

## **Metabolic responses to glucose infusion in Estonian Holstein cows of different body condition**

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Breeding for milk production has led to a higher frequency of metabolic diseases, which mostly appear during the transition period and are associated with insulin resistance. The objective of this study was to evaluate the response of metabolites to glucose infusion in cows with different amounts of fat reserves.

Holstein dairy cows (n=44) were divided according to body condition score (BCS) four weeks before parturition into three groups: BCS $\leq$ 3.0; BCS=3.25-3.5; BCS $\geq$ 3.75. A glucose tolerance test (GTT) was carried out three weeks before and after parturition. Glucose, insulin, non-esterified fatty acids (NEFA) and  $\beta$ -hydroxybutyrate (BHB) concentrations were analyzed from the blood samples collected during GTT.

Glucose infusion led to transient changes in the analyzed blood metabolite concentrations. Although the shapes of the response curves were similar, basal concentrations of NEFA and BHB were lower, and maximum concentrations of glucose and insulin were higher before parturition compared to the values after parturition (P<0.001) in all BCS groups. Before parturition BCS $\geq$ 3.75 cows had higher insulin basal concentrations (P<0.01) and during the GTT a more pronounced insulin response (P<0.01 40 to 60 min.) along with higher NEFA concentrations (P<0.05 5 to 40 min.) compared to the BCS $\leq$ 3.0 cows, and a more extensive glucose response compared to other groups (P<0.05). After parturition, glucose and insulin basal concentrations and dynamics from the GTT were not different between the BCS groups. Both the BHB and the NEFA basal concentrations in the BCS $\geq$ 3.75 cows were almost double the concentrations in the BCS $\leq$ 3.0 cows (P=0.05 and P=0.12 respectively). During the GTT concentrations were higher at 20 to 40 min. for NEFA (P<0.05) and within the first 40 min. for BHB (P<0.05) in the BCS $\geq$ 3.75 cows compared to BCS $\leq$ 3.0 cows. This indicates that the BCS $\geq$ 3.75 cows were in a more extensive lipolytic state compared to the BCS $\leq$ 3.0 cows. The results indicate that BCS influences glucose and lipid metabolism before parturition; however, BCS may not play such a relevant role on glucose metabolism after parturition but may have more profound effect on lipid metabolism.

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