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Comparison of metabolic and immune biomarkers between primiparous and multiparous dairy cows during the peripartum period

A. Corset^{1,2}, A. Boudon¹, S. Philau¹, O. Dhumez¹, A. Remot³, P. Germon³, M. Boutinaud¹

¹ INRAE-Institut Agro Rennes Angers, UMR 1348 PEGASE, Saint-Gilles, France ;

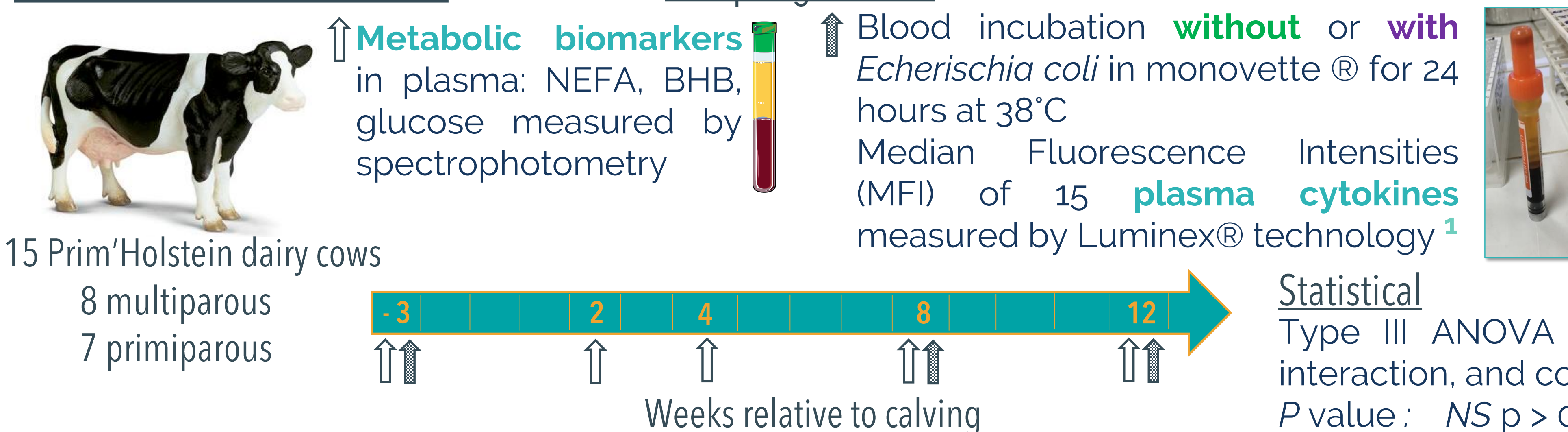
² Biodevas laboratoires, Savigné-l'Évêque, France ;

³ INRAE-Université de Tours, UMR 1282 ISP, Nouzilly, France.

Introduction

- The peripartum period, before calving and the first month of lactation, is a critical period for dairy cows
- The onset of lactation : Increased milk production and decreased immune capacity due to inflammation
- Objective of this study : Investigate the influence of parity during this period of risk on metabolic and immune biomarkers (chemokines, pro-inflammatory and anti-inflammatory cytokines) in the dairy cows

Material & Methods



Functions of the 15 cytokines:

- 4 chemokines or chemoattractant cytokines: CCL2, CCL3, CCL4, CXCL10
- 8 pro-inflammatory cytokines: IFN γ , IL17A, IL1 α , IL1b, IL2, IL6, IL8, TNF α
- 3 anti-inflammatory cytokines: IL10, IL1R α , IL4

Statistical

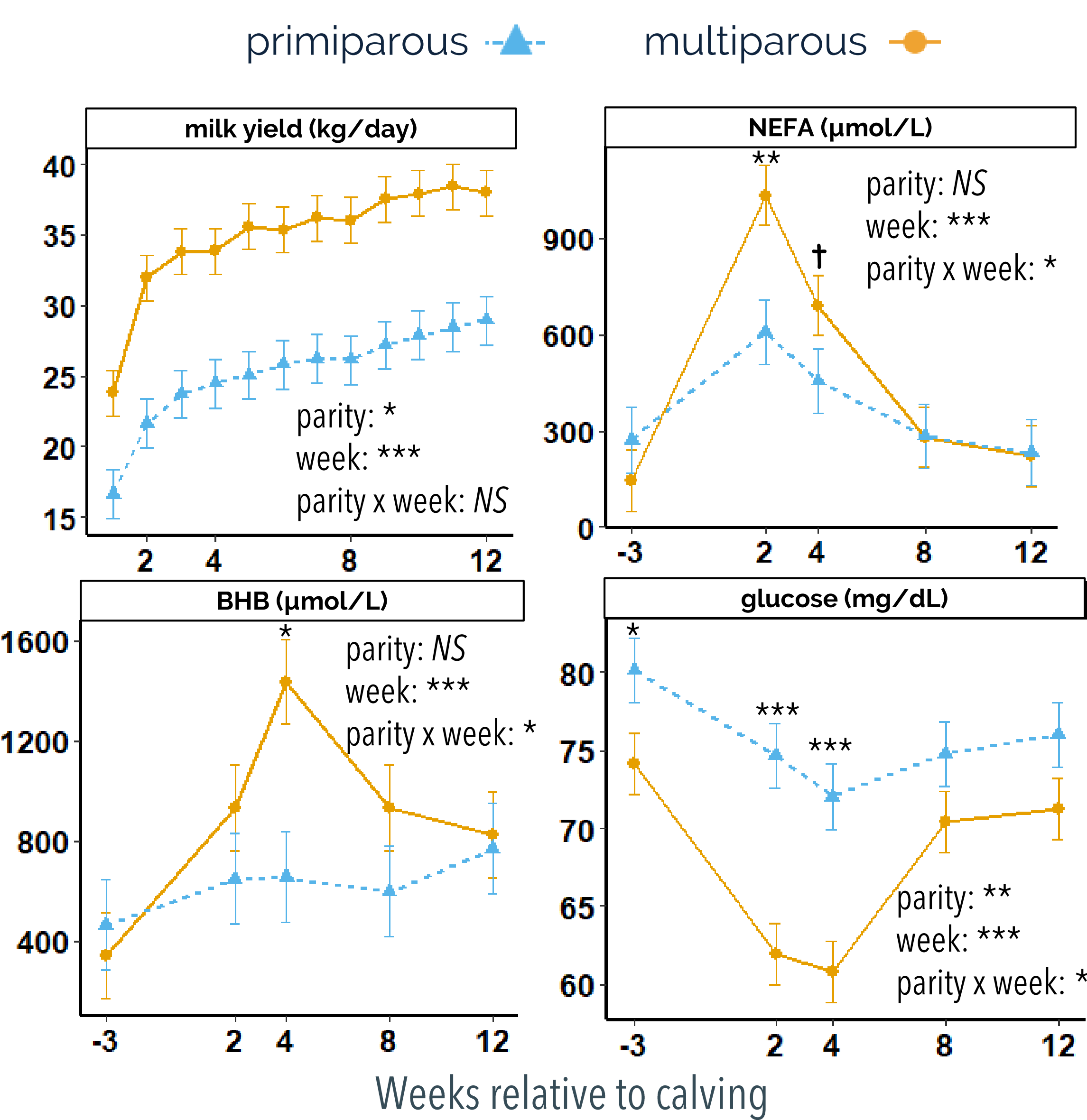
Type III ANOVA mixed linear model with the parity, weeks, their interaction, and cow as a random effect

P value : NS p > 0.1 † p < 0.1 * p < 0.05 ** p < 0.01 *** p < 0.001

Results

Metabolic biomarkers

As described in the literature², at the beginning of lactation multiparous dairy cows produce more milk and their metabolism is more solicited.



NEFA = Non Esterified Fatty Acid
BHB = β -hydroxybutyrate

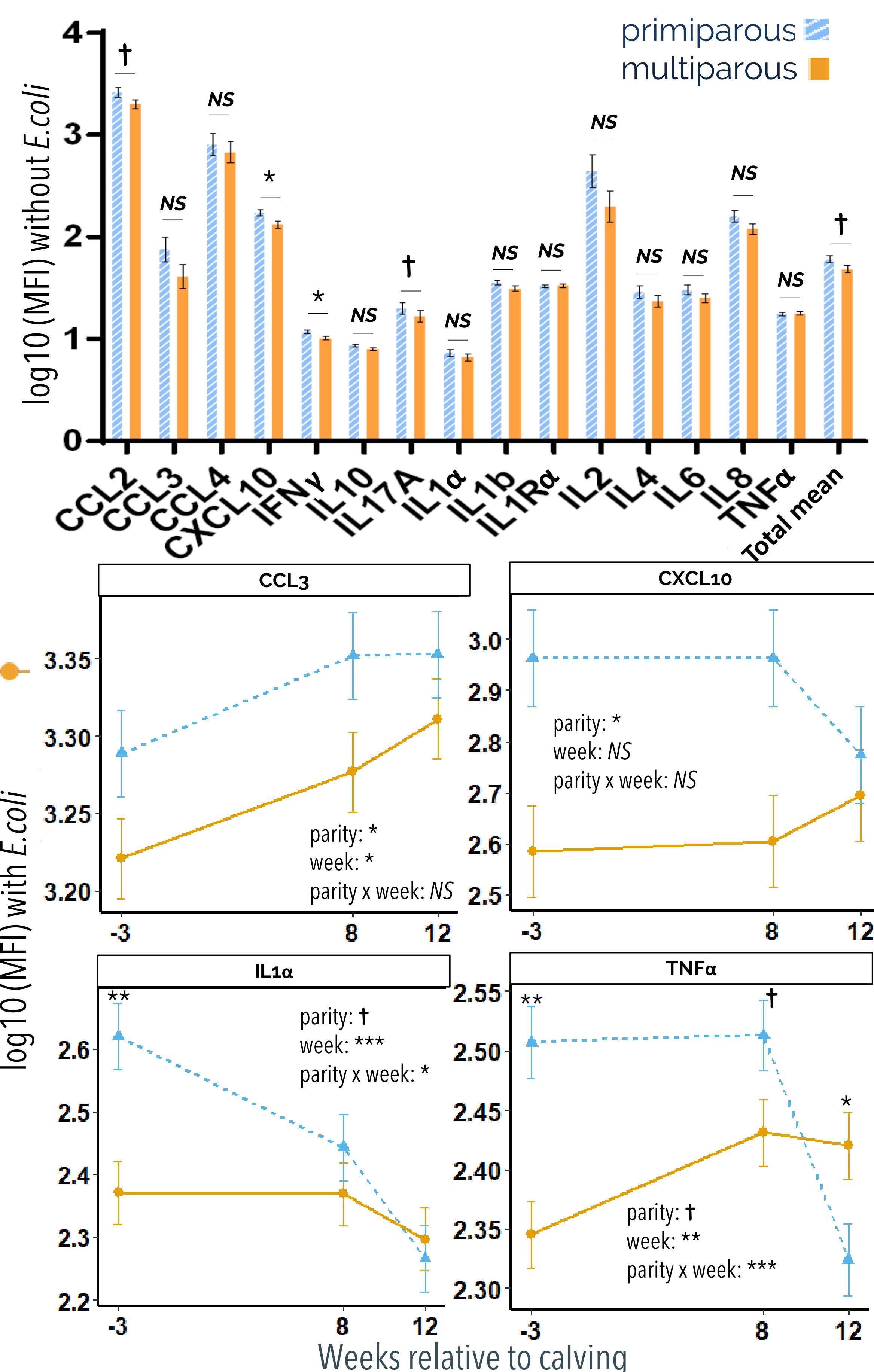
Plasma cytokines

Without *E. Coli* stimulation:

- chemoattractant & pro-inflammatory cytokines primiparous > multiparous
- anti-inflammatory cytokines =
- total average of the 15 cytokines tend to have primiparous > multiparous
- differences independent of week of lactation

With *E. Coli* stimulation:

- chemoattractant & pro-inflammatory cytokines primiparous > multiparous
- anti-inflammatory cytokines = (not showed)
- total average of the 15 cytokines tend to have primiparous > multiparous in week -3 and 8 (not showed)



Conclusion

Our study shows that compared with primiparous, multiparous cows have:

- a greater metabolic solicitation

- less excessive inflammation

These results suggests that multiparous cows may have acquired a better regulation of inflammation by decreasing the pro-inflammatory cytokine production compared with primiparous cows.

References 1. Lesueur, J. et al., 2022 Standardized Whole Blood Assay and Bead-Based Cytokine Profiling Reveal Commonalities and Diversity of the Response to Bacteria and TLR Ligands in Cattle. Front Immunol.
2. Wathes, D.C. et al., 2007 Differences between primiparous and multiparous dairy cows in the inter-relationships between metabolic traits, milk yield and body condition score in the periparturient period. Domestic Anim Endocrinol.