 5 ml of milk was collected. Blood glucose level (mg/dl) was estimated by glucometer. The blood ketones bodies were estimated by the standard method [2]. The pH of freshly collected milk and urine samples was measured by using pH meter. The Rothera's test for qualitative assessment of ketones in the urine and milk was performed as described by standard method [3]. Data collected was subjected to

M. Nigam, P. C. Shukla, A. Tiwari*, R. P. S. Baghel[1]
[1]Dean, College of Veterinary Science and Animal Husbandry, Jabalpur, India
Department of Veterinary Medicine, College of Veterinary Science and Animal Husbandry, Jabalpur, India
e-mail: amitasandhu@gmail.com
*Correspondence

**Table 1.** Different parameters in healthy and subclinical ketotic animals. Values with different superscripts between the column (upper case) differed significantly ($p < 0.05$).

| Sl. No. | Parameter | Healthy control | Animal suffering from subclinical ketosis |
|---|---|---|---|
| 1 | Blood glucose (mg/dl) | $65.5\pm0.17^{A}$ | $36.13\pm2.22^{B}$ |
| 2. | Blood ketone bodies (mg/dl) | $2.52\pm0.17^{A}$ | $9.69\pm0.11^{B}$ |
| 3. | Urine pH | $8.15\pm0.2^{A}$ | $6.78\pm0.07^{B}$ |
| 4. | Milk pH | $6.92\pm0.06^{A}$ | $6.43\pm0.14^{B}$ |

the statistical analysis as per the standard methods [4].

## Results and Discussion

Six animals which were suspected of subclinical ketosis showed positive results of Rothera's test and the animals chosen in the group of healthy control were negative for Rothera's test.

The mean values of blood glucose level were significantly lower in animals suffering from subclinical ketosis as compared to healthy control group. The mean values of blood ketone bodies were significantly higher in all the affected animals. The mean value of milk pH and urine pH was significantly lower in affected animals as compared to control group (Table 1).

In the present study, the blood glucose levels were lower in the affected animals. Similar findings were observed by other scientists [5]. This might be due to the fact that lactation possess a great demand for glucose as further glycerol has to be synthesized for production of milk fat. So the high yielding cows suffer from a physiological hypoglycemia if adequate balanced energetic diet is not provided during this period.

Ketones bodies are one of the important metabolic end products of free fatty acid metabolism and they are increased due to diversion of carbohydrate during lactation for milk production. The findings of the present investigation showed significantly higher level of blood ketone bodies in all affected animals as compared to healthy control group.

Milk and urine pH was found to be decreased significantly. The reduction in milk and urine alkalinity was due to the presence of ketone bodies in these fluids which increases the acidity [6].

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