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Dietary Anion-Cation Balance of Grass and Net Acid-Base Excretion in Urine of Suckler Cows

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Abstract : Dietary Anion-Cation Balance (DCAB) in grazing systems under German conditions has a tendency to decrease from May until September and often are measured DCAB lower than 100 meq per kg dry matter. Lower DCAB in grass feeding system can change the metabolic status of suckler cows and often are results in acidotic metabolism. Measurement of acid-base excretion in dairy cows has been proved to a method to evaluate the acid-base status. The hypothesis was that metabolic imbalances could be identified by urine measurement in suckler cows. The farm study was conducted during the grazing seasons 2017 and 2018 and involved 7 suckler cow farms in Germany. Suckler cows were grazing during the whole time of the investigation and had no access to other feeding components. Cows had free access to water and salt block and free access to minerals (loose). The dry matter of the grass was determined at 60 °C and were then analysed for energy and nutrient content and for the Dietary Cation-Anion Balance (DCAB). Urine was collected in 50 ml-glasses and analysed for net acid-base excretion (NSBA) and the concentration of creatinine and urea in the laboratory. Statistical analysis took place with ANOVA with fixed effects of farms (1-7), month (May until September), and number of lactations (1, 2, and ≥ 3 lactations) using SPSS Version 25.0 for windows. An alpha of 0.05 was used for all statistical tests. During the grazing periods of years 2017 and 2018, an average DCAB was observed in the grass of 167 meq per kg DM. A very high mean variation could be determined from -42 meq/kg to +439 meq/kg. Reference values in relation to DCAB were described between 150 meq and 400 meq per kg DM. It was found the high chlorine content with reduced potassium level led to this reduction in DCAB at the end of the grazing period. Between the DCAB of the grass and the NSBA in urine of suckler cows was a correlation according to PEARSON of $r = 0.478$ ($p \leq 0.001$) or after SPEARMAN of $r = 0.601$ ($p \leq 0.001$) observed. For the control of urine values of grazing suckler cows, the wide spread of the values poses a challenge of the interpretation, especially since the DCAB is unknown. The influence of several feeding components such as chlorine, sulfur, potassium, and sodium (ions for the DCAB) and dry matter feed intake during the grazing period of suckler cows should be taken into account in further research. The results obtained show that up a decrease in the DCAB is related to a decrease in NSBA in urine of suckler cows. Monitoring of metabolic disturbances should include analysis of urine, blood, milk, and ruminal fluid.

Keywords : dietary anion-cation balance, DCAB, net acid-base excretion, NSBA, suckler cow, grazing period
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