

# METABOLIC ADAPTATIONS TO DYNAMIC ENERGY REQUIREMENTS DURING LACTATION AND PREGNANCY IN DAIRY COWS WITH VARYING PROPORTIONS OF HOLSTEIN AND SIMMENTAL BREED

Deise Aline Knob<sup>1,2</sup>, André Thaler Neto<sup>2</sup>, Helen Schweizer<sup>1</sup>, Anna Weigand<sup>1</sup>, Roberto Kappes<sup>2</sup>, Armin M. Scholz<sup>1</sup>

<sup>1</sup>Ludwig Maximilians Universität München (LMU), Tierärztliche Fakultät, Lehr- und Versuchsgut Oberschleißheim, Oberschleißheim, Deutschland.

<sup>2</sup>Programa de Pós-Graduação em Ciência Animal - Centro de Ciências Agroveterinárias - Universidade do Estado de Santa Catarina - CAV/UEDESC, Lages – Santa Catarina. Brasil.

## Introduction

- ❖ Negative energy balance (NEB) of cows with high milk yields in early lactation;
- ❖ Can be detected by beta-hydroxybutyrate (BHBA) and non-esterified fatty acids (NEFA) in blood;
- ❖ Preventing NEB by improving feeding strategies or by breeding may improve the sustainability of milk production;

## Materials and Methods



- ❖ Livestock Center of the Ludwig Maximilians University (Munich, Germany) from April 2018 to August 2019;

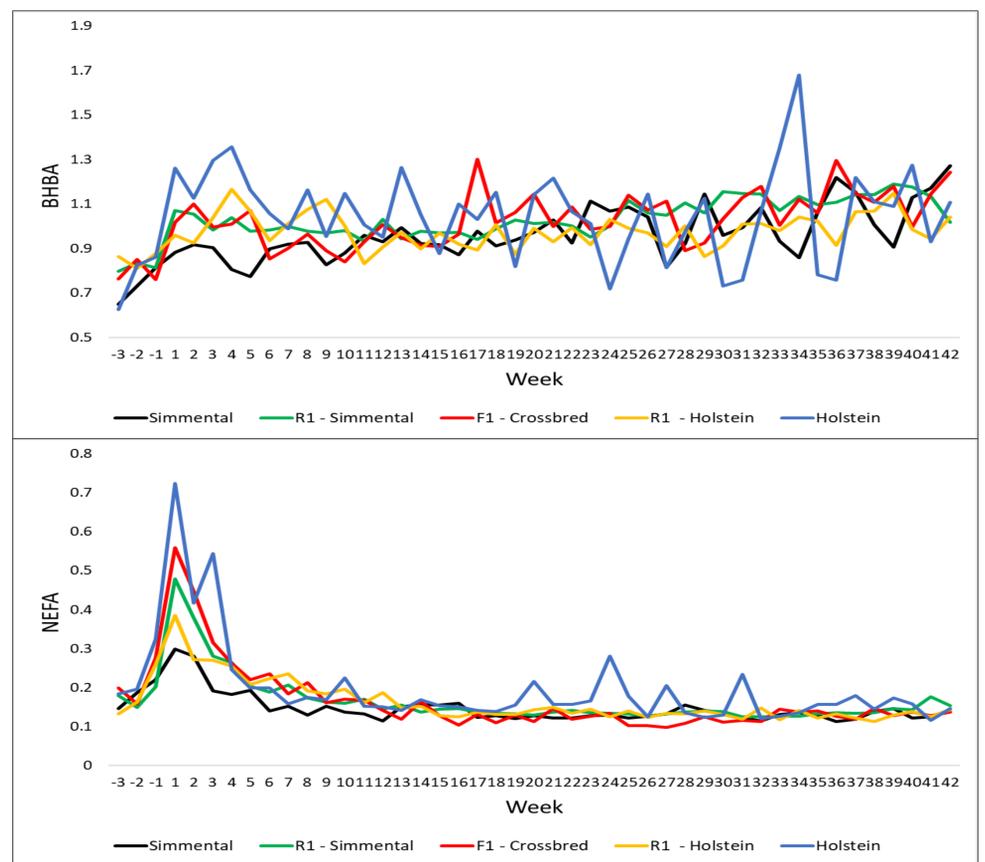
Holstein 100% Holstein; n=9	R1 Holstein 51-99% Holstein; n=30	F1 crossbreds 50% Holstein, 50% Simmental; n=17	R1 Simmental 1-49% Holstein; n=81	Simmental 100% Simmental; n=27

- ❖ Weekly: BHBA and NEFA;
- ❖ Mixed model (SAS) for statistical analysis;



## Results

Figure 1. Weekly least squares means (LSM) of BHBA, and NEFA between three weeks before calving until week 42 after calving (the end of the lactation) for purebred Holstein, Simmental, and crossbred cows.



- ❖ Holstein cows had higher NEFA ( $0.196 \pm 0.013$  mmol/l), and Simmental cows the lowest NEFA concentrations ( $0.147 \pm 0.008$  mmol/l,  $P=0.03$ );
- ❖ Highest NEFA value was found at the first week after calving ( $0.49 \pm 0.013$  mmol/l);
- ❖ No difference for BHBA among genetic groups ( $P=0.1007$ );
- ❖ Simmental, R1-Sim and F1 cows had the highest BHB value at the second week after calving ( $0.92 \pm 0.07$  and  $1.05 \pm 0.04$ , and  $1.10 \pm 0.10$  mmol/l, respectively);
- ❖ R1-Hol and Holstein cows showed the BHB peak at the fourth week after calving ( $1.16 \pm 0.07$  and  $1.36 \pm 0.12$  mmol/l, respectively);
- ❖ Unexpectedly, Holstein cows had a high BHBA peak again at the week 34 after calving ( $1.68 \pm 0.21$  mmol/l);

## Conclusion

- ❖ Simmental and R1-Sim cows mobilize fewer body reserves after calving;
- ❖ Dairy cows with higher degrees of Simmental origin might be more sustainable in comparison with the Holstein genetic.