E-mail: **cvillot@lallemand.com**

Florence 1-5 september 2024

Saccharomyces cerevisiae boulardii supplementation for transition and early lactation cows

Pineda, A [1*].; **Villot, C.;**[2] Dekraker [1], K.; Kvidera, S.;[3] Jantzi, S [1].; Cartwright, S [1].; Boerefyn, M [1].; Steele, M [1].

[1] Department of Animal Biosciences, University of Guelph, Guelph, ON, Canada

[2] Lallemand SAS, Blagnac, France

[3] Elanco Animal Health, Greenfield, IN 46140, USA

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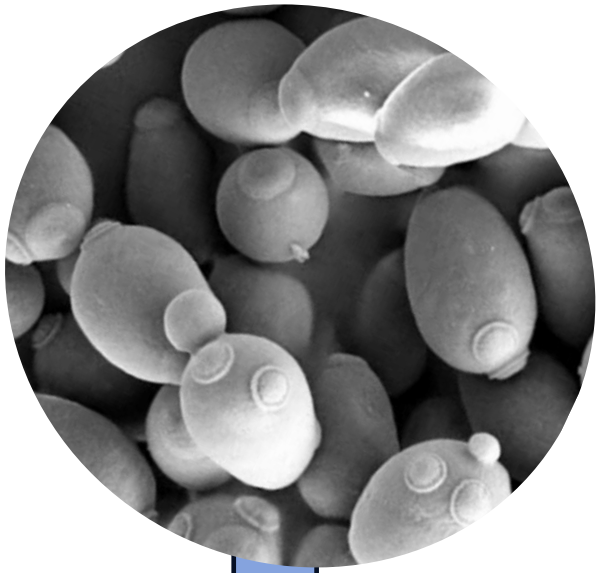
LIVE YEAST SUPPLEMENTATION & DAIRY COW PERFORMANCES

Live yeast Saccharomyces cerevisiae (Sc)



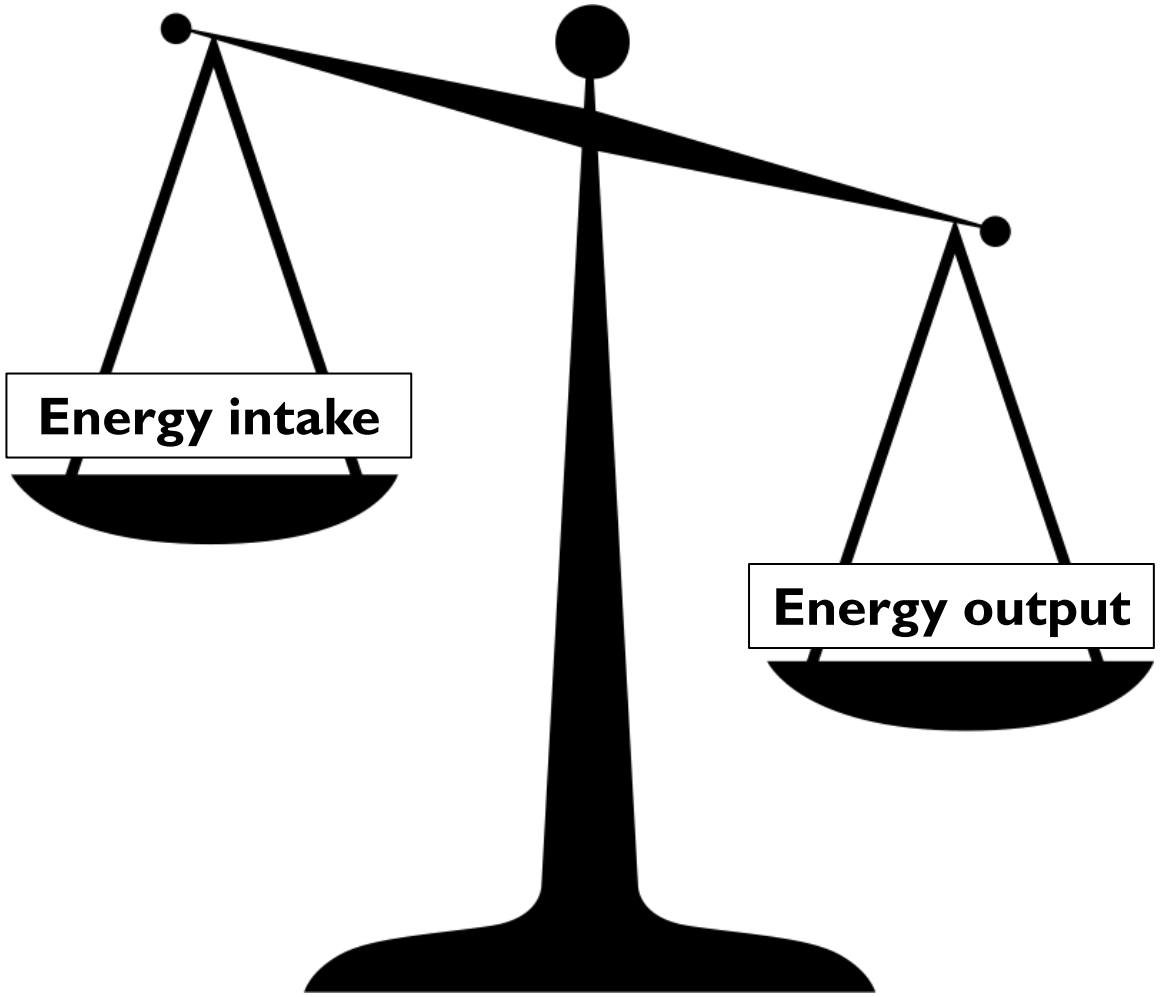
Dietary supplementation

- ↑ **Milk yield**
- ↑ **Milk components**
- ↑ **Feed efficiency**

Focus on the start of the lactation

Meta-analysis: *Ondarza et al., 2010; Salah et al., 2024 et al., 2023; Perdomo et al., 2020*

THE CLASSIC **TRANSITION** PERIOD CHALLENGE



Rapid physiologic and metabolic changes

CAN DIETARY LIVE YEAST IMPROVE **TRANSITION** COW PERFORMANCE?

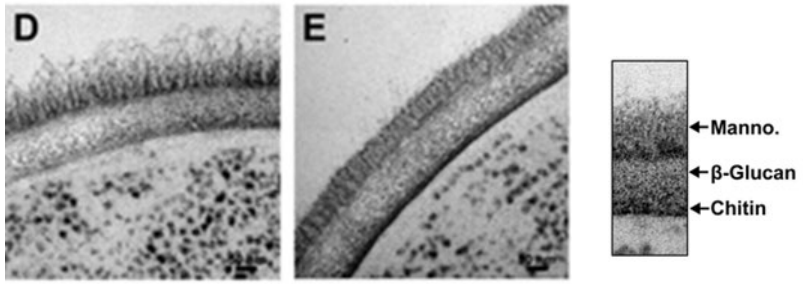
***Saccharomyces cerevisiae boulardii* (SCB)** CNCM I-1079

Dietary supplementation

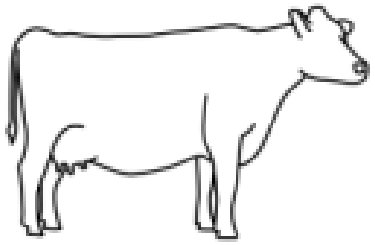
- ↓ incidence of diarrhea[1,2]
- ↑ ADG[1, 3]
- ↑ production of IgA[4]

[1]*Davis et al. 2004;* [2]*Fomenky et al., 2017;* [3]*Renaud et al. 2019;* [4]*Villot et al. 2020*

ScB **Sc**



Hudson et al., 2016 Plos One



- ↑ Milk yield[1]
- Milk components ?
- ↑ Feed efficiency[1]

Hiltz et al., 2023

HOW DIETARY LIVE YEAST COULD IMPROVE **TRANSITION** COW?

1. Innate immune response[4,5,6]
2. Barrier function of lower gut[7,8]
3. Microbiota[1,2,3]

Improved cow performance?

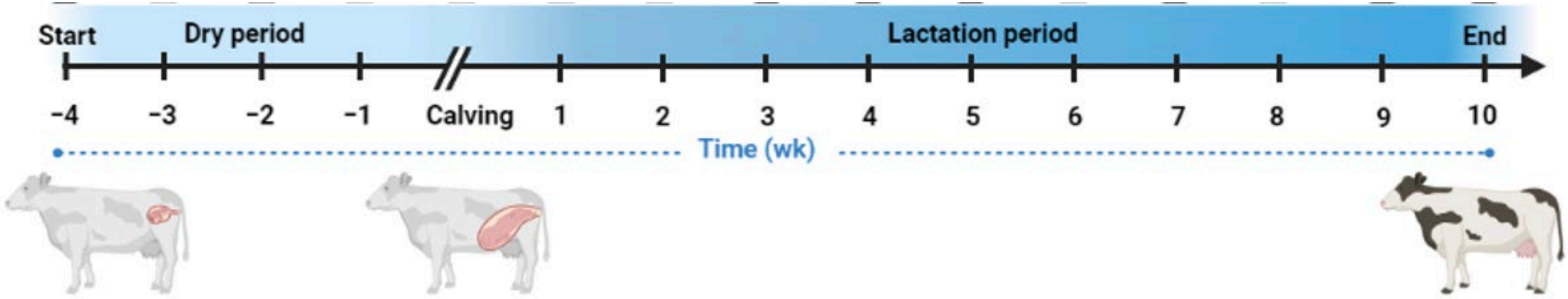
HYPOTHESIS

- Supplementation of SCB would result in similar DMI but improved milk production during the early postpartum period thanks to the mitigation of the transition period

[1]Seo et al., 2010; [2]McAllister et al., 2011; [3]Khan et al., 2016; [4] Buts et al., 1990; [5]Fomenky et al., 2017; [6] Lopreiato et al., 2020;; [7]Mumy et al., 2008; [8]Fomenky et al., 2017

EXPERIMENTAL UNITS AND TREATMENTS

- 83 Holstein cows enrolled (52 multiparous, 31 primiparous)

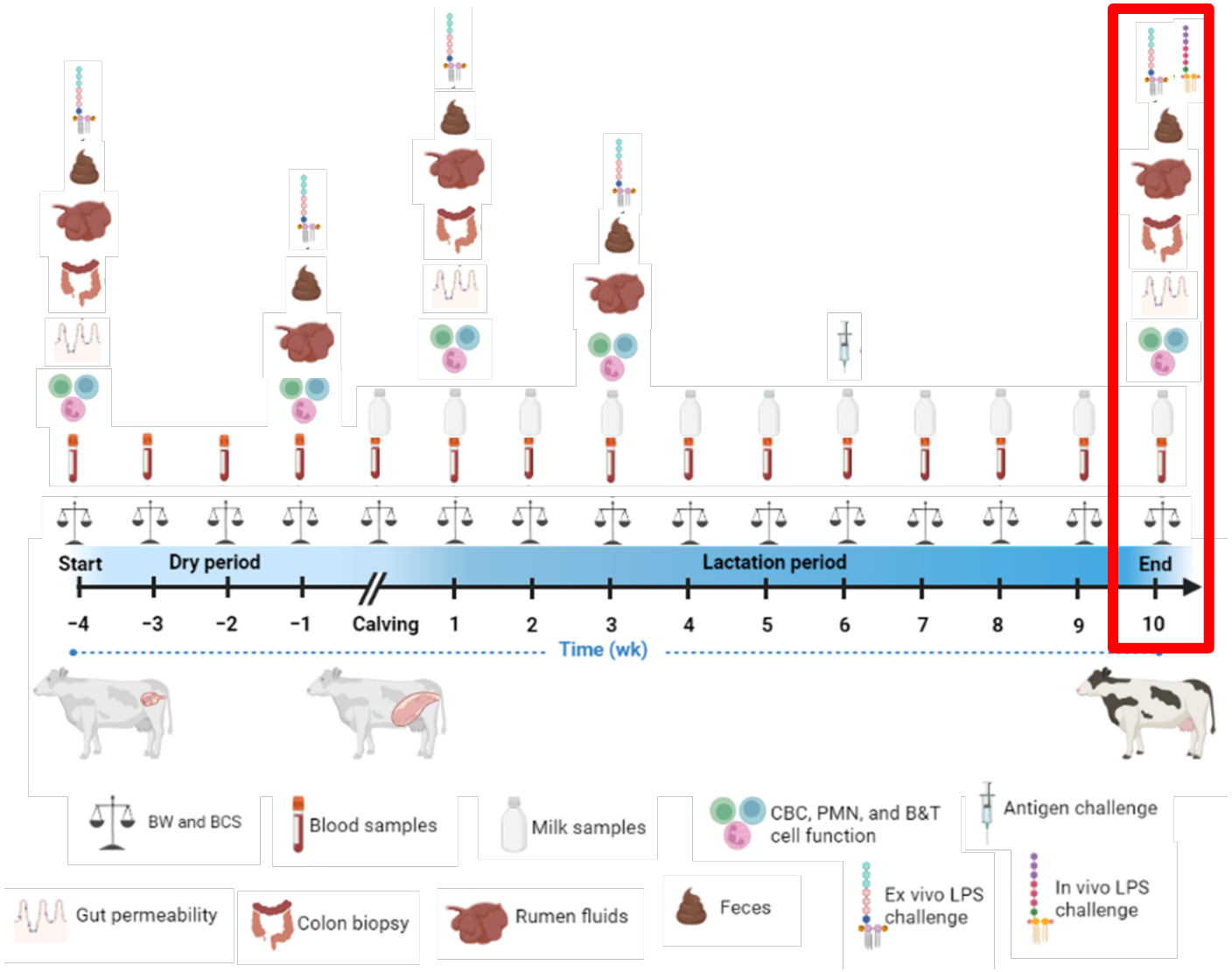


- Cows fed 1 or 2 treatments from **-4 to +10 weeks,** relative to calving:

  1. **SCB supplementation** (targeting 5 x10^8 cfu of SCB/kg complete feed)
  2. **Control**

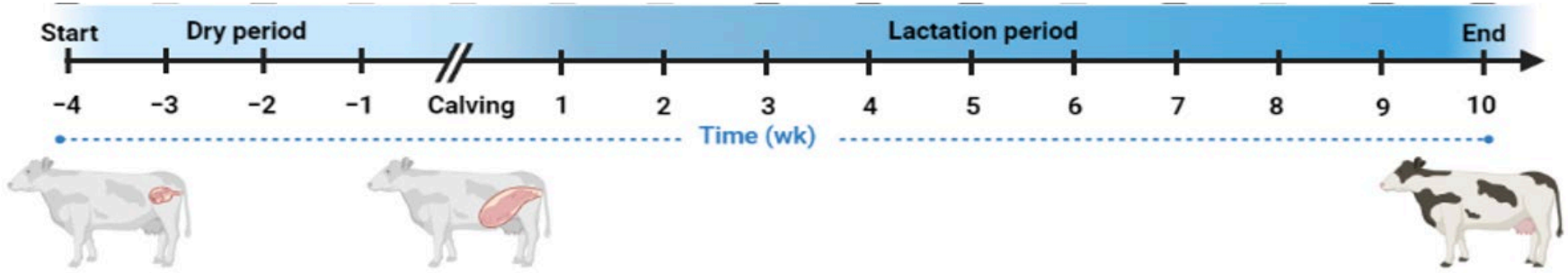
→ Top dressed on common corn silage based TMR fed at individual level within a group pen

SAMPLINGS & ANALYSIS



DATA ANALYSIS

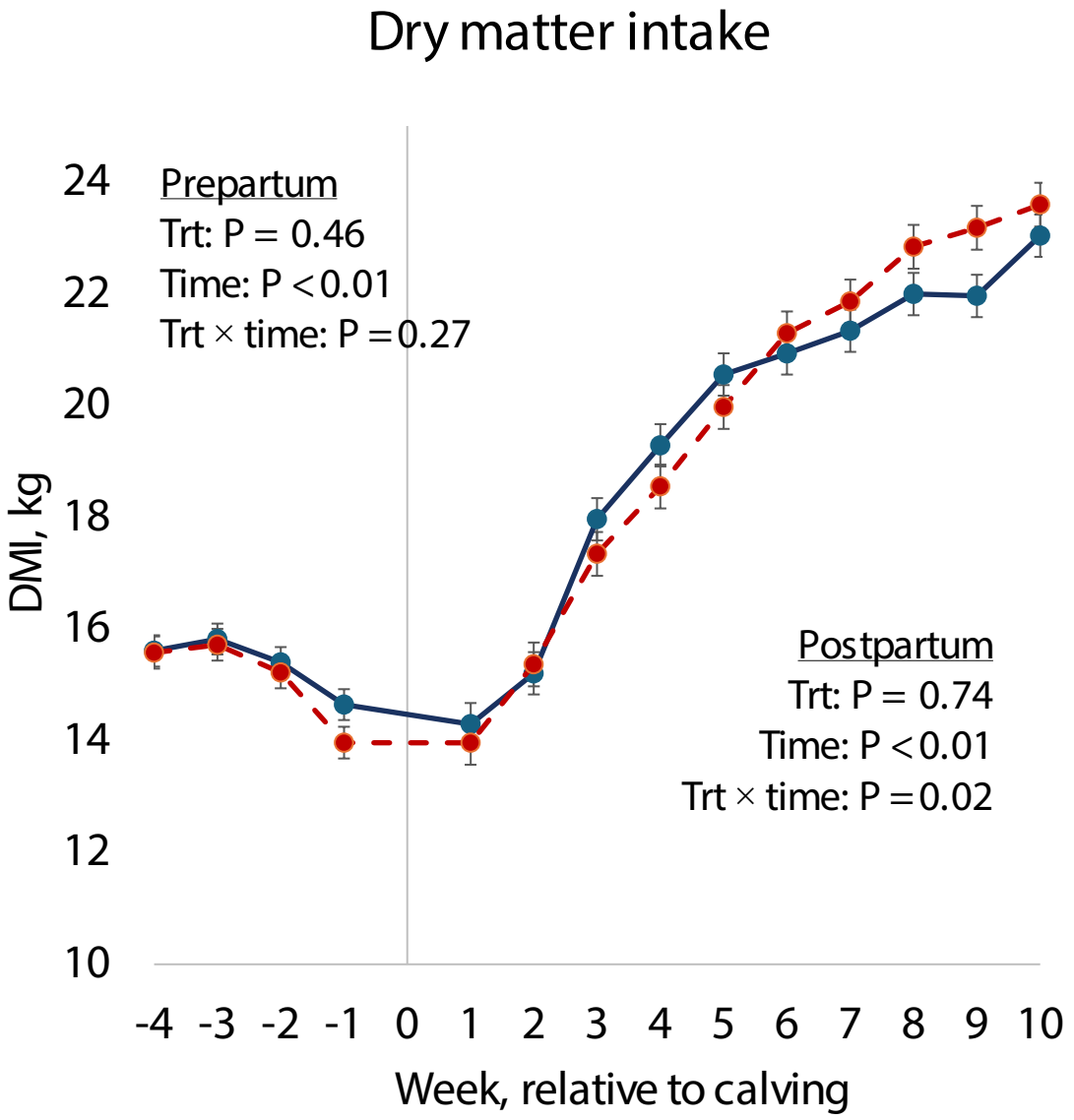
Intake, milk, BW, and BCS assessed throughout trial on a daily scale

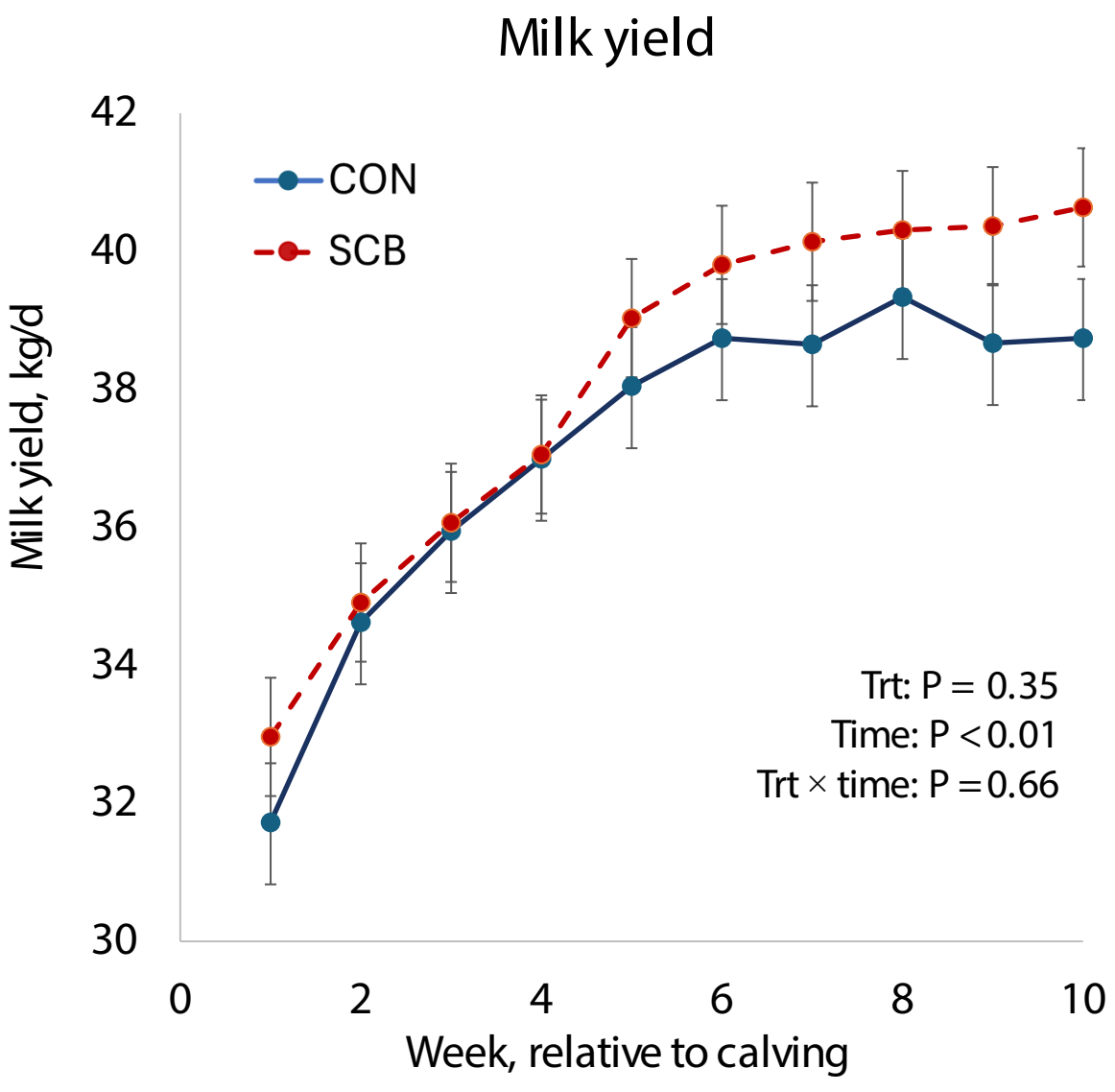


- Data analyzed using a mixed linear model in SAS (9.4)
  - Fixed effects: treatment, parity, time, and their interactions
  - Random effects: cow
- Significance was declared at $P \leq 0.05$ and tendencies at $P \leq 0.10$.

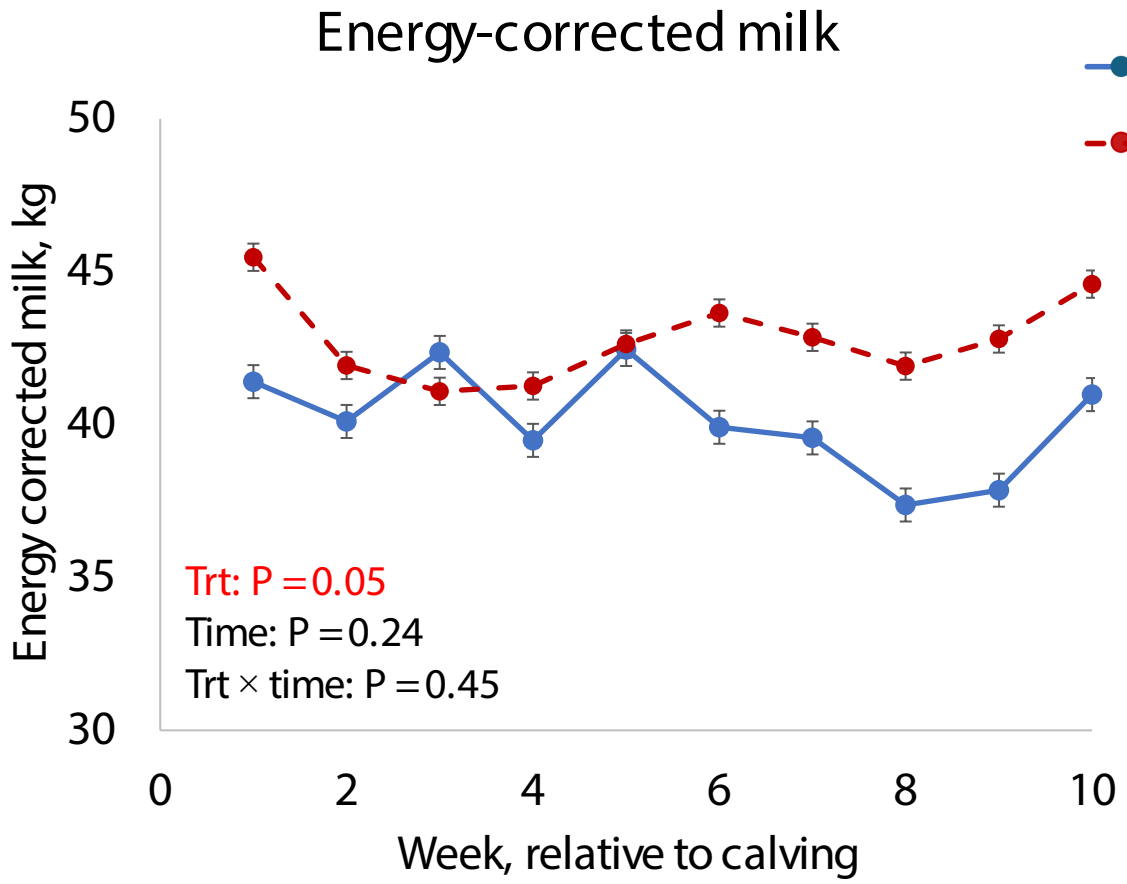
RESULTS

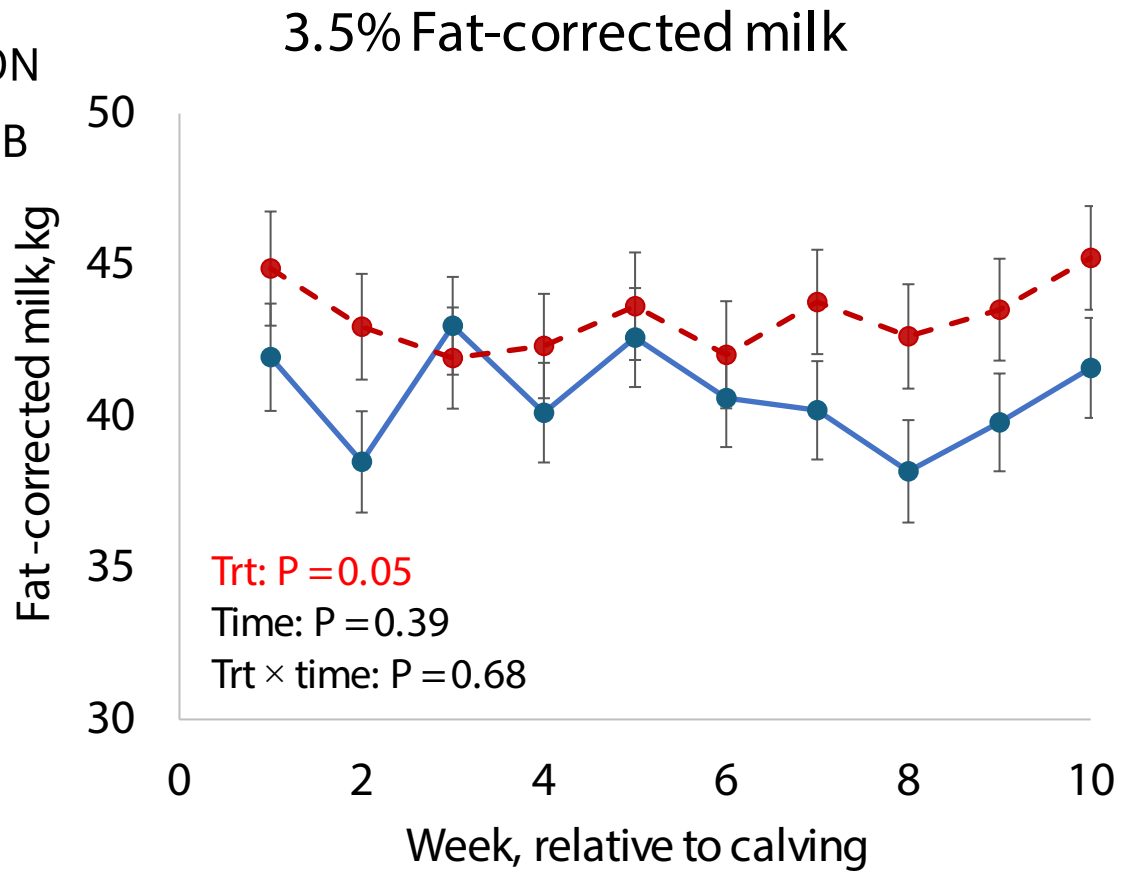
DRY MATTER INTAKE AND MILK YIELD





ENERGY-CORRECTED MILK AND 3.5% FAT-CORRECTED MILK





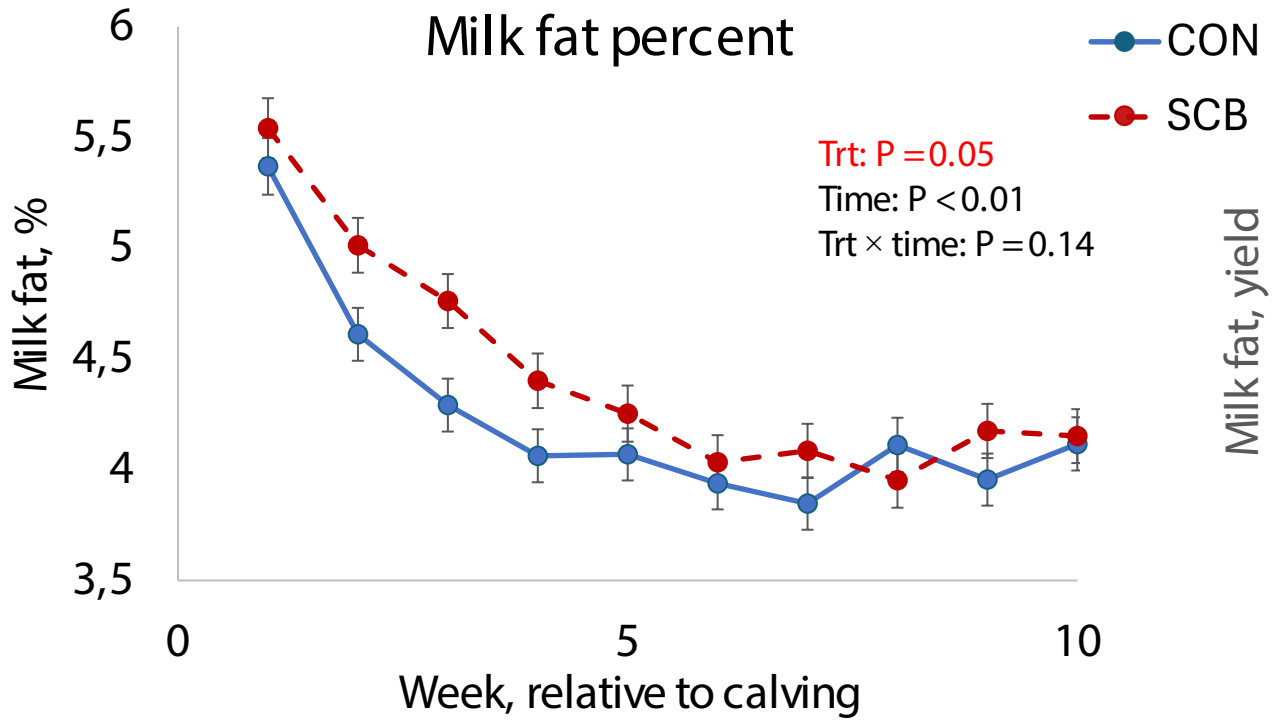
ECM = [12.95 × fat yield (kg)] + [7.20 × protein yield (kg)] + [0.327 × milk yield (kg)] (Boerman et al., 2015).

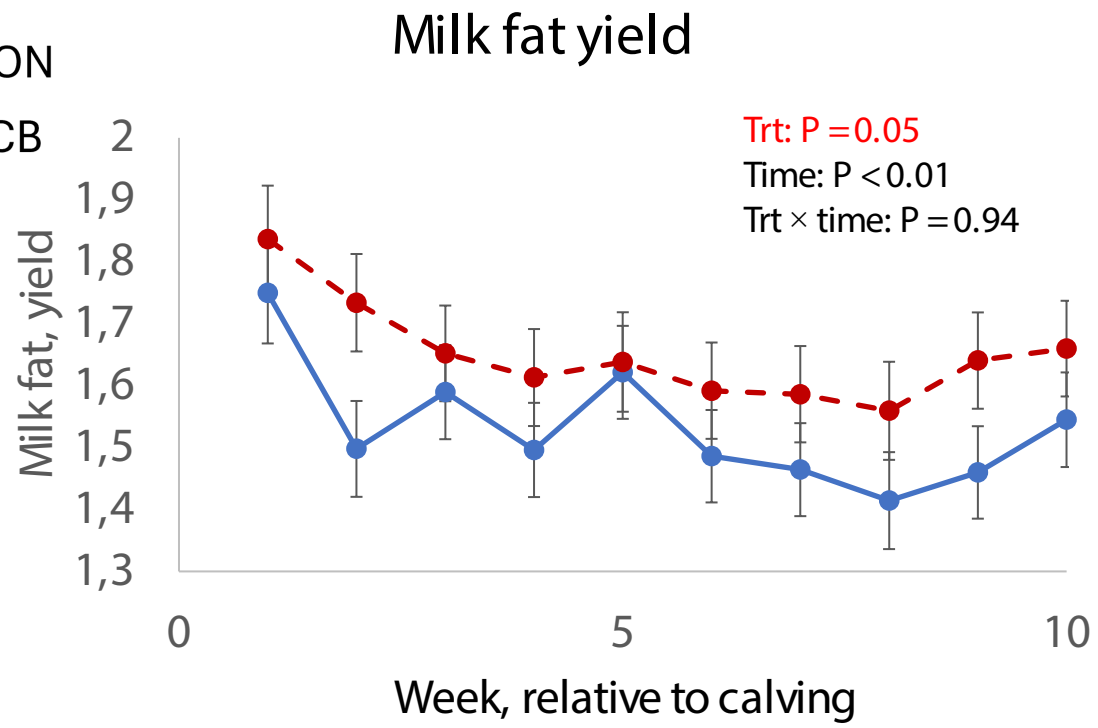
FCM = [0.4324 × milk yield (kg)] + [16.216 × milk fat (kg)].

Higher FCM and ECM milk in SCB cows → Why?

MILK FAT PERCENT AND YIELD

- Higher FCM and ECM milk in SCB cows
  - → No difference in milk protein or lactose
  - → **Higher milk fat in SCB cows**

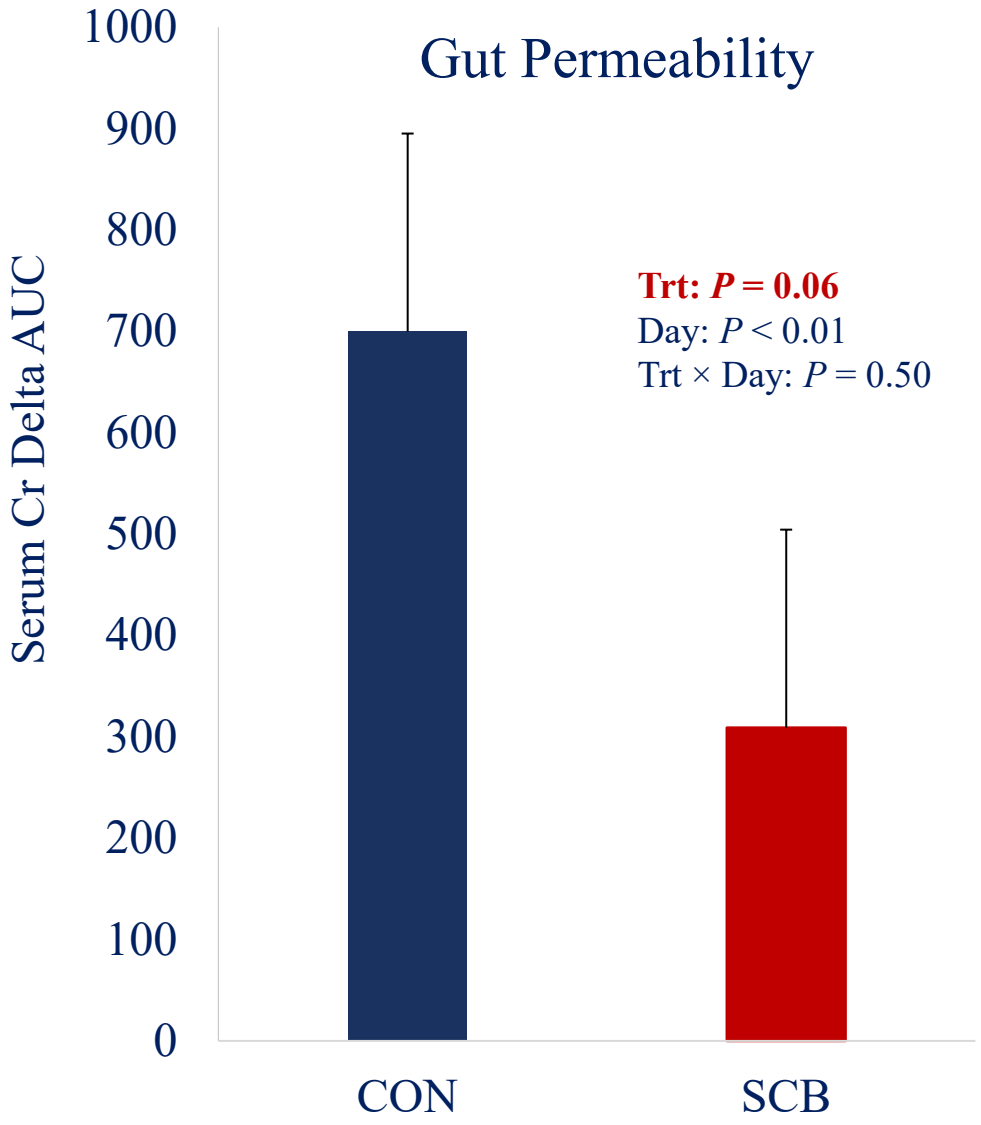


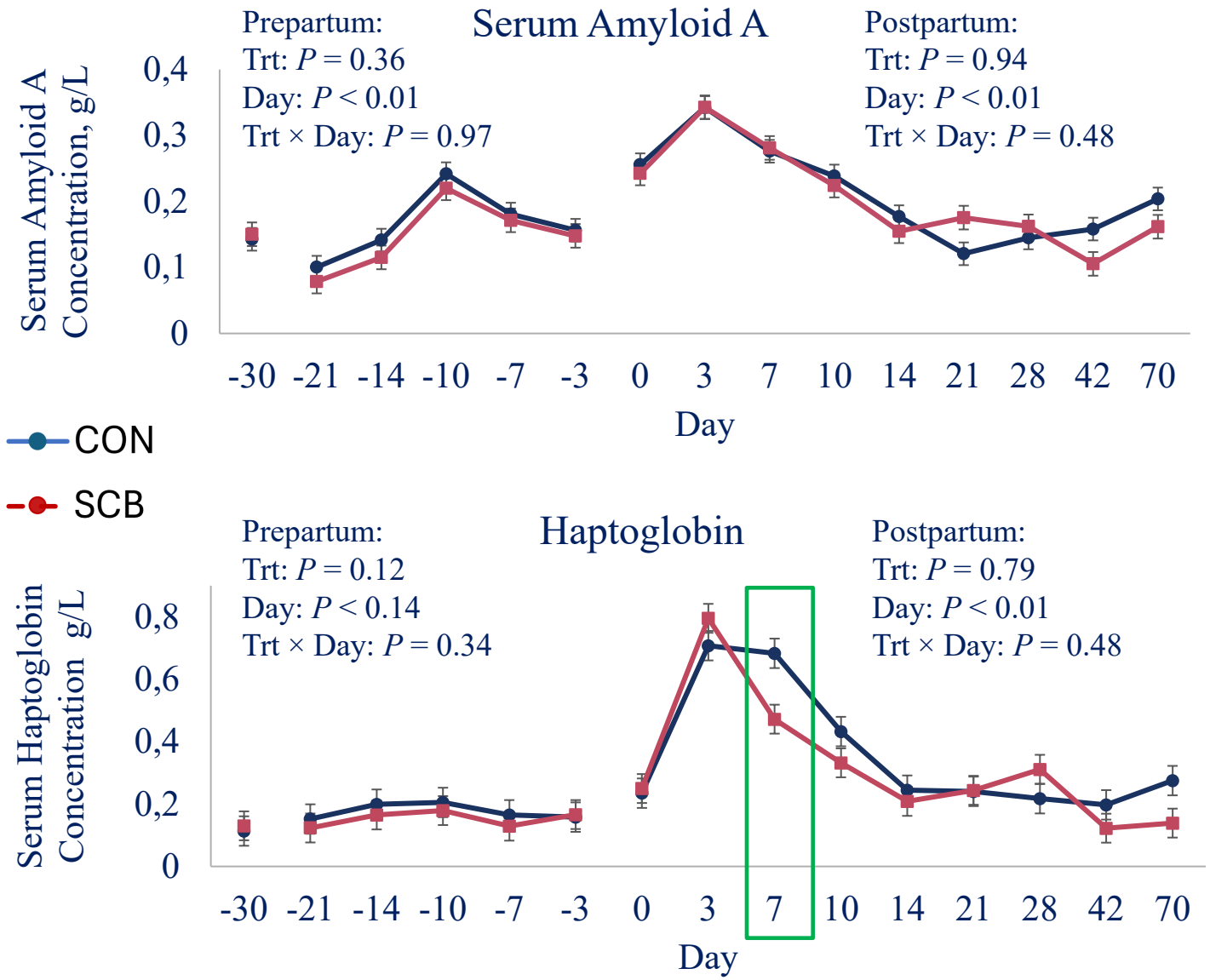


WHY DOES SCB INCREASE MILK FAT PERCENT AND YIELD?

- Higher fat mobilization ? 
  - Greater BCS or BW loss → No difference for BCS ($P = 0.64$) or BW ($P = 0.39$)
  - Greater NEFA mobilization → No difference ($P = 0.17$)
- Reduced gut permeability?

GUT PERMEABILITY AND ACUTE PHASE PROTEINS





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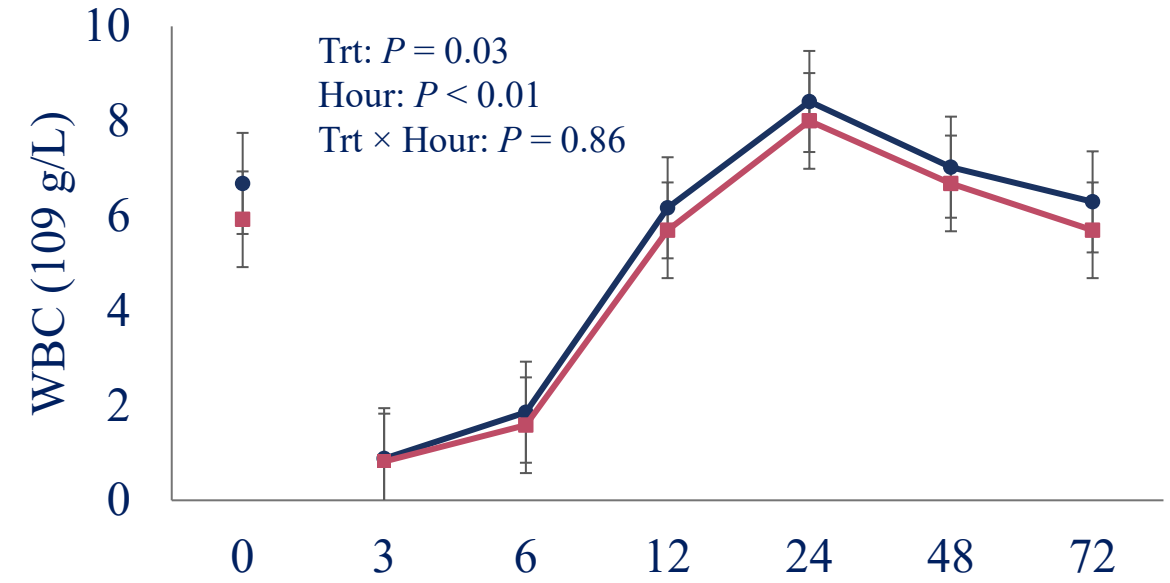
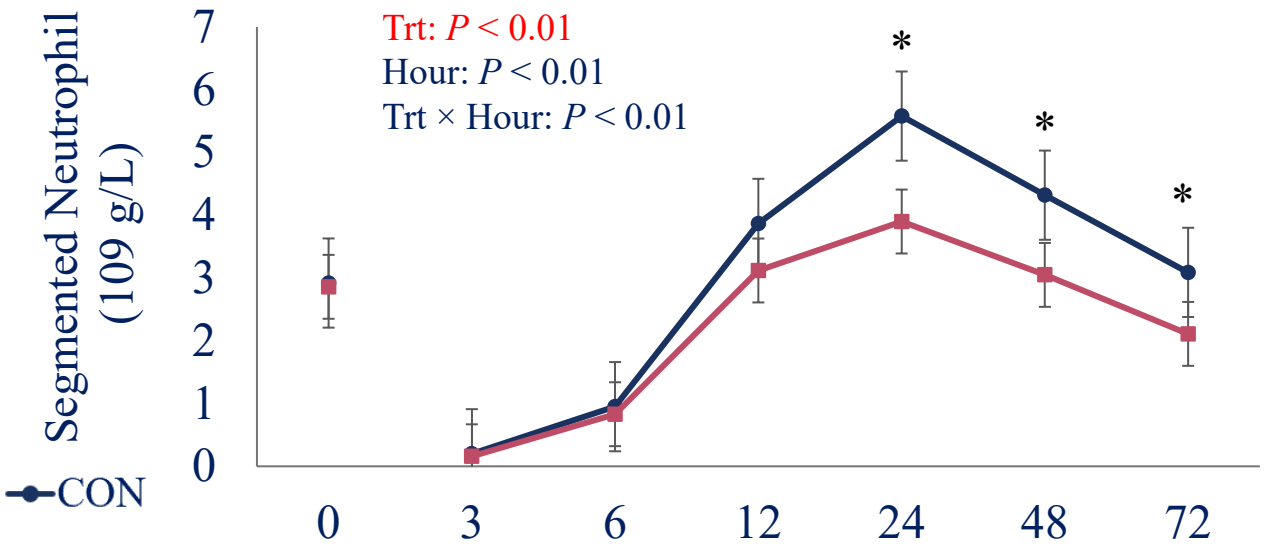
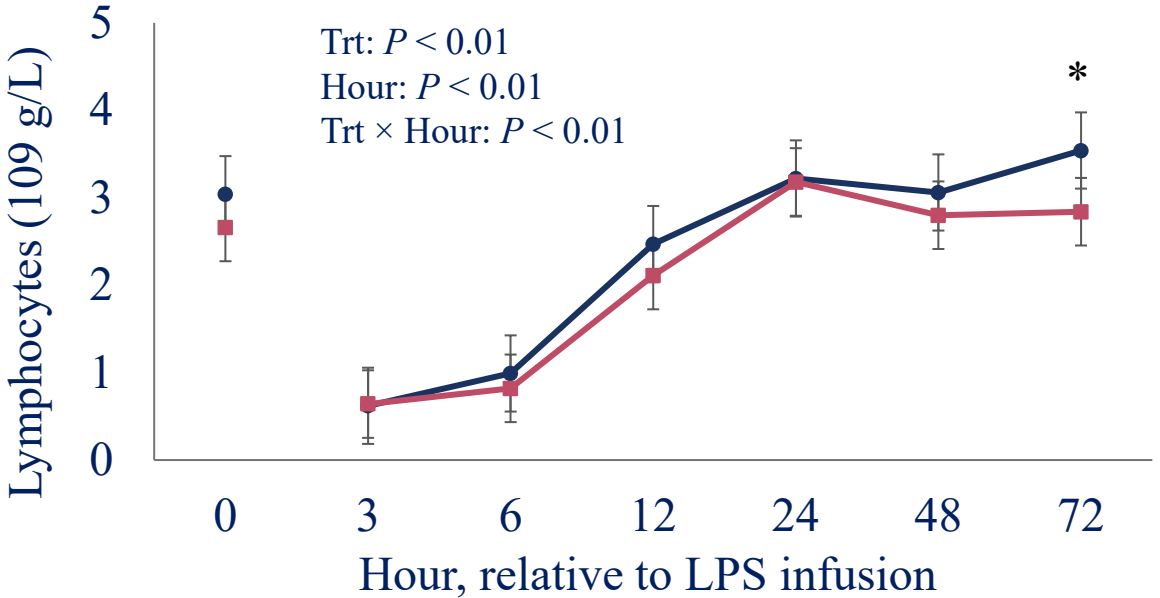
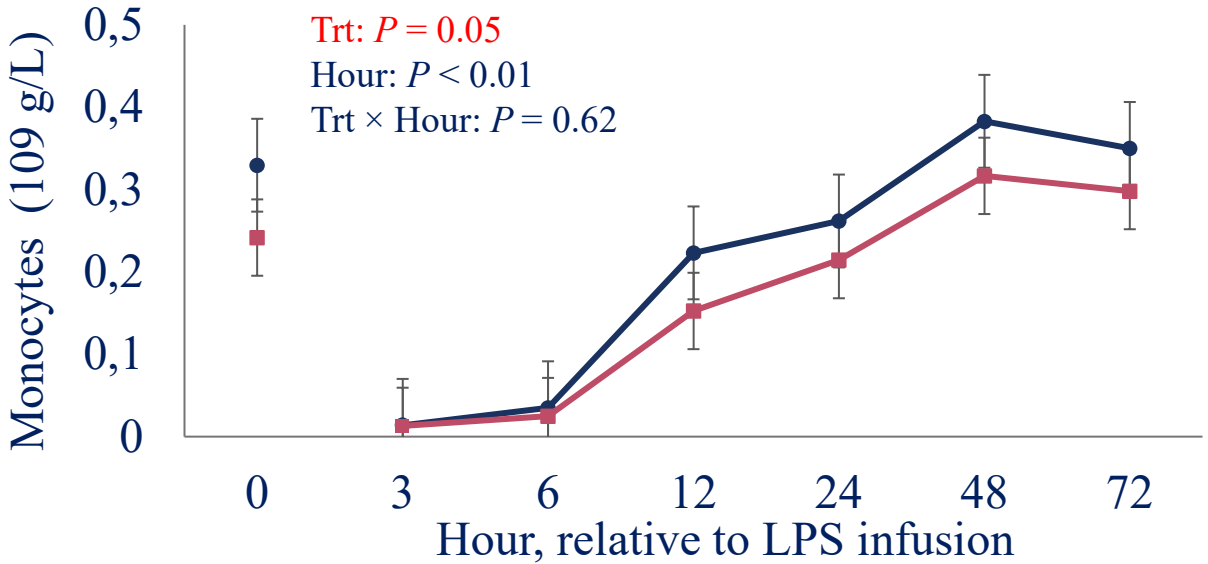
- Mitigate immune response?

LPS-CHALLENGE (DAY 72, RELATIVE TO CALVING): IMMUNE CELLS









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[1]Shakira et al., 2018; [2]Villot et al., 2019; [3]Cangiano et al., 2023; [4]Desnoyers et al., 2009; [5]Giang et al., 2010; [6]Yan and Kim, 2011; [7]Czerucka et al., 2007; Moré et al., 2018[8]

TAKE HOME MESSAGE

- Supplementation of the live yeast SCB:
  - ↑ 3.5% Fat-corrected and energy-corrected milk
  - ↓Gut permeability
  - ↓ Immune cell concentration in transition and early lactation period and during LPS challenge

Rumen conditions

Feeding behavior

Milk fat composition

?

Microbiota profiles

Calves performances

Colostrum quality

THANK YOU

- Steele Lab members
- Ontario Dairy Research Centre

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TO GO FURTHER:

Wednesday Sept 4th -16:30

Session 89

Room: **Chianina** - Palazzo Affari 1st Floor

Florence 1-5 september 2024

Production efficiency during the early postpartum of dairy cattle supplemented with *Saccharomyces cerevisiae boulardii* live yeast

Villot, C.; Bart, A.; Chevaux, E.; Goossens, K.

E-mail: cvillot@lallemand.com

Abstract

- Inflammation in dairy cows, during the transition period, is thought to be related to increased gut permeability, and could be a source of impaired performances in early lactation. The aim of the study was to investigate if the supplementation of Saccharomyces cerevisiae boulardii CNCM I-1079 (SCB) could alleviate these challenges. Eighty-three multiparous (n = 52; MP) and primiparous (n = 31; PP) cows were blocked by previous 305-d milk yield, parity, body condition score (BCS), and body weight (BW), and randomly assigned to either prepartum and postpartum control (CON; n = 43) or SCB (n = 40) dietary treatments. SCB had no effect on dry matter intake (DMI) but increased 3.5% fat-corrected milk (FCM) and energy corrected milk (ECM) yield. Milk fat content and yield were greater with SCB. Ruminal indigestible marker Cr-EDTA was dosed for gut permeability assessment. Cr area under the curve (AUC) was greater on day 7 compared than day 70 postpartum, indicating increased permeability during early lactation. SCB tended to reduce Cr AUC, suggesting improved gut integrity. These results suggest SCB may enhance milk performance due to limiting the gut leakage during the transition in dairy cows.