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Dairy cow inflammatory status is modulated by physiological stage and feed restriction

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In dairy cows, the transition period is characterized by an altered inflammatory status (IS) whose physiological origin has not been clarified. The objectives were to describe the IS around parturition, and to evaluate the effects of feed restriction (FR) after peak lactation, in order to evaluate effects of DMI on IS separately from physiological changes of transition period. Fourteen Holstein and 14 Montbéliarde multiparous cows were studied from weeks -4 to +23 of lactation. Starting at 87±9 DIM, cows underwent four 4-day periods of FR to meet 50% of individual net energy requirements (FR1 wk12, FR2 wk14, FR3 wk15, FR4 wk 16). Dry matter intake was measured, and blood samples were collected from coccygeal vessels before am feeding on weeks -3 (wk-3), 2 (wk+2), 12 (wk+12) and 22 (wk+22) of lactation. Two samples were collected on days 0 (i.e. before) and 4 of FR1 wk 12. Plasma was stored at -80 °C and the IS was assessed by analysis of a panel of chemokines, pro and anti-inflammatory cytokines (IL-1α, IL-6, IL-8, IL-10, MCP-1, MIP-1β, TNFα and VEGFα; Milliplex^R Bovine; BCYT1-33K-10, Merck, DE). Antioxidant capacity was assessed by FRAP assay and lipomobilization by plasma NEFA. Data were analysed using mixed models and repeated measures with cow as random effect. For Holstein and Montbéliarde cows, IL-1α, IL-10, MCP-1, IL-6 and MIP-1β were significantly lower on wk+2 compared to wk-3 and remained steady over the course of lactation. IL-8 concentration was higher on wk+2 compared with wk-3, whereas VEGFα declined on d0-wk+12 and wk+22 compared with wk-3 and +2. IL-8, TNFα and VEGFα were higher in Holstein than Montbéliarde cows. The 4-day FR1 significantly decreased IL-10, MCP-1 and MIP-1β concentrations. Plasma FRAP was negatively correlated with NEFA ($r=-0.40$), and decreased with FR. The cytokines measured were not correlated with either plasma FRAP or NEFA. To conclude, the lactation stage modulates IS in dairy cows, and short FR after lactation peak does not seem to cause inflammation despite lipomobilization and altered redox state.