

GLUTATHIONE REDOX STATE, GPX ACTIVITY AND SE CONCENTRATION IN DAIRY COWS DURING NEGATIVE ENERGY BALANCE

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The aim of research was to evaluate glutathione redox state, GPx activity, Se concentration and also NEFA and BHB concentrations in 15 Holstein dairy cows during negative energy balance.

Blood samples were collected 4 times during this period — 7 days a.p., calving day, 7 days p.p. and 14 days p.p. All of the cows had gone through two or more lactations. The BCS was recorded at every single blood collection of the cows. Serum NEFA and BHB concentrations and whole blood GPx activity were measured using standardized kits supplied by *Randox Laboratories*. Reduced and oxidized glutathione concentrations were measured with a BIOXYTECH GSH/GSSG-412 kit (*Oxis-Research*, USA) using a colorimetric enzymatic method. The selenium concentration in whole blood was analyzed using atomic absorption spectrometry. The data were analyzed statistically by one-way analysis of variance (ANOVA) followed by the Fisher LSD *post-hoc* test. The relationship between parameters was evaluated by the correlation coefficient and the significance of correlation using linear regression analysis.

A significantly increased NEFA concentration was recorded on calving day ($P < 0.05$) and 7 days p.p. ($P < 0.01$) compared to 7 days a.p. An increase in BHB concentration was also observed after parturition in our study, but was not, however, significant ($P > 0.05$). The GSH concentration was significantly decreased on calving day and 7 days p.p. ($P < 0.05$) as compared to 7 days a.p. The mean GSSG concentration was significantly higher 7 days p.p. as compared to calving day ($P < 0.01$) and 14 days p.p. ($P < 0.05$). The differences in GSH/GSSG ratio were not, however, significant ($P > 0.05$). The significant decrease in GPx activity was found 14 days p.p. as compared to 7 days p.p. ($P < 0.05$). No significant differences ($P > 0.05$) in Se concentration between individual groups were found. Between the GSSG concentration and the GSH/GSSG ratio a significantly negative ($r = -0.84$; $P < 0.001$) correlation was found. A significantly positive correlation was found between the BCS value and the GSSG concentration ($r = 0.44$; $P < 0.05$). The BCS value was also negatively correlated to GSH/GSSG ratio ($r = -0.30$) but it was not, however, significant ($P > 0.05$).

The results of our study indicate significant changes of antioxidant markers during negative energy balance and also confirm that during the periparturient period oxidative stress occurs in dairy cows. It seems that BCS value correlates to antioxidant markers and could influence the level of oxidant processes in cows during the periparturient period.

Keywords: REDUCED GLUTATHIONE, OXIDIZED GLUTATHIONE, OXIDATIVE STRESS, NEGATIVE ENERGY BALANCE, DAIRY COWS

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