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

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Live yeast supplementation & dairy cow performances

Live yeast Saccharomyces cerevisiae (Sc)

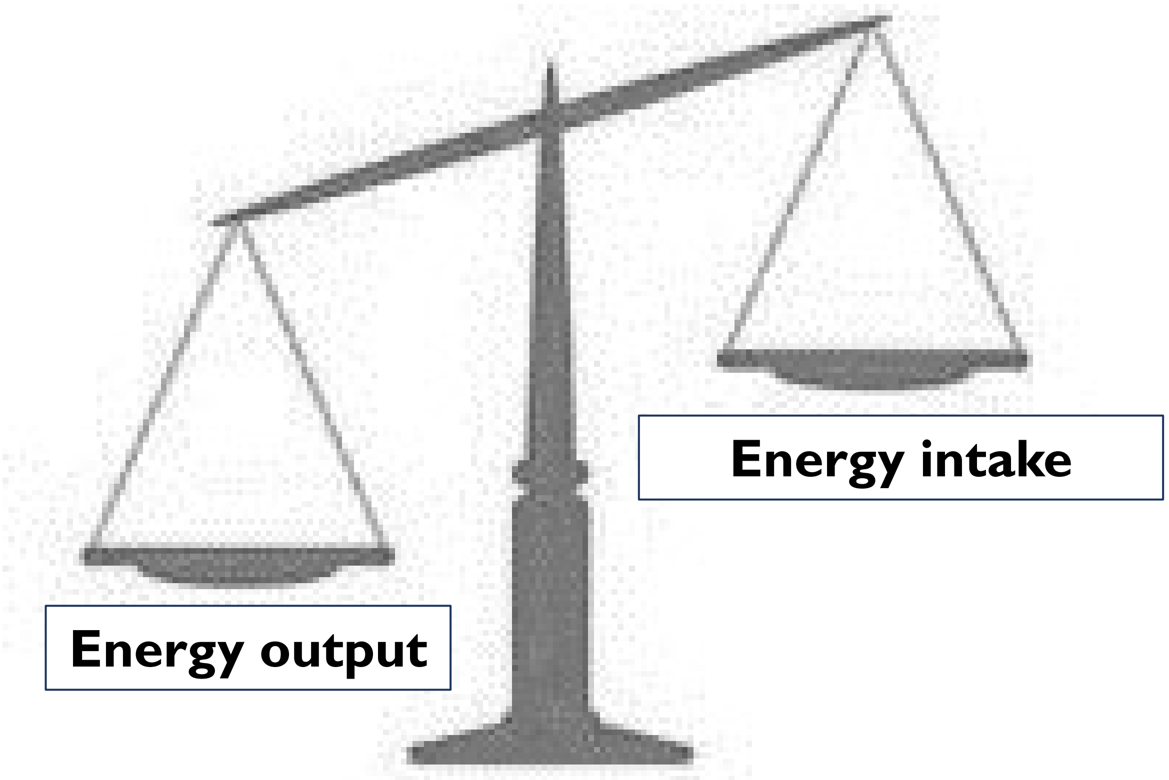
Dietary supplementation

- ↑ **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



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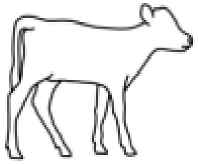
Rapid physiologic and metabolic changes

Can dietary live yeast improve transition cow performance?

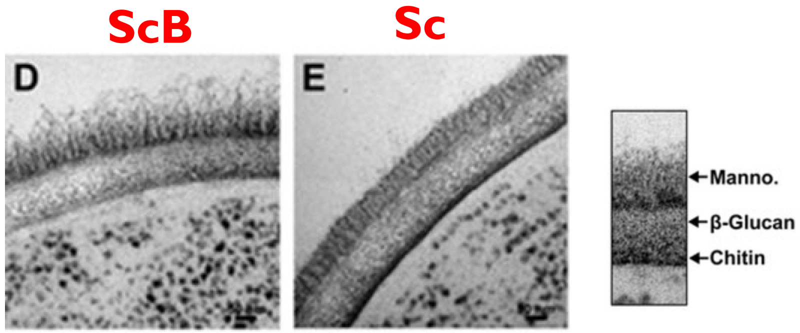
***Saccharomyces cerevisiae boulardii* (SCB)** CNCM I-1079

Dietary supplementation

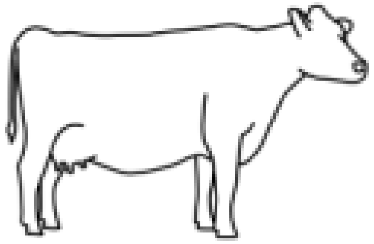


- ↓ incidence of diarrhea[1,2]
- ↑ ADG[1, 3]
- ↑ production of IgA[4]

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



Hudson et al., 2016 Plos One



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

Hiltz et al., 2023

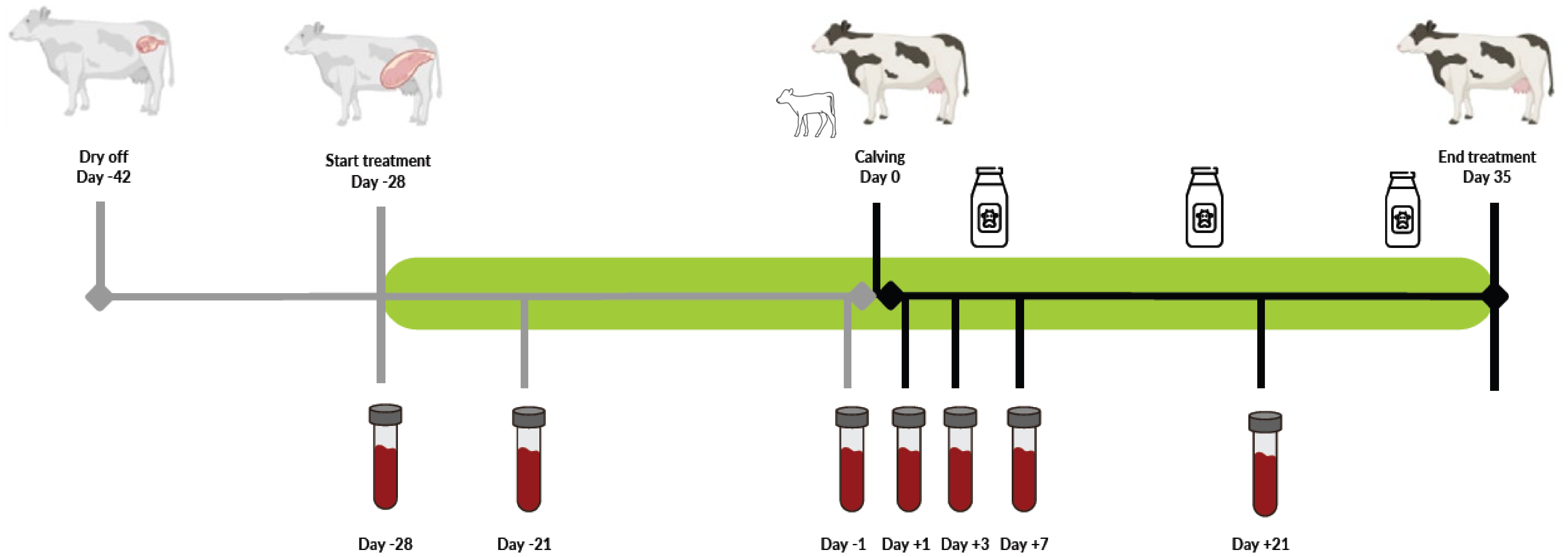
OBJECTIVE

- To evaluate the effects of SCB supplementation on performance and metabolism of transition cows.

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

Experimental design



40 **MP** Holstein cows fed the same corn-based TMR diet supplemented with or without ***Saccharomyces cerevisiae boulardii*** **CNCM I-1079 (included in the concentrate targeting 5 x10^8 cfu of SCB/kg complete feed)**

Material & Methods

	Overall (n=40)	CTRL (n=20)	SCB (n=20)
Parity	1.8 ± 0.8	1.8 ± 0.8	1.8 ± 0.8
305 MP, kg	10,143 ± 1,625	10,250 ± 1,929	10,035 ± 1,293
BW, kg	770 ± 84	750 ± 85	761 ± 84
Milk fat	4.3 ± 0.41	4.2 ± 0.43	4.3 ± 0.40
Milk protein	3.6 ± 0.21	3.5 ± 0.23	3.6 ± 0.18

- Group pen with individual feed record Individual feed intake and milk production.
- Effect of treatment was analysed with a linear mixed model in R. The interaction between **treatment, parity of the cows and week/sampling day** was evaluated and if significant included in the model.

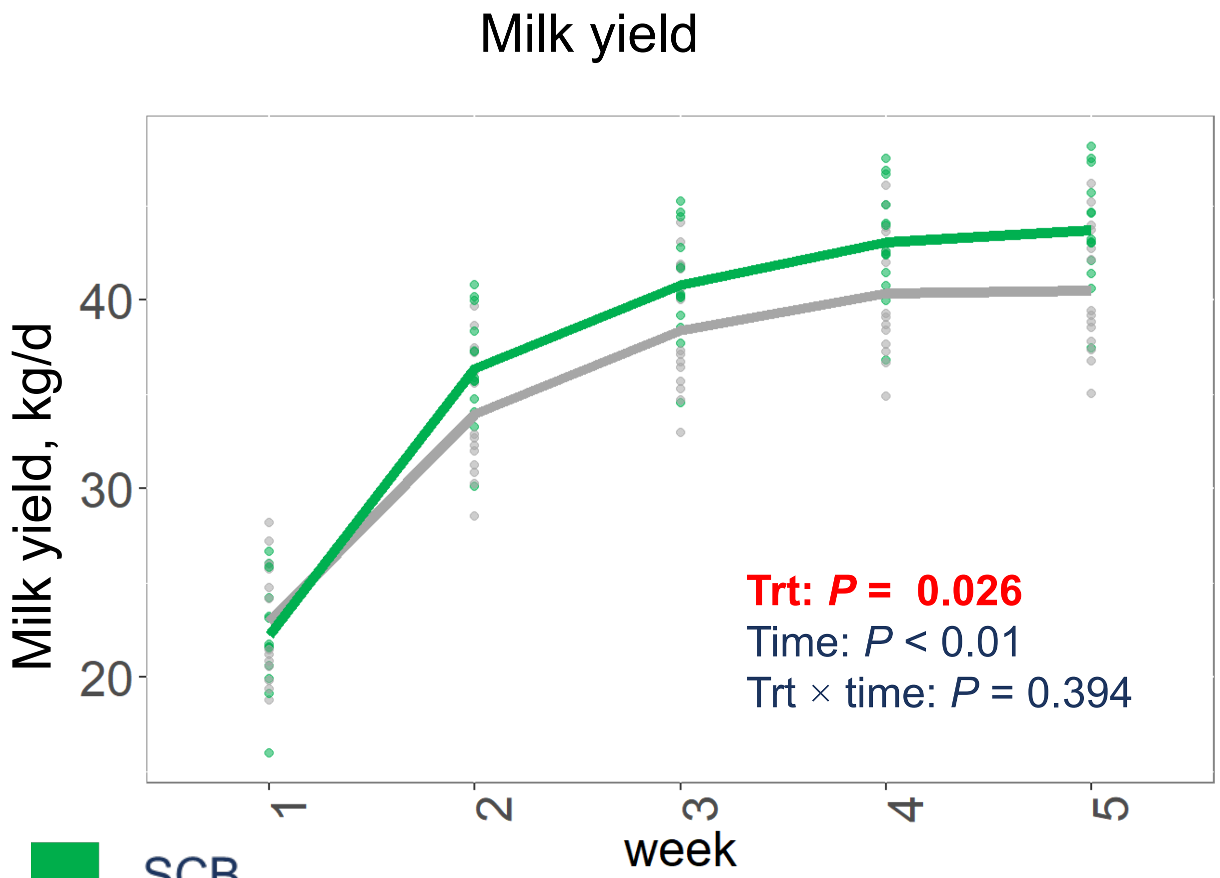
Nutrient Content of Diets

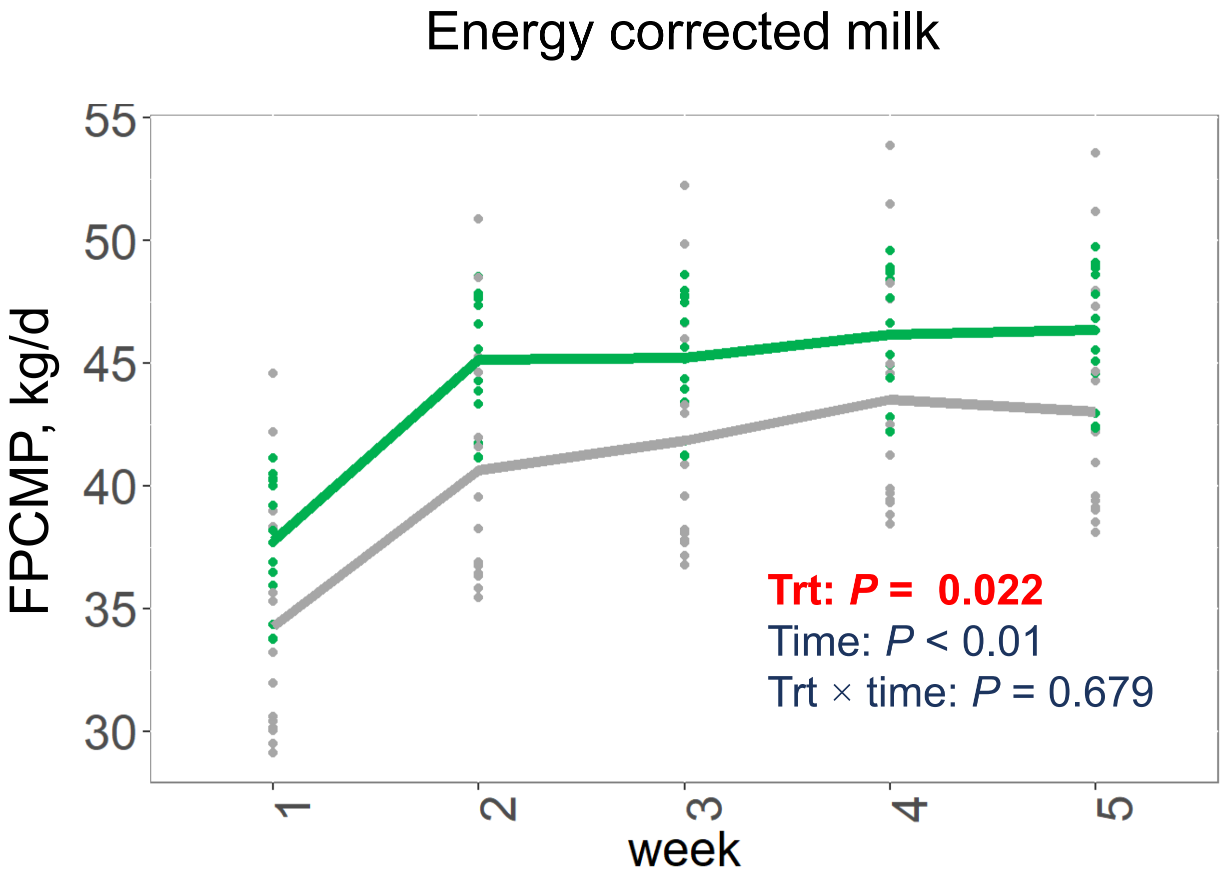
Cows fed common corn silage-based PMR +
dietary treatment added to the concentrate (AMS):

Nutrient content	Far-off	Close-up	Lactation
DM, g/kg of FM	58.9	50.4	53.8
Starch, % of DM	21.8	20.4	20.2
NDF, % of DM	44.3	35.0	33.3
CP, % of DM	12.1	14.0	15.5
Crude fat, % of DM	2.15	2.56	2.48
NE_L, Mcal/kg	1.41	1.62	1.65

RESULTS

Milk yield





SCB

CTRL

FPCMP= MY × [0.337 + (0.116 × milk fat %) + (0.06 × milk protein %)]
(Subnel et al., 1994)

Milk components

Variable	CTRL	SCB	SEM	TRT*PAR	Week	Trt	PAR
Milk fat, %	4.77	4.90	0.157	NS	<0.001	0.297	0.349
Fat yield, g/day	1780	1904	73.6	0.025	<0.001	0.031	<0.001
Milk protein, %	3.40	3.36	0.065	NS	<0.001	0.993	0.869
Protein yield, g/day	1286	1302	31.7	0.043	<0.001	0.120	0.001
Milk lactose, %	4.77	4.82	0.035	NS	<0.001	0.860	0.029
Lactose yield, g/day	1818	1903	53.0	0.014	<0.001	0.048	<0.001
Milk SCC, log cells/mL	4.72	4.52	0.196	NS	0.403	0.148	0.783
MUN, mg/dL	11.3	10.4	0.52	0.014	<0.001	0.003	0.000
Feed-efficiency	2.04	2.18	0.089	NS	0.065	0.061	0.014

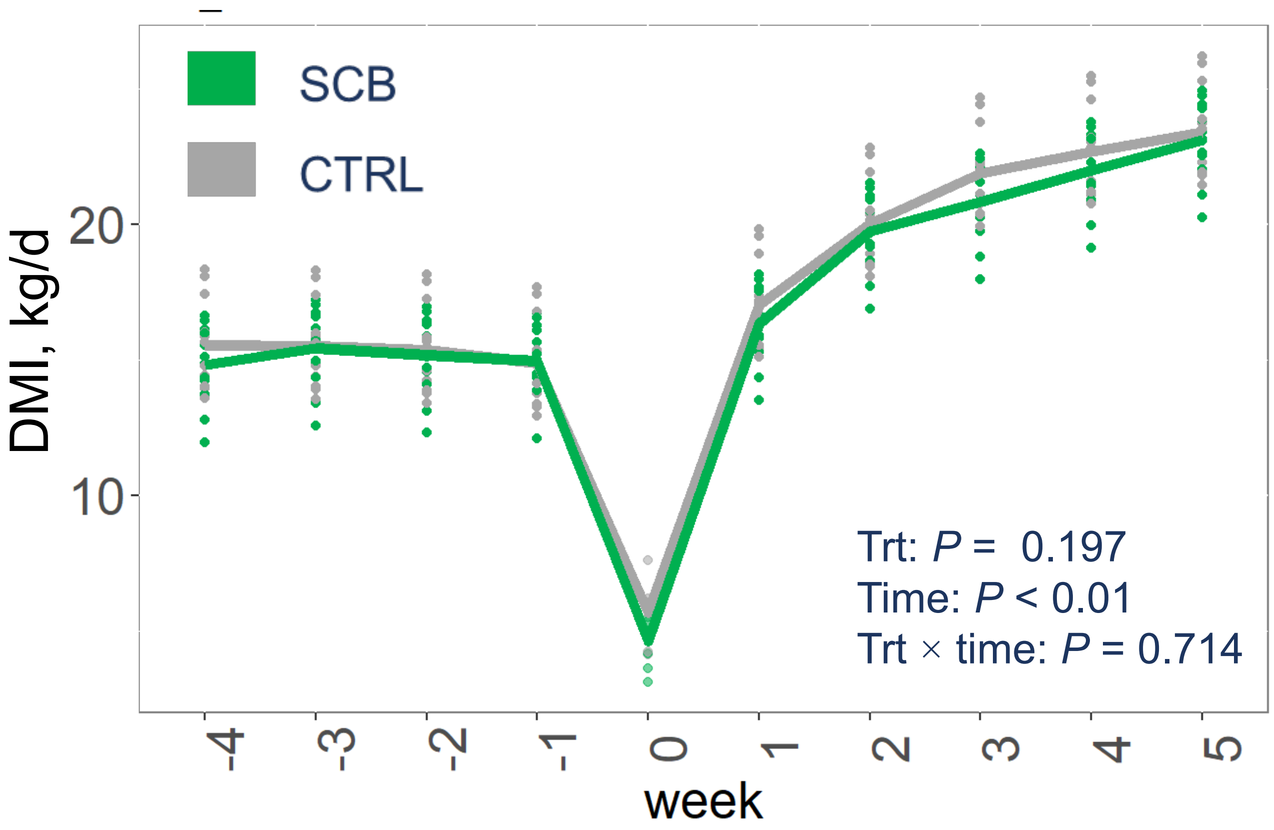
Improved feed efficiency during early lactation

Why does SCB improve performances at early lactation?

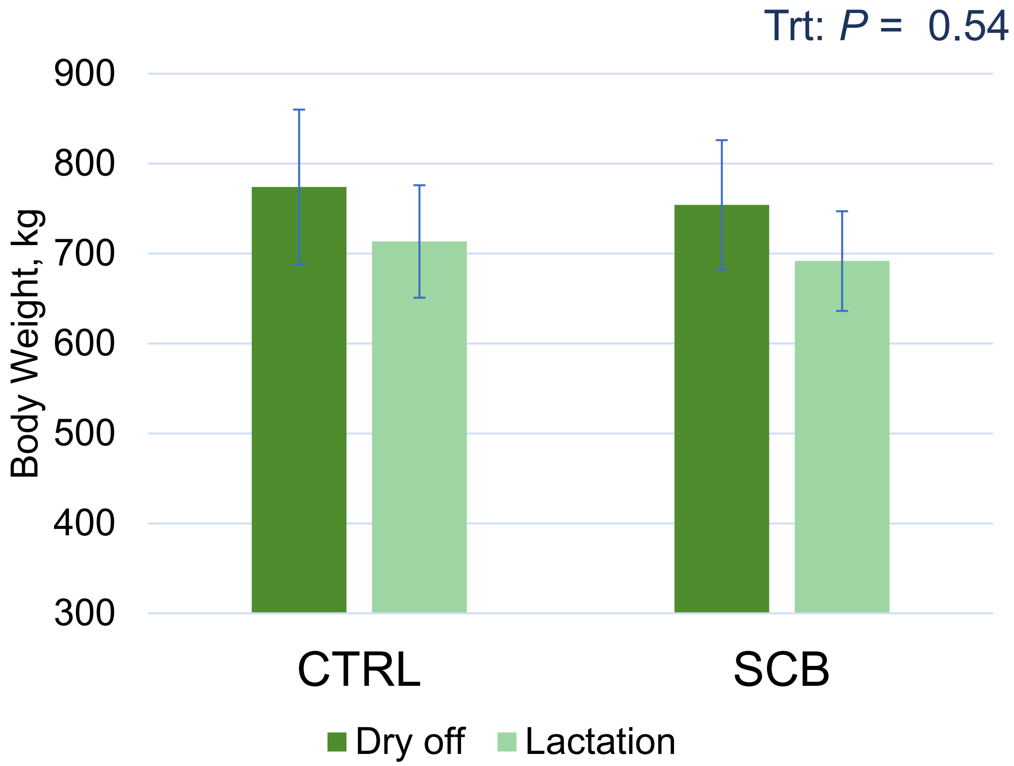
- Higher fat mobilization
- Impact energy metabolism
- Enhanced immune response
- Reduced gut permeability
- Altered GIT microbiota
- Increased nutrient digestibility or absorption

Intake & BW

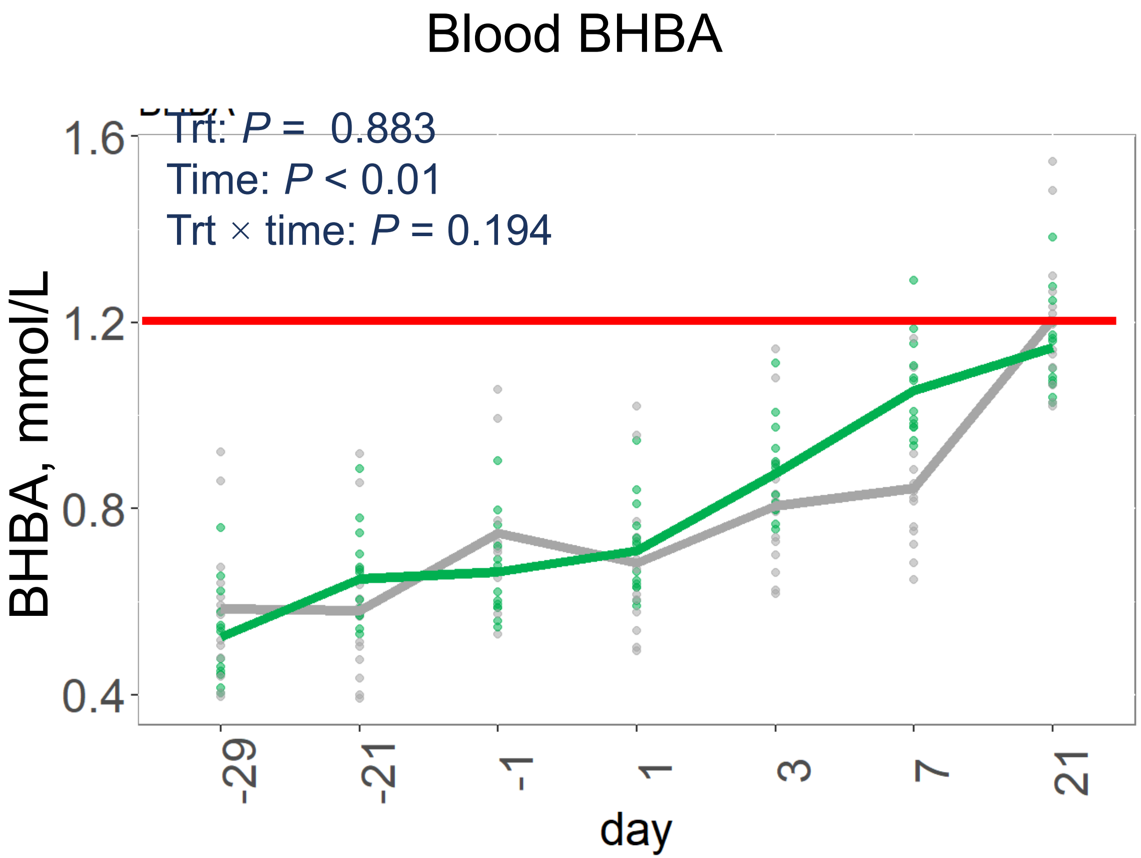
Dry matter intake

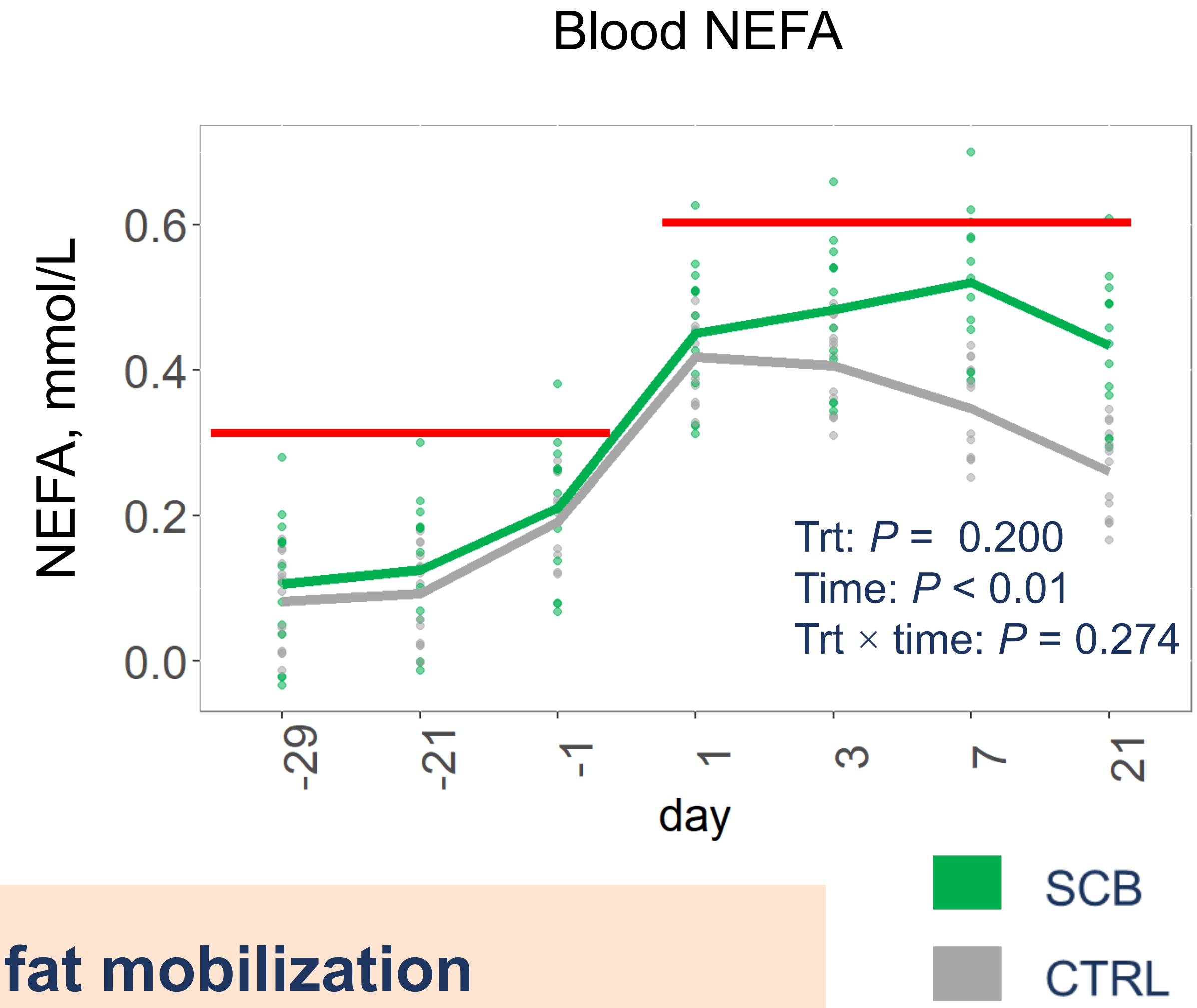


Body Weight



Blood parameters





No difference in fat mobilization

Why does SCB improve performance at early lactation?

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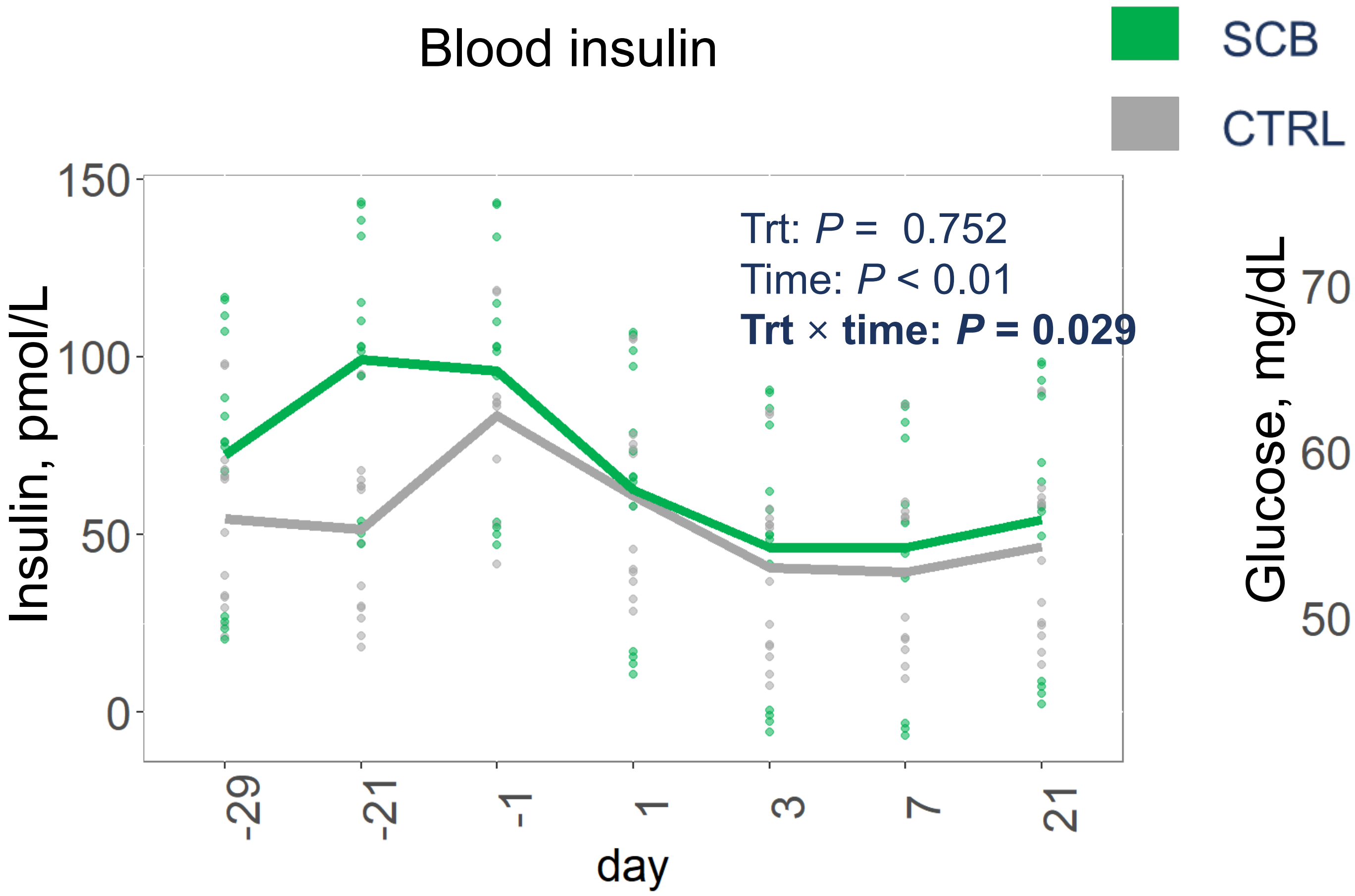
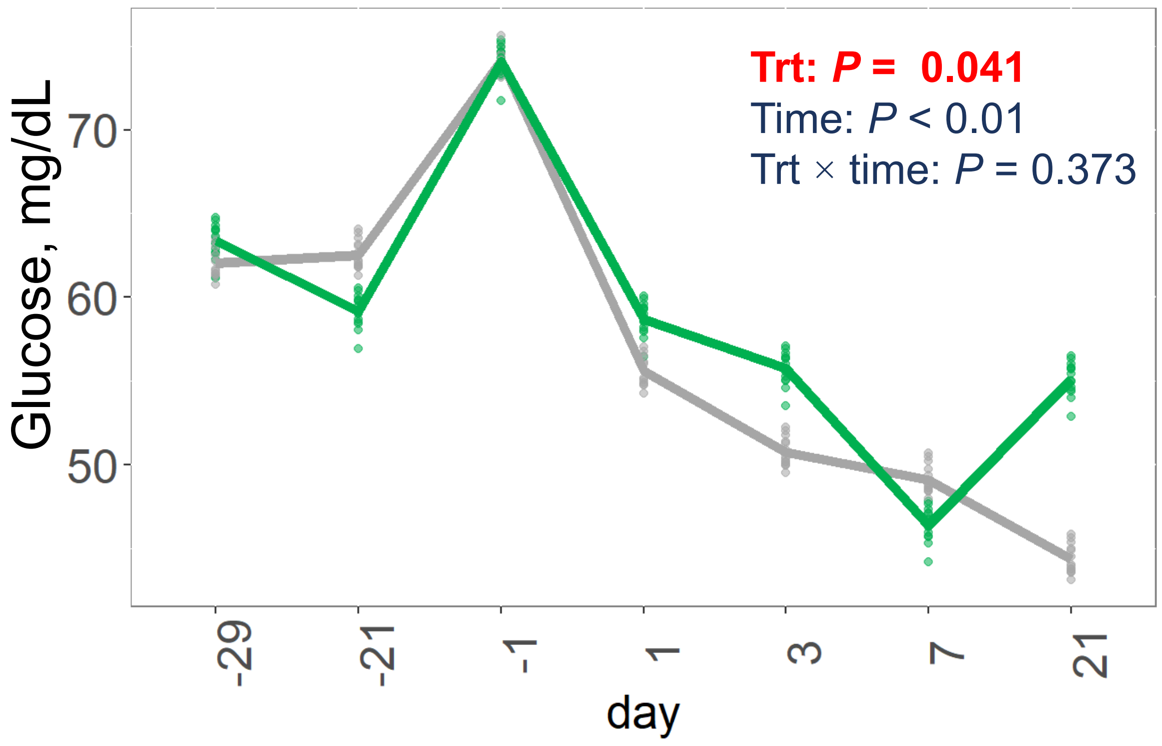
Glucose metabolism





More glucose was measured in the blood of SCB after calving without impacting the insulin level

Why does SCB improve performance at early lactation?

- Higher fat mobilization ✗
- Impact energy metabolism ✓
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- Reduced gut permeability
- Altered GIT microbiota
- Increased nutrient digestibility or absorption

Blood formula & clinical health

- No difference for clinical disease (25%) between treatment

Variable	CTRL	SCB	SEM	DAY	TRT	PAR
Haptoglobin (g/L)	0.54	0.56	0.06	0.003	0.897	0.540
Erythrocytes (10E6/µl)	6.17	6.09	0.16	<0.001	0.814	0.052
Hematocrit (%)	32.12	32.26	0.57	<0.001	0.739	0.825
Hemoglobin (g/dL)	10.34	10.44	0.19	<0.001	0.492	0.955
MCV (fL)	52.26	53.04	0.91	0.083	0.635	0.003
MCH (pg/cel)	16.81	17.14	0.28	<0.001	0.437	0.006
MCHC (g/dL)	32.17	32.39	0.17	0.001	0.155	0.234
red.cell.distribution (%)	23.02	22.19	1.05	0.009	0.475	0.358
Leukocytes (10E3/µL)	7.82	7.68	0.44	0.004	0.961	0.069
Neutrophils (/µL)	4292	4177	413	0.001	0.987	0.453
Lymphocytes (/µL)	2606	2547	181	0.127	0.552	0.036
Monocytes (/µL)	**488**	**575**	**64**	**0.015**	**0.080**	**0.970**
Eosinophils (/µL)	318	333	61	<0.001	0.744	0.269
Basophils (/µL)	**42.3**	**48.9**	**5.9**	**0.124**	**0.064**	**0.116**
Platelets (10E3/µL)	281	302	21	0.002	0.307	0.073

Why does SCB improve performance at early lactation?

- Higher fat mobilization ✖
- Impact energy metabolism ✓
- Enhanced immune response ?
- Reduced gut permeability
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Why does SCB improve performance at early lactation?

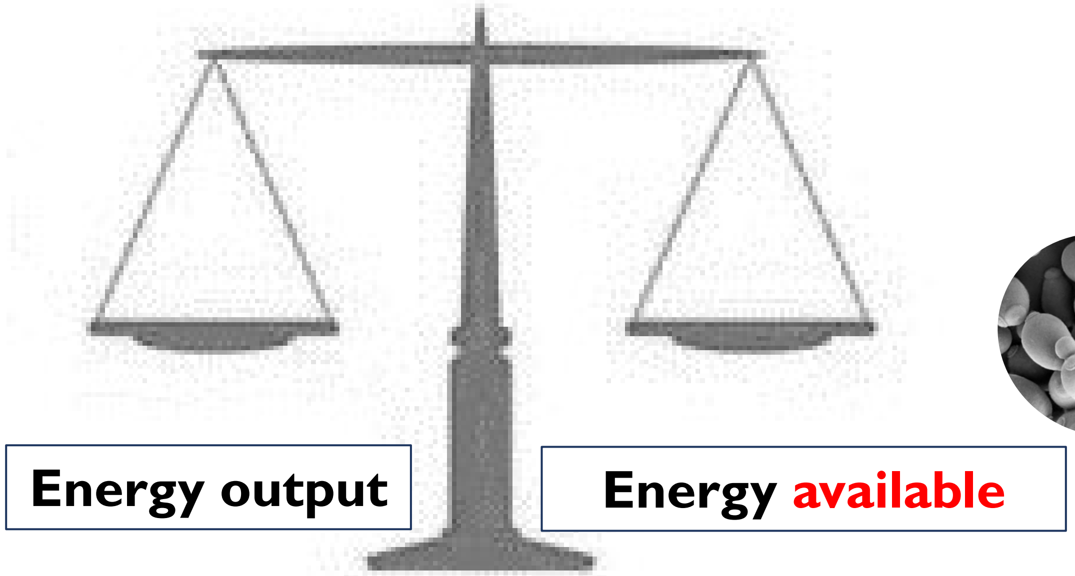
- Higher fat mobilization ✗
- Impact energy metabolism ✓
- Enhanced immune response ?
- Reduced gut permeability
- Altered GIT microbiota[1,2,3]
- Increased nutrient digestibility[4,5,6] or absorption?[7,8]

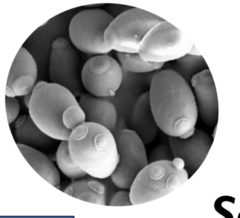
Cf Guelph study

[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 during the transition period increased milk production and milk efficiency thanks to the improved energy metabolism at early stage of lactation





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

THANK YOU

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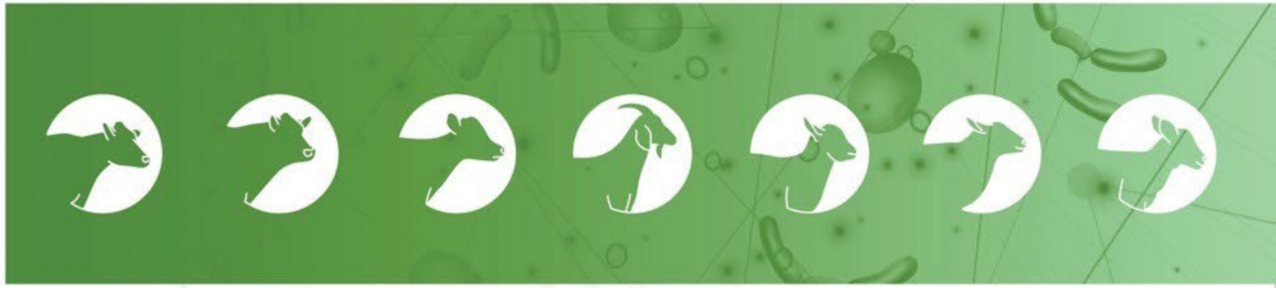

Asbtract

- The transition period in dairy cows presents a complex phase, with both nutritional and physiological changes potentially affecting immune function and disease resistance. Saccharomyces cerevisiae boulardii has recently demonstrated health benefits in young ruminants. In a trial performed at the ILVO dairy cattle barn, 40 Holstein Friesian cows in transition (n=17 for parity 2 and n=23 for parity >2), received a control diet (CON) or a diet supplemented with S. cerevisiae boulardii CNCM I-1079 (1×1010 CFU/d) from days -28 till +35 from calving (SCB). Whereas no difference in total DMI postpartum was reported for cows in parity 2 (18.3 kg/d), a significant lower DMI was depicted in SCB cows in parity >2 compared to CON (19.2 vs 17.8 kg/d, P=0.012). The live yeast supplementation during early postpartum had beneficial effects on milk production, especially for dairy cows in their first transition period (34.7 vs 38.8 kg/d, P=0.014). Fat and protein corrected milk was also improved in parity 2. The nitrogen efficiency was higher in SCB cows, irrespective of parity (39.2 vs 41.1 %, P=0.02). Consequently, an improved feed efficiency independently of parity in SCB cows (2.04 vs 2.18 , P=0.06) was depicted. NEFA and BHBA concentrations tended to be higher in plasma of SCB cows at start of lactation (Goossens et al., 2024), but stayed below the reported physiological reference values without leading to increased metabolic transition disorders. Total somatic cell counts was not different between group (4.6 log10 SCC/mL). In conclusion, by promoting fat mobilization in a physiological range, S. cerevisiae boulardii can increase milk efficiency in early lactation without affecting the risk of metabolic transition problems.