

Metabolites in blood serum of suckler cows during the grazing period

H. Scholz¹, P. Kühne¹, G. Heckenberger²

¹ Anhalt University of Applied Sciences, Bernburg, Germany

² State Institute for Agriculture and Horticulture Saxony-Anhalt, Iden, Germany

Introduction

The objective of the studies reported was to examine the concentration of different blood serum metabolites in grazing suckler cows during the grazing season. A large number of reference values for assessing the metabolic situation in suckler cows are derived from the values of dairy cows. The feeding and management of both cows are much differentiated. Evidently, more knowledge about metabolism of beef cattle and suckler cows is required in order to improve health and productivity in this area of livestock production under German conditions.

Material and Methods

Blood samples were taken from cows every month from the jugular vein during the grazing period from May until September (years 2015 to 2019; 3 farms) and were analysed for the content of urea (UREA), total protein (TP), β -hydroxybutyrate (BHB), cholesterol (CHOL) and the activity of aspartate aminotransferase (ASAT) and glutamate dehydrogenase (GLDH). Feed samples for chemical analysis (DM, energy and nutrition content, Dietary Cation-Anion Balance) were taken every month on each farm during the grazing season. The cows were weighted at the onset and the end of grazing period and were condition-scored by ultrasound. For statistical analysis within each farm were estimated the average concentration of blood serum every month to minimize the effect of different herd sizes. Statistical analysis took place with ANOVA with fixed effects of farms (1-3) and month (May until September) using SPSS Version 25.0. An alpha of 0.05 was used for all statistical tests.

Results

The average serum total protein (TP) concentration of the cows was 73 g/l with a large variability within the grazing period. MANNINEN et al. (2008) found a concentration of 69-76 g/l during constant winter feeding conditions of pregnant and non-pregnant suckler cows. Concentration of BHB and CHOL in blood serum of suckler cows was documented within the reference values (LKS, 2018; FÜRLL, 2004). Major deviations from the reference values are shown in the concentrations of ASAT, GLDH and UREA (table 1).

Table 1: N-efficiency of suckler cows

	BHB (mmol/l)	ASAT (U/l)	GLDH (U/l)	CHOL (mmol/l)	UREA (mmol/l)	TP (g/l)
Mean \pm s	0.4 \pm 0.1	88 \pm 16	19 \pm 17	3.4 \pm 0.6	6.9 \pm 5.1	73 \pm 8
Min-Max	0.3 - 0.6	60 - 135	7 - 105	2.2 - 4.9	2.7 - 40.0	38 - 86
reference	\leq 1.0	\leq 80	\leq 30	\geq 2.0	3.5 - 5.0	60 - 80

The serum ASAT activity was higher ($p < 0.05$) in May and June than in the other part of the grazing period.

The level of GLDH in blood serum was above the reference values only in May (figure 1). Increased activities of ASAT and GLDH can indicate a damage of the liver (FÜRLL, 2004; STAUFENBIEL, 2019).

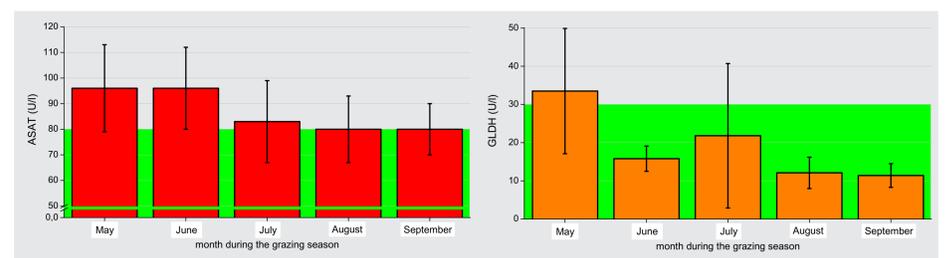


Figure 1: blood serum content of ASAT and GLDH in the average of the grazing seasons 2015-2019

Nitrogen efficiency of suckler cows is different between year, genotype, feeding and intensification of the grass land (JAHRSTEDT et al., 2017; SCHOLZ et al., 2019). In the investigation, there was a tendency to increase of blood urea concentration from onset to the end of grazing season (figure 2). If the crude protein content decreases during the grazing period, this increase can only be justified by a decrease in the milk yield and thus a lower excretion of nitrogen from the milk. For further investigation, the urine urea level should also be considered.

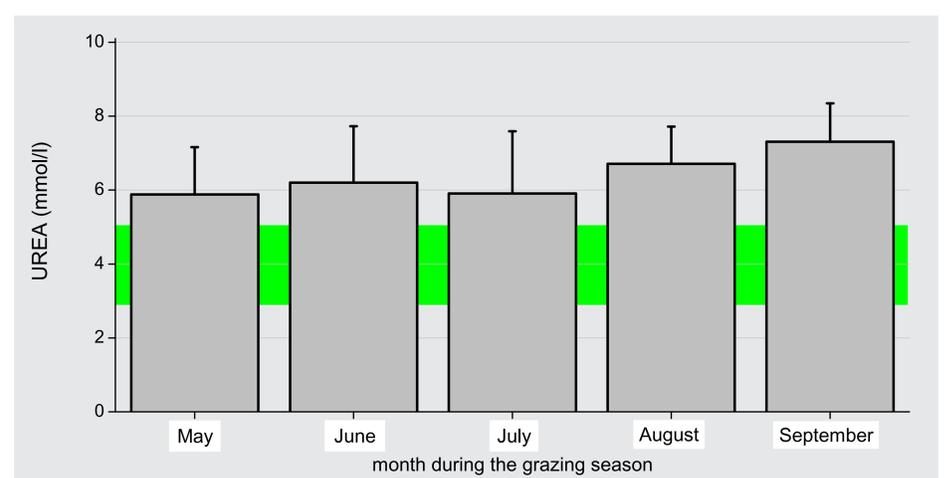


Figure 2: blood urea content in suckler cows in the average of the grazing seasons 2015-2019

Conclusions

The results indicated that at the onset of the grazing period often the high amount of crude protein ($> 18\%$) in the grass results in high activities of ASAT and GLDH (liver damage). An increase of blood urea content during the grazing season was found. Options for optimizing protein and energy supply are advisable to keep the suckler cows healthy.