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Technical Assistance:
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Telephone.: +359 42 699446
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Clinical and haematological studies on subclinical lactational ketosis in dairy goats

R. Binev*, V. Marutsova1, V. Radev2

1Department of Internal Diseases, Faculty of Veterinary Medicine, Trakia University, 6000 Stara Zagora, Bulgaria
2Department of Animal Morphology, Physiology and Nutrition, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria

Abstract. The most common metabolic diseases in small ruminants are peri-parturient hypocalcemia, pregnancy toxemia (ketosis), rumen acidosis and hypomagnesaemia. While pregnancy toxemia is well known medical condition, lactational ketosis is almost unknown in small ruminant practice. A total of 58 dairy goats, up to day 30 of lactation were included in the study. Clinical examination (rectal temperature, heart rate, respiratory rates, rumen contractions and inspection of conjunctival mucus membrane), BCS and determining the values of β-hydroxybutyrate was performed on all goats. Animals were divided into two groups, control one consists of 30 goats (BCS > 2.0 and concentration of β-hydroxybutyrate < 0.8 mmol/l), and second group consists of 28 goats with subclinical lactational ketosis (BCS < 2.0 and concentration of β-hydroxybutyrate ≥ 0.8 mmol/l). Blood samples were obtained and analyzed for red blood cell (RBC, T/l), haemoglobin (HGB, g/l), haematocrit (HCT, %), mean corpuscular volume (MCV, fl), mean corpuscular haemoglobin (MCH, pg), mean corpuscular haemoglobin concentration (MCHC, g/l), white blood cell counts (WBC, G/l), lymphocytes (LYM, %), monocytes (MON, %), granulocytes (GRA, %), red blood cell distribution width (RDW, %) and red blood cell distribution width absolute (RDWa, fl). From our study, no changes were found in the examined clinical signs. Haematologic analysis showed changes in the quantities of erythrocytes, while the other parameters (HGB, HCT, MCV, MCH, MCHC, WBC, LYM, MON, GRA, RDW and RDWa) fluctuated around control values.

Keywords: negative energy balance, subclinical ketosis, β-hydroxybutyrate, dairy goats

Introduction

Metabolic diseases occupy a substantial part of ruminant pathology. In dairy livestock husbandry, bovine ketosis, as well as pregnancy toxicsis (gestational ketosis) in small ruminants, are the most important health problems. So far, some aspects of cause-and-effect relationships between negative energy balance in the immediate precalving period and disorders as ketosis, abomasal dislocation, retention of placenta, milk fever, metritis and mastitis in parturient dairy cows have been elucidated (Dohoo et al., 1983; Duffield et al., 2008; LeBlanc, 2010). The last 10 – 15 years have witnessed an increased interest to subclinical forms of diseases related to negative energy balance in dairy cows, sheep and goats (Herdt, 2000; Suthar et al., 2013). The significance of subclinical ketosis for health and economic results is confirmed by the average incidence of 43% of this disorder among dairy cattle in the USA (McArt et al., 2012). The total prevalence of subclinical ketosis in the USA varies from 8.9 to 43% in the different reports (Dohoo et al., 1983; Duffield et al., 1998; McArt et al., 2012). Investigations conducted in 10 European countries between May-October 2011 established a prevalence of 21.8% (from 11.2% to 36.6%) (Suthar et al., 2013). On the background of the considerable body of information on subclinical ketosis in dairy cows, the data on this disease in small ruminants are mainly on toxicsis during pregnancy and at a lesser extent, on lactational ketosis, observed after the parturition.

Literature data about the prevalence of ketosis among sheep and goats are rather few. Over a 12-year period (1992 – 2004) sheep affected by pregnancy toxicsis were between 6.5% and 37% (Al-Mujalli, 2008). Gupta et al. (2008) demonstrated that subclinical ketosis prevalence in pregnant sheep was 14.86%, while the rate in lactating sheep – 13.51%. In available scientific literature, there are no reliable numeric data for morbidity rates referring both to gestational and lactational clinical and/or subclinical ketosis in goats. Subclinical ketosis is diagnosed on the basis of assay of blood β-hydroxybutyrate (BHBA), either spectrophotometrically or by means of portable electronic devices (Iwersen et al., 2009; Voyvoda and Erdogan, 2010; Panousis et al., 2012). An important tool for assessment not only of nutritional status of animals in a given population, but also detecting potential health problems in dairy cows, sheep and goats, is body condition score (BCS). BCS is a relatively simple and accessible parameter of available body reserves allowing animals to cope with states of negative energy balance, stress and nutritional deficiencies (Villaquar et al., 2012). Deviations in blood BHBA concentrations and BCS are indices of inadequate energy resources and possible occurrence of postpartum metabolic disturbances (Koyuncu and Altınışıkçı, 2012).

The purpose of the present study was to investigate the causes for appearance of clinical and subclinical lactational ketosis in high-yielding dairy goats and corresponding clinical and haematological parameters. The results could help to diagnose the condition.

Material and methods

Animals

In February 2014, two goats owned by a private owner from the Yabalkovo settlement, Dimitrovgrad municipality were referred to the Farm Animal Clinic at the Faculty of Veterinary Medicine, Stara Zagora. The animals originated from a farm with 304 purebred Saanen goats up to 3.5 years of age, out of which 174 parturient, 96 – pregnant, 7 breeding bucks and 27 young males. The average milk yield of the herd was 4.25 l/day/goat, and average offspring number – 2.3. The goats were entirely reared indoor in barns.
Clinical investigations
Rectal temperature, heart and respiratory rates, rumen contractions were measured in patients referred to the clinic as well as goats at the farm. Inspection of visible mucous coats was also performed using routine clinical diagnostic methods.

Body condition score
Body condition score was assessed using 5-point scale (1.0–5.0, 0.5 increments) (Villaqurin et al., 2012). The animals were evaluated visually, via palpation in the region of lumbar vertebrae and the sternum.

Blood sampling and analyses
Blood samples were obtained by jugular venipuncture using sterile 21G needles and vacutainers (Biomed, Bulgaria) with K$_2$EDTA – 3 ml, heparin – 5 ml, gel and clot activator – 6 ml. Blood BHBA concentrations were determined in situ using a portable Xpress-I system (Nova Biomedical, UK). Samples for CBC analysis were transported and stored at 4°C. Analysis was conducted within 2 hours after sampling. The following indices were determined: red blood cells (RBC, T/l), haemoglobin (HGB, g/l), haematocrit (HCT, l/l), mean corpuscular volume (MCV, fl), mean corpuscular haemoglobin concentration (MCHC, g/l), white blood cell counts (WBC, G/l), lymphocytes (LYM, %), monocytes (MON, %), granulocytes (GRA, %), red blood cell distribution width (RDW, %) and absolute red blood cell distribution width (RDW$a$, fl). Haematological investigations were done on an automated analyser Exigo EOS Vet (Boule Medical AB, Sweden).

Nutrition
Goats were reared entirely in indoors, offered feed twice per day and with free access to drinking water. The ration consisted of roughage: straw, beansstalks and bean hulls, alfalfa hay (nutritional content: dry matter – 84.50%, crude protein – 20.97%, crude fat – 1.23%, crude ash – 10.66%, moisture – 15.50%, digestibility – 62.85%, gas production – 223.83%, neutral detergent fibre (NDF) – 49.01%, acid detergent fibre (ADF) – 35.45%, ME, MJ/kg DM – 10.33), approximately 3 kg/animal daily, chopped, particle size 4–6 cm and pelleted concentrate feed at 4–6 kg daily and pelleted concentrate feed at 4–6 kg.

Experimental design
A total of 58 goats, 2.5–3.5 years of age, were included in the study. Lactating goats until the 30th lactation day were used. All animals underwent physical examination, BCS, blood β-hydroxybutyrate analysis. On the basis of results, goats were divided into 2 groups – ketotic and control: first group with BCS > 2.0 and blood β-hydroxybutyrate < 0.8 mmol/L (n=30) – control group; second group with BCS ≤ 2.0 and blood β-hydroxybutyrate ≥ 0.8 mmol/L (n=28) – lactational subclinical ketosis group.

Statistical analysis
Statistical analysis was done with Statistica 6.0 (Windows) software, StatSoft, Inc. (USA, 1993) and ANOVA test. Data are presented as mean ± standard deviation (SD). The level of statistically significance was p < 0.05.

Results
Physical exam did not reveal any significant changes vs control measurements. Data for rectal temperature, heart rate, respiratory rates and rumen contractions are presented in Table 1. The investigations showed that weight loss in goats was substantial at the background of preserved appetite and milk yield. Wight loss occurred between 10th and 30th postpartum days, and most the most pronounced between the 10th and the 20th days.

Mean BCS (Table 2) in goats with subclinical ketosis (group 2) was 1.36±0.36 (p<0.001) vs control goats 2.50±0.27. Average

| Table 1. Clinical parameters in control goats (Group 1) and goats with subclinical ketosis (Group 2) |
|---|---|---|
| Parameters | Group 1 | Group 2 |
| Temperature (°C) | 38.2 ± 0.01 | 38.7 ± 0.02** |
| Heart rate (bpm) | 75.4 ± 0.03 | 79.6 ± 0.01** |
| Respiratory rate (l/min) | 20.1 ± 0.01 | 23.2 ± 0.02** |
| Rumen contractions | 12.4 ± 0.02 | 11.3 ± 0.01** |

Legend: n.s.–non-significant

| Table 2. Body condition scores and blood in control goats (Group 1) and goats with subclinical ketosis (Group 2) |
|---|---|---|
| Goats | BCS | BHBA (mmoll/L) |
| Group 1 | 2.50 ± 0.27 | 0.17 ± 0.1 |
| Group 2 | 1.36 ± 0.36*** | 1.01 ± 0.32*** |

*** Level of significance, p<0.001

| Table 3. Haematological parameters in control goats (Group 1) and goats with subclinical ketosis (Group 2) |
|---|---|---|
| Parameters | Group 1 | Group 2 |
| RBC (x10$^12$/l) | 13.15 ± 0.03 | 11.18 ± 0.51* |
| HGB (g/l) | 97.00 ± 7.55 | 86.50 ± 6.56 |
| HCT (l/l) | 0.26 ± 0.05 | 0.26 ± 0.03 |
| MCV (fl) | 20.07 ± 1.30 | 20.70 ± 1.40 |
| MCH (pg) | 7.41 ± 0.45 | 8.15 ± 0.67 |
| MCHC (g/l) | 369.71 ± 3.87 | 366.28 ± 6.85 |
| WBC (x10$^3$/l) | 10.89 ± 2.75 | 11.21 ± 2.68 |
| LYM (%) | 60.87 ± 11.14 | 57.82 ± 8.47 |
| MON (%) | 5.59 ± 1.10 | 5.61 ± 0.96 |
| GRA (%) | 33.52 ± 10.38 | 36.77 ± 8.54 |
| RDW (%) | 33.14 ± 1.66 | 31.12 ± 1.03 |
| RDW$a$ (fl) | 12.03 ± 0.65 | 11.80 ± 0.91 |

*Level of significance, p<0.05
blood BHBA concentration in the group with subclinical ketosis was 1.01±0.32 mmol/l (p<0.001) whereas in control goats 0.17±0.1 mmol/l.

Haematological results in control and ketogenic goats are shown in Table 3. Statistically significant changes were detected only in RBC counts. In animals with subclinical ketosis they were lower (11.18±0.51 T/L, p<0.05) than in controls 13.15±0.03 T/L. The other studied CBC parameters (HGB, HCT, MCV, MCH, MCHC, WBC, LYM, MON, GRA, RDW and RDWa) were comparable to values in controls.

Discussion

In sheep and goats, gestational ketosis is observed during the last 6 to 4 weeks of pregnancy. The most important cause for the occurrence of this pathology is the negative energy balance consequently to enhanced requirements of developing foetuses for glucose (Van Saun, 2000; Schlumbohm and Harmeyer, 2008). As predisposing factors, the number and weight of foetuses, body condition of the dam, age, breed, number of lactation, feeding, stress factors etc. have been outlined (Hefnawy et al., 2011). The farming of dairy goats with high genetic potential for milk and evidence for the presence of subclinical ketosis are reasons for separating subclinical lactational ketosis in small ruminants from pregnancy toxiscosis.

Blood BHBA concentrations reflect the extent of oxidation of esterified fatty acids in the liver (LeBlanc, 2010), with values higher than 0.7 mmol/l regarded as indicating subclinical ketosis in goats (Rook, 2000; Ramin et al., 2007), while in sheep the range is from 0.8 to 1.6 mmol/l (Andrews, 1997). The postpartum body weight loss in high-yielding animals and BHBA concentrations from 0.8 to 1.9 mmol/l between the 10th and 30th lactation days in our study were compatible with signs of classic type 1 subclinical ketosis in dairy cows.

Recommended BCS for goats during the last third of pregnancy in the literature are from 2.5 to 3.0 (Pugh, 2002), but data about lactating goats are not available. On the basis of our experiment, we could suggest BCS over 2.0 for lactating goats, as they are accompanied with normal blood BHBA concentrations.

The established negative energy balance (NEB) results from the impossibility to satisfy the nutritional needs of the body in the period of enhanced milk production. The NEB requires an adequate nutritional regimen and purposeful prevention action in intensively reared high-producing goats. On the other side, NEB-related conditions activate the adrenal glands function (Antonov, 2000), that could explain the detected erythropaenia. The latter occurs consequently to blood redistribution in a way similar to that in “stress leukogramme” which is present when the levels of catecholamines, cortisol, endorphins etc. are increased.

We assume that the lack of changes in the colour of conjunctivae was due to the milk decrease in RBC and the lack of deviations in haemoglobin content.

The performed haematological investigations showed change in erythrocyte counts only, which were lower than the control levels. The differences in all other studied parameters (HGB, HCT, MCV, MCH, MCHC, WBC, LYM, MON, GRA, RDW and RDWa), were insignificant. Thus our data were in agreement with CBC changes reported in goats (Barakat et al., 2007) and sheep (Gupta et al., 2008).

There are literature reports about immunosuppressive effect of ketone bodies (BHBA and acetooacetate) in cows (Franklin and Young, 1991) and goats (Hefnawy et al., 2011), resulting in decreased lymphocytopoiesis and lower lymphocyte counts. In the present study, such a tendency was also present, although the alterations were statistically insignificant.

Conclusion

The observation of subclinical lactational ketosis in high-yielding dairy goats is a reason for more in-depth and extensive future investigations on lactational ketosis, including sheep as well. The health and economic impact of the disease requires more attention from farmers and practicing veterinarians for monitoring and management of this problem in modern intensive production systems. In this study, the onset of NEB and subclinical ketosis had a slight effect on haematological parameters in agreement with the subclinical course of the disease.

The monitoring of blood BHBA concentrations (≥ 0.8 mmol/l) and deviations in body condition score (≥ 2.0) are recommended as specific markers of assessment and prevention of metabolic diseases in high-yielding dairy goats.

References

Dohoo IR, Martin SW, Meek AH and Sandals WCD, 1983. Disease, production and culling in Holstein-Friesian cows. I. The data. Preventive Veterinary Medicine, 1, 321-334.


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