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Inflammation status weakly modulated by short-term feed restriction in suckling beef cows

INTRODUCTION

Variations in feed intake modify metabolism¹ and may have putative effects on inflammation status². There is scarce data on suckling cows experiencing acute shifts in feed allowance. The objective was to study inflammation and metabolic responses to a short nutritional stress induced by experimental feed restriction (FR) after 9 weeks of lactation in suckling Charolais cows.

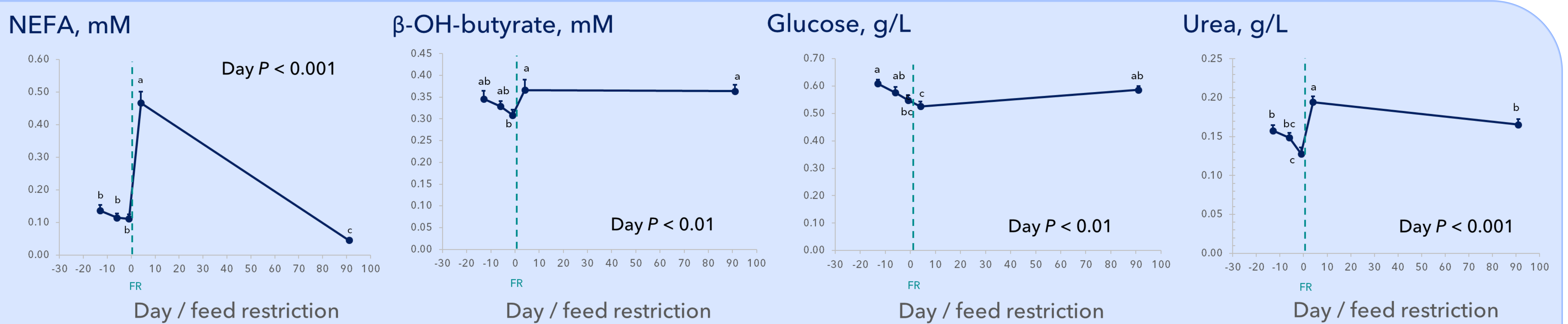
METHODS

- 22 primiparous Charolais cows, fed *ad libitum* with grassland hay supplemented with concentrate to meet their predictive net energy and protein requirements, underwent a single 4-day FR to meet 50% of net energy requirements (FR1 wk9) followed by 10-day recovery period with *ad libitum* intake. After which, a succession of 3 FR (FR2 wk12, FR3 wk13, FR4 wk14) each separated by 3-d of *ad libitum* intake were performed. The experiment ended by a 8-week *ad libitum* intake.
- Dry matter intake measured and residual feed intake (RFI) calculated from wks 1 to 8 of lactation. RFI ranged from -0.01 to -0.63 for negative RFI (RFI-, n=13) and from 0.03 to 1.15 kg DMI/d for positive RFI (RFI+, n=9).
- Blood samples collected from coccygeal vessels before AM feeding on days -13, -6, -1, +4, and +91 relative to FR1. Plasma was stored at -20°C for NEFA, β -hydroxybutyrate, glucose and urea analysis. Plasma was stored at -80°C for IL-1 α , IL-8, IL-10, IL-17 α , MCP-1, MIP-1 β , TNF α and VEGF α analysis using Milliplex® Bovine Cytokine/Chemokine Panel (BCYT-33K-10, Merck, DE).
- Statistical analysis: Effects of FR1 and RFI classification was tested using mixed procedure of SAS with RFI and Day (relative to FR1) and interaction as fixed effects, and cow as random effects. Repeated statement with Sp(pow) structure.



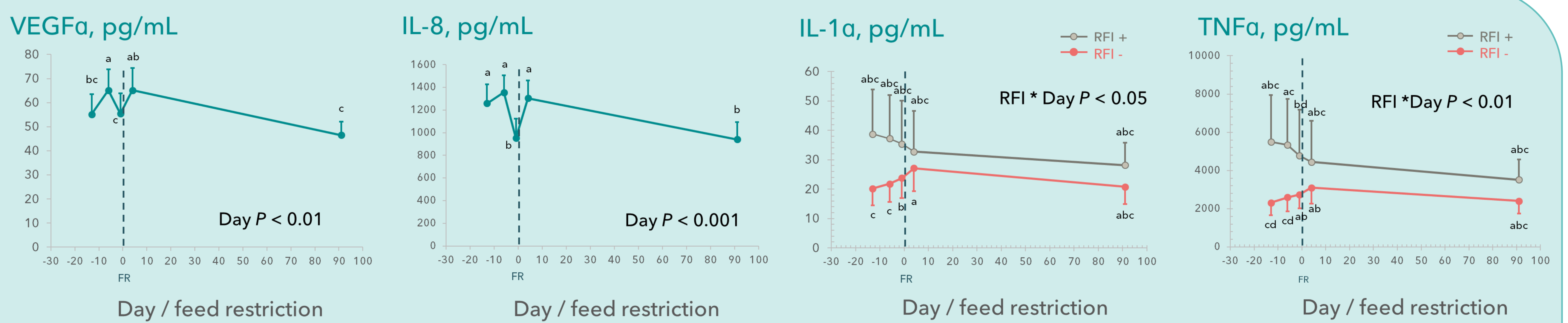
RESULTS

Metabolic status



- All metabolites were significantly modulated by day relative to FR1 for both RFI groups
- The concentrations of NEFA, β -OH-butyrate and urea increased 320%, 19% and 52%, respectively, from d-1 to +4 relative to FR1.

Inflammation status



- For both RFI groups, the concentrations of VEGF α and IL-8 increased 17% and 37%, respectively, from d-1 to +4 relative to FR1.
- The concentration of IL-1 α increased 14% from d-1 to +4 relative to FR1 in RFI-.
- Significant modulations of VEGF α , IL-8, IL-1 α , and TNF α observed before FR1 were difficult to explain with known experimental parameters and may reflect background physiological variations.
- Large inter-individual variations and no significant effect of FR1 were observed for TNF α , IL-10, IL-17 α , MCP-1, and MIP-1 β .

DISCUSSION

- The 4-day 50% deficit in net energy requirement experienced by suckling Charolais cows after the peak of lactation (9 wk) modulated metabolite concentrations, in agreement with De La Torre et al (2022).
- Moderate but significant increases in the concentrations of VEGF α , IL-8, and IL-1 α were observed in response to FR1, despite large inter-individual variations. Together with absence of modulation of the other cytokines or chemokines, these results indicate a weak activation of the immune system by FR1 under the present experimental conditions.
- The increases in IL-8 and IL-1 α concentrations observed in RFI- may indicate that FR induces an inflammatory response in efficient cows. Monitoring over a longer period of FR could be tested in both RFI- and RFI+ suckling cows.

REFERENCES: ¹ De La Torre et al., 2022. Animal 100556; ² Contreras and Sordillo, 2011. Comparative Immunology, Microbiology and infectious diseases 34:281-9.

