Effects of live yeast and selenium supplementation on rumen parameters in long-transported Charolais bulls

Santinello[1], M., Lora[2], I., Villot[3], C., Cozzi[2], G., Penasa[4], M., Chevaux[3], E., Martin[3], B., Guerra[4], A., Simoni[5], M., De Marchi[4], M.

[1]*University of Padova, Department of Medicine (DIMED), Via Giustiniani, 2, 35128 Padova, Italy*

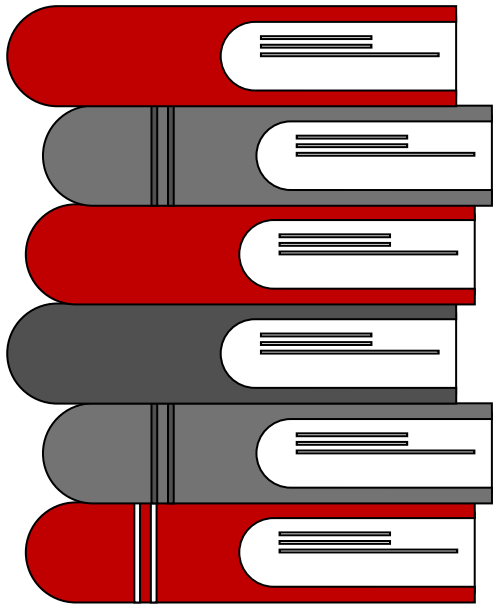
[2]*University of Padova, Department of Animal Medicine, Production and Health (MAPS), Viale dell'Università, 16, 35020 Legnaro (PD), Italy*

[3]*LALLEMAND SAS, Rue des Briquetiers, 9, 31702 Blagnac, France*

[4]*University of Padova, Department of Agronomy, Food, Natural resources, Animals and Environment (DAFNAE), Viale dell'Università 16, 35020 Legnaro (PD), Italy*

[5] *University of Parma, Department of Veterinary Science, Strada del Taglio 10, 43126 Parma, Italy.*

E-mail: **Matteo.santinello@unipd.it**



Introduction

INTRODUCTION: transport

Around **1.4 billion** animals are transported across Europe yearly, with over **125,000 long-distance journeys** (more than 8 h).

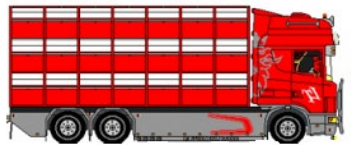
Long-distance transport induces severe **stress**, increasing **disease risk** and **mortality** in cattle (Ashenafi et al., 2018; Rumor et al., 2015).

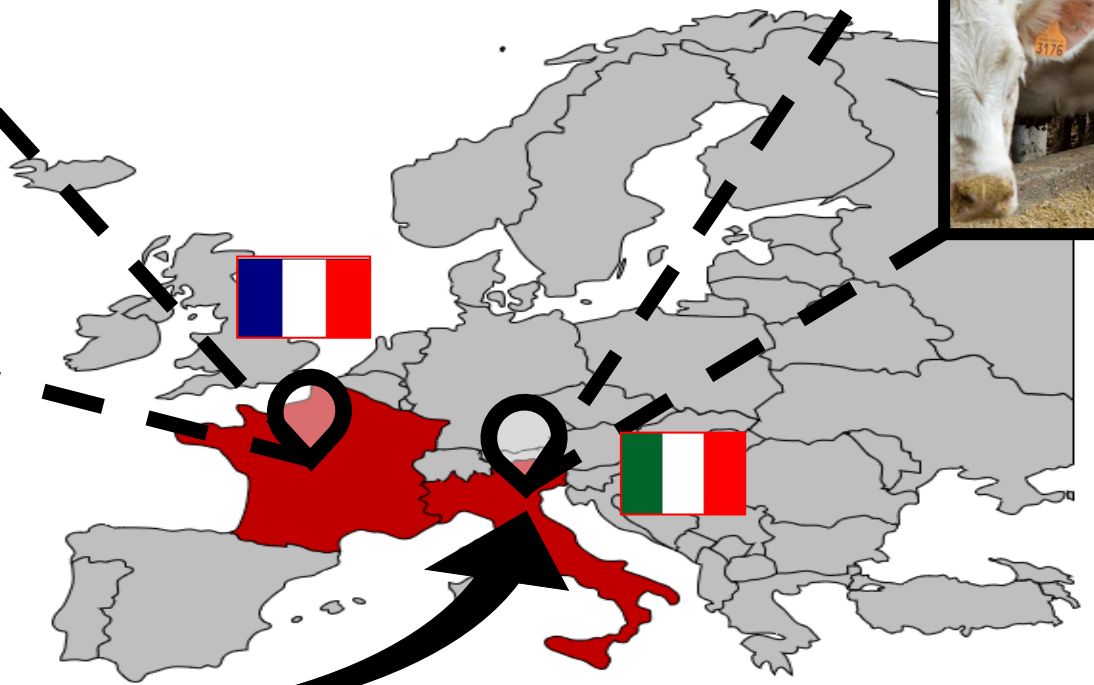
Monitoring stress rumen environment may mitigate transport-induced health issues (EFSA, 2022).

INTRODUCTION: Case study

Each year, around **900,000** young cattle are imported into Italy from France, commingled, and stratified by sex and BW before transport to fattening units (ISMEA, 2022).

Charolais





Specialised fattening units

INTRODUCTION: Possible stress mitigation strategies

Live Yeast: *Saccharomyces cerevisiae* improves cattle performance and **rumen health** by preventing subacute ruminal acidosis (SARA) reducing acid-producing bacteria mantaining **stable rumen environment** and boosting the activity of macrophages and other immune cells

Selenium: Selenium-enriched yeast boosts immune responses and reduces oxidative stress (**glutathione peroxidase**), helping manage stress from transport and dietary changes.

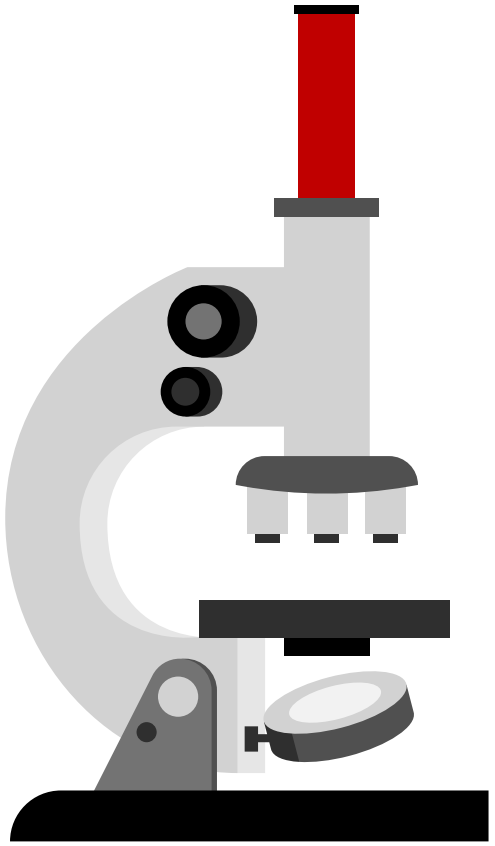
Immune responses

Gut health

Oxidative stress

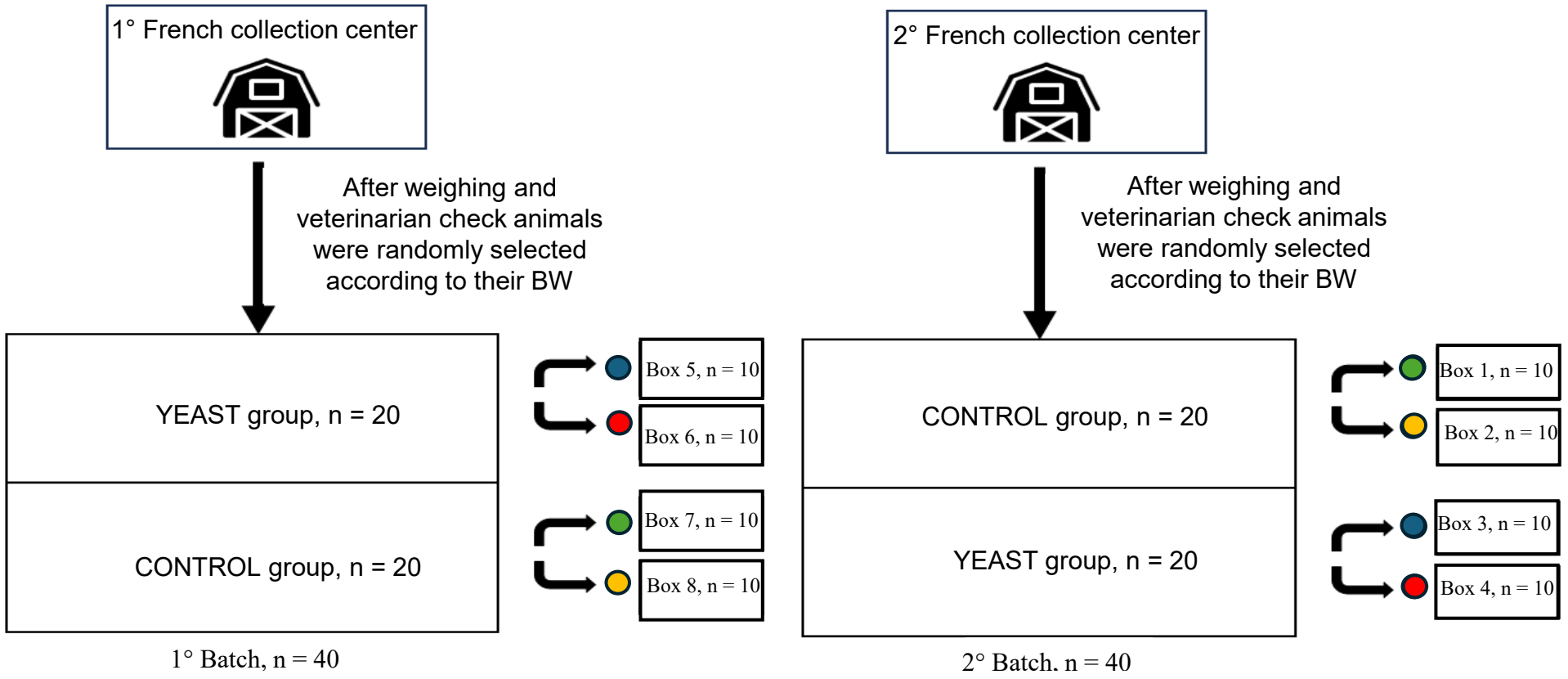
AIM OF THE STUDY

The study aimed to evaluate the effects of **live yeast** and **selenium-enriched yeast** supplementations on the **growth performance** and **rumen environment** of French Charolais young bulls transported for long-distance during the receiving period.



Materials and methods

MATERIALS AND METHODS: study design



Scale		Corridor					
8 CONTROL	7 CONTROL	6 YEAST	5 YEAST	4 YEAST	3 YEAST	2 CONTROL	1 CONTROL

MATERIALS AND METHODS: Yeast group

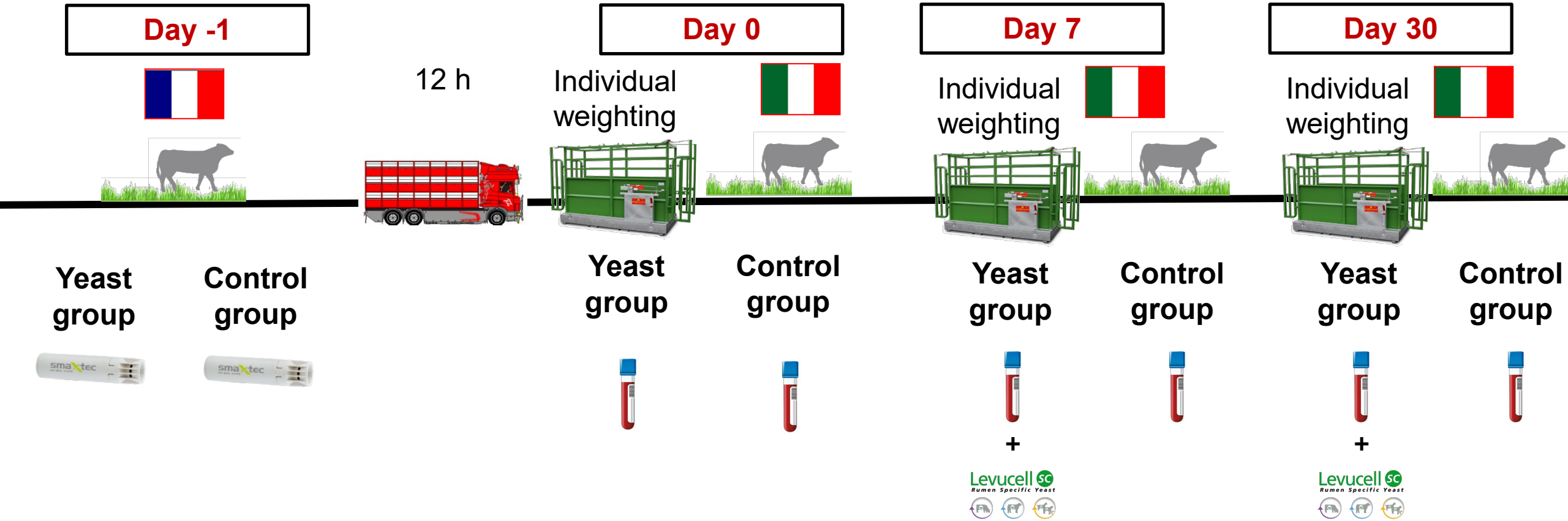
- **At their departure in France**, each animal of the yeast group received **2 slow-release bolus** containing **live yeast** and a **selenium-enriched bolus** which were designed to release 1.5 g/day of live yeast and 1.5 mg/day of selenium, respectively.

- **At their arrival in Italy**, each animal of the yeast group was supplemented with a total of **8×10^9 CFU/bull/day** of live yeast through the diet, equivalent to **100 g/day of yeast premix**.

Levucell SC
Rumen Specific Yeast

alkosel®
The Premium Source of Bioavailable Selenium

MATERIALS AND METHODS: study design



MATERIALS AND METHODS: Metabolites

Protein Profile, Energy Profile, Hepato-Muscle Profile, Mineral Profile, Stress profile

Reticulum-rumen sensors: temperature (°C), activity, rumination (min/day), pH were collected every 10 minutes in the first 30 days, except to transport.

MATERIALS AND METHODS: statistical analysis

The effects of transport and supplementation on metabolic profile and growth performance (ADG) at day 0, 7 and 30 have been analyzed through a generalized linear mixed model:

$$y_{ijklm} = \mu + Time_i + Supplementation_j + Pen_k(Supplementation_j) + (Time \times Supplementation)_{ij} + Age_l + animal_m + e_{ijklm}$$

MATERIALS AND METHODS: Sensor data

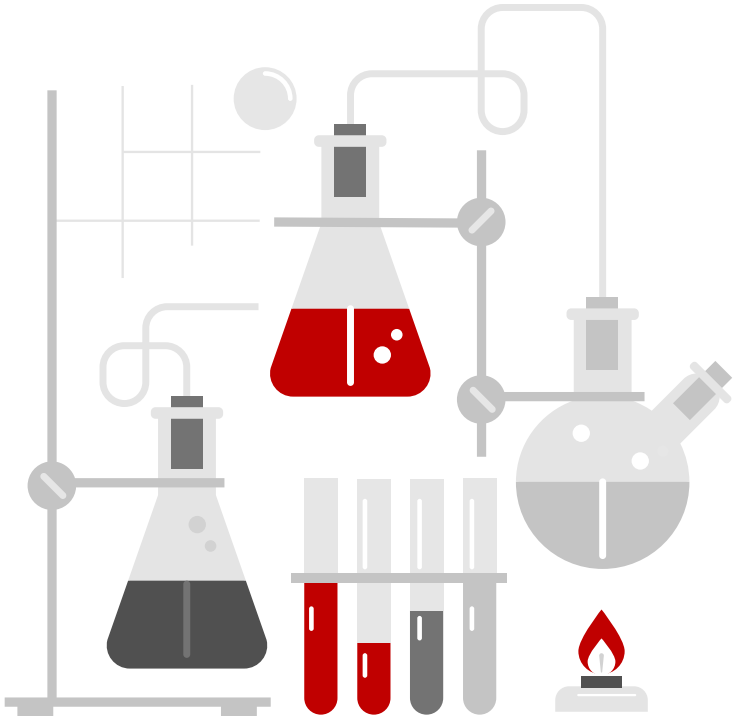
-Reticulo-rumen sensor data were analyzed using R software, averaging the 10 min measurements of the **4 days around day 7 and day 30** the pH pattern has been obtained.

-**Daily indicators** were calculated for pH, activity, rumination, and temperature.

- A **SARA** score was calculated based on pH magnitude, drops in pH and its variability *(Villot et al., 2008)*

-The following mixed model was used to assess the impact of supplementation on reticulo-rumen indicators separately for day 7 and 30:

$$y_{ijklmn} = \mu + supplementation_i + age_j + day_k + truck_l + bull_m(pen_n) + e_{ijklmn}$$

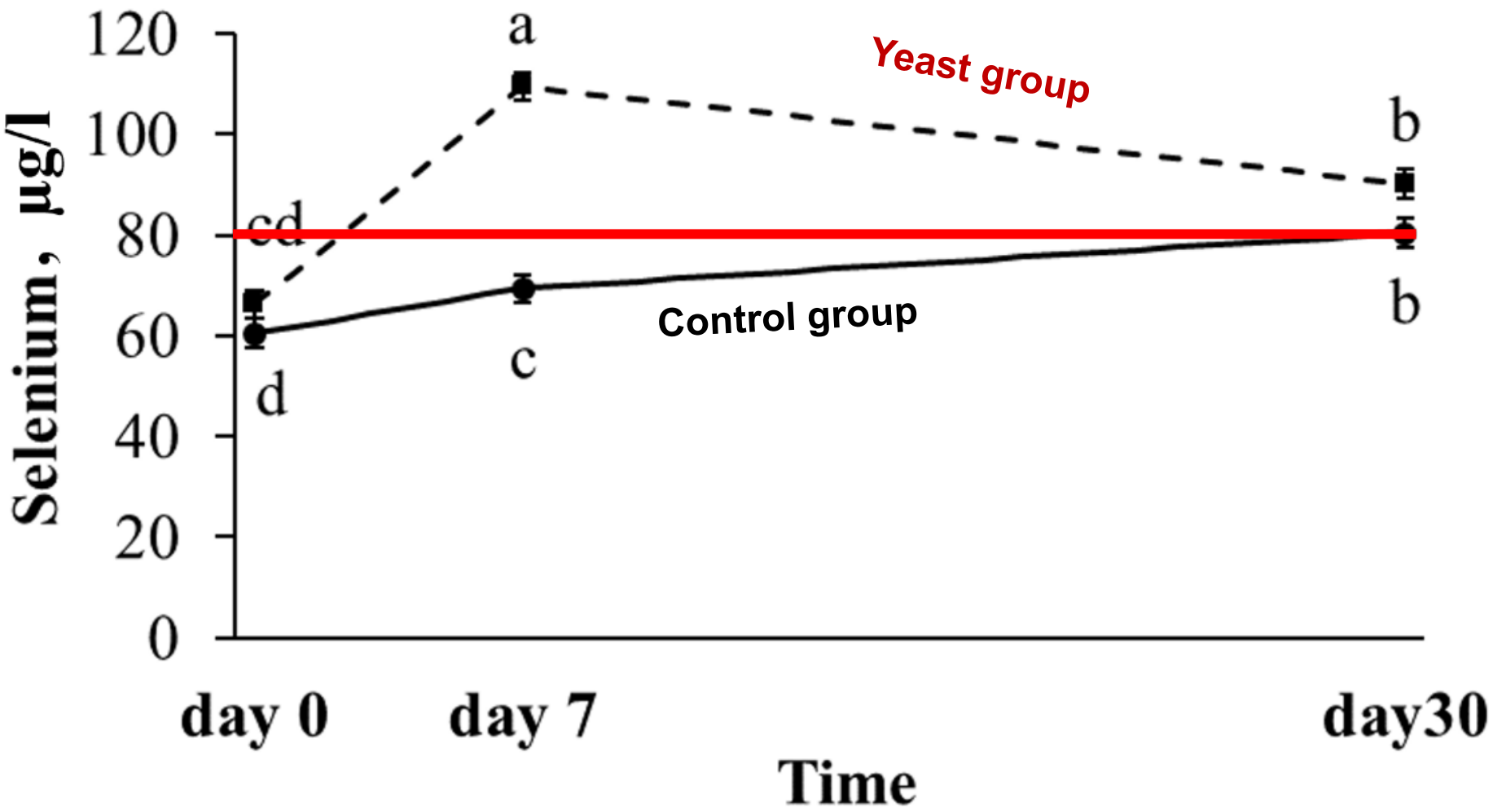


Results and discussion

RESULTS AND DISCUSSIONS: growth performance

Trait	Supplementation		SEM	*P*-value
	Control	Yeast		
Bulls, n	40	40		
Average daily gain, kg/day				
from day 0 to day 7	2.30	2.35	0.21	0.87
from day 7 to day 30	1.69	1.66	0.08	0.83
from day 0 to day 30	1.84	1.83	0.07	0.91

RESULTS AND DISCUSSIONS: Blood



More information can be retrieved scanning the QR Code to access the additional presentation that will be presented in EAAP in Florence (4th September, Session 77, 9.45 AM).

Changes in plasma metabolic profile of long-transported Charolais young bulls

Santinello[1], M., Lora[2], I., Villot[3], C., Cozzi[2], G., Penasa[4], M., Chevaux[3], E., Martin[3], B., Guerra[4], A., Righi, F., De Marchi[4], M.

[1]University of Padova, Department of Medicine (**DIMED**), Via Giustiniani, 2, 35128 Padova, Italy;

[2]University of Padova, Department of Animal Medicine, Production and Health (**MAPS**), Viale dell'Università, 16, 35020 Legnaro (PD), Italy;

[3]LALLEMAND SAS, Rue des Briquetiers, 9, 31702 Blagnac, France;

[4]University of Padova, Department of Agronomy, Food, Natural resources, Animals and Environment (**DAFNAE**), Viale dell'Università, 16, 35020 Legnaro (PD), Italy.

[5] University of Parma, Department of Veterinary Science, Strada del Taglio 10, 43126 Parma, Italy.

E-mail: Matteo.santinello@unipd.it

Florence 1-5 september 2024

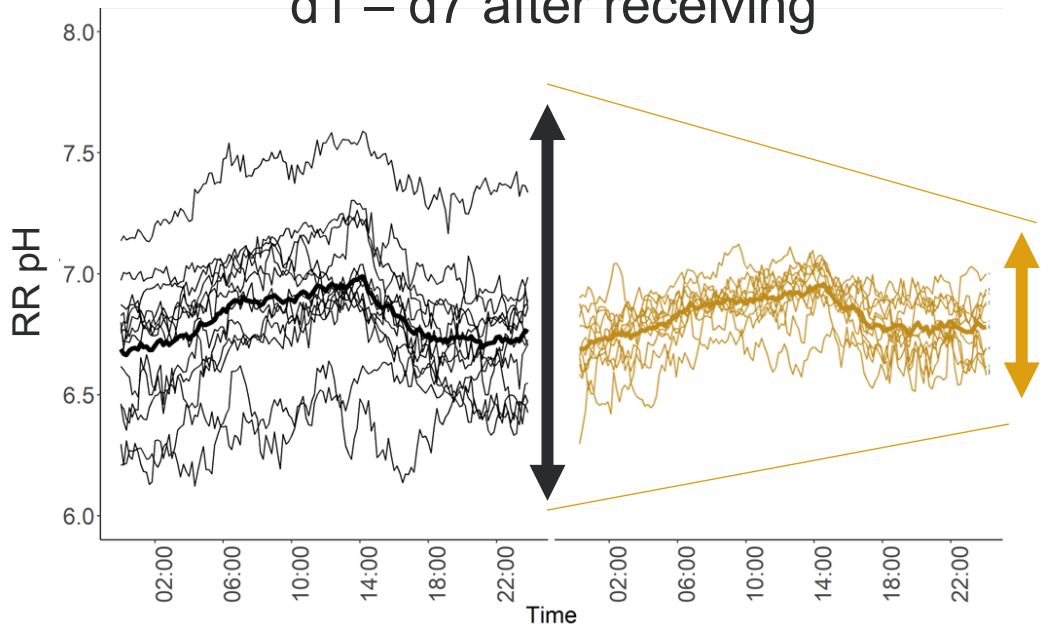
RESULTS AND DISCUSSIONS: Reticulum-rumen traits

Trait	Supplementation		SEM	*P*-value
	Control	Yeast		
Day 7				
N of bulls with pH bolus	13	13	-	-
Daily pH mean	6.94	6.97	0.06	0.69
Daily pH amplitude	0.68[a]	0.58[b]	0.03	0.04
Daily pH standard deviation	0.17[a]	0.13[b]	0.01	0.01
pH drops, number/d	3.85[b]	4.54[a]	0.29	0.03
Daily SARA-positive, % of animals[3]	36.0[a]	12.8[b]	6.00	0.01
N bulls with temperature bolus	17	17	-	-
Activity, reference unit	6.52	6.56	0.24	0.91
Rumination, min/d	396	428	13.1	0.09
Temperature, °C	39.9	39.8	0.05	0.82
Day 30				
N of bulls with pH bolus	13	13	-	-
Daily pH mean	7.01	6.95	0.11	0.56
Daily pH amplitude	0.75	0.76	0.08	0.88
Daily pH standard deviation	0.17	0.17	0.02	0.92
pH drop, number/d	4.11	4.10	0.29	0.99
Daily SARA-positive, % of animals	16.1	17.8	7.00	0.85
N of bulls with temperature bolus	17	17	-	-
Activity, reference unit	4.43	4.77	0.27	0.36
Rumination, min/d	347[b]	386[a]	12.6	0.03
Temperature, °C	39.9	39.9	0.03	0.76

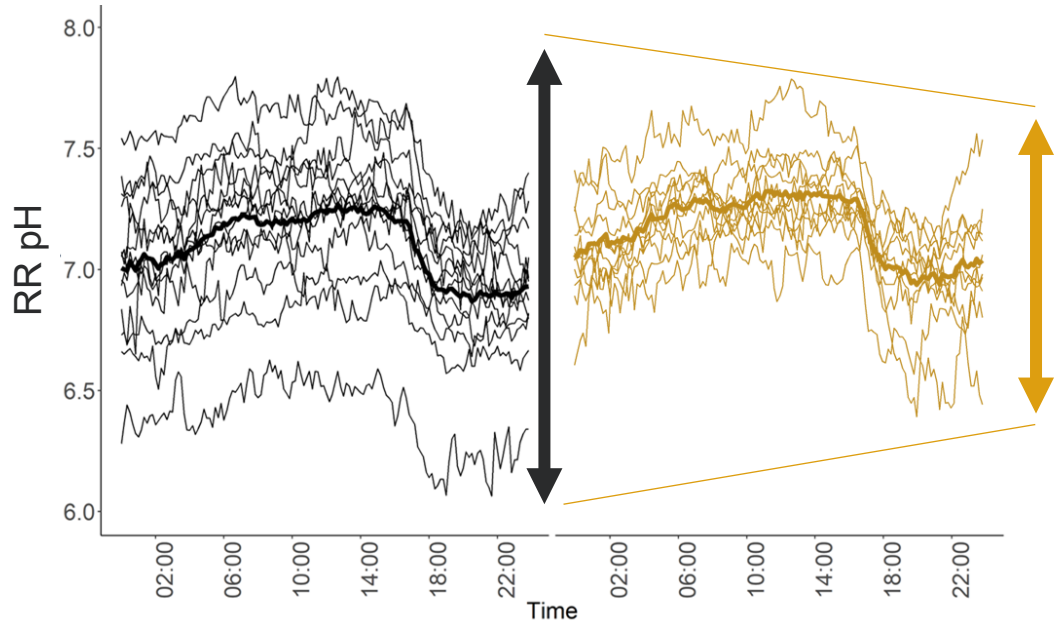
RESULTS AND DISCUSSIONS: reticulo-rumen (RR) pH

Evolution of **inter-animal** variability of **daily** RR pH

d1 – d7 after receiving



d23 - d30 after receiving



Less heteregenous pH when animals are supplemented
=> Stabilization of rumen environnement

CONCLUSIONS

CONCLUSIONS

✓ **Slow-release bolus** delivered for long-transportation :
- did not affect growth performance.
- reduced rumen **pH variability** and **SARA** cases.
- Increased **selenium** level in the blood of Yeast group.

✓ **Live yeast** supplementation increases **rumination time** at day 30 without improving overall performance during the first 30 days of fattening.

THANK YOU