COMPARISON OF A LACTATIONAL AND NUTRITION-INDUCED ENERGY DEFICIENCY IN HIGH-YIELDING DAIRY COWS WITH REGARD TO PERFORMANCE AND METABOLISM

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Objective: The lactational energy deficiency in early lactation and a following NUTRITION-induced NEB in dairy cows were compared with regard to performance and metabolism.

Methodology: Fifty dairy cows (3.2±0.2 parities) were allocated according to their EB in wks 1-12 p.p. (= period 1) at around 100 DIM to either a control (C, n=25) or a restriction group (R, n=25) for 3 wks (=period 2). Feed intake was individually limited to induce an energy deficiency of at least 30% of the calculated requirements. DMI and milk yield were recorded daily, BW weekly. Blood samples were taken once a week, milk samples twice a week. Data were analyzed with a Mixed procedure from SAS, including wk and group as fixed effects, and cow as repeated subject. A covariate based on period 1 was additionally used for analysis of data from the restriction and realimentation period.

Results: In period 1, DMI increased from 14.9 (wk 1) to 22.7 kg/d/cow (wk 12). Average milk yield started at 27.5 kg/d in wk 1 p.p. with a maximum in wk 6 (39.5 kg/d) and was 33.7 kg/d in wk 12 p.p. BW at calving (668.2 kg) decreased to 647.2 kg in wk 5. EB turned positive on average in wk 9 p.p. During period 2, DMI (10.4 vs. 21.0 kg/d), milk yield (27.9 vs. 30.0 kg/d), BW (629.5 vs. 652.6 kg) and EB (+6.0 vs. +4.9 MJ NEL/d) were decreased for R cows vs. C cows (LSM, P< 0.001). Plasma glucose had a nadir in wk 2 p.p. (3.30 mmol/l) and increased to 4.13 mmol/l in wk 12 p.p. For R vs. C cows glucose was lower (3.85 vs. 4.06 mmol/l; P< 0.05) in period 2. NEFA concentration was highest in period 1 in wk 2 p.p. (3.30 mmol/l) and increased to 4.13 mmol/l in wk 12 p.p. For R vs. C cows glucose was lower (3.85 vs. 4.06 mmol/l; P< 0.05) in period 2. NEFA concentration was highest in period 1 in wk 2 p.p. (0.90±0.06 mmol/l). R cows had higher values of NEFA in period 2 (0.23 mmol/l) than C cows (0.14 mmol/l) (P< 0.05). BHBA increased from 0.70 mmol/l (wk 1 p.p.) to a maximum in wk 3 p.p. (0.96 mmol/l). In period 2, BHBA was slightly higher for R vs. C cows (0.62 vs. 0.52 mmol/l).

Conclusions: Despite a higher NUTRITIONal NEB than the lactational NEB, the extent of changes in performance parameters and plasma metabolites was lower compared to the metabolic adjustments observed in early lactation.