Resilience to acute underfeeding in dairy sheep diverging in feed efficiency: 2) Blood parameters

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INTRODUCTION

In the current scenario of climate change and economic instability, it can be expected that livestock will **increasingly** face **nutritional challenges**.

Resilience (understood as the ability of an animal to revert quickly to high production and health status in response to a perturbation) would therefore be of great importance. However, animal breeding is still focused on higher production or, at best, higher feed efficiency (FE).

Yet, it is uncertain whether **improving FE** could detrimentally **affect resilience**, particularly in small dairy ruminants.

OBJECTIVE

Examine the **relationship between resilience and FE**; namely, to compare the variation in some **blood metabolites** in dairy ewes phenotypically **divergent for FE** and **subjected to an acute nutritional challenge.**
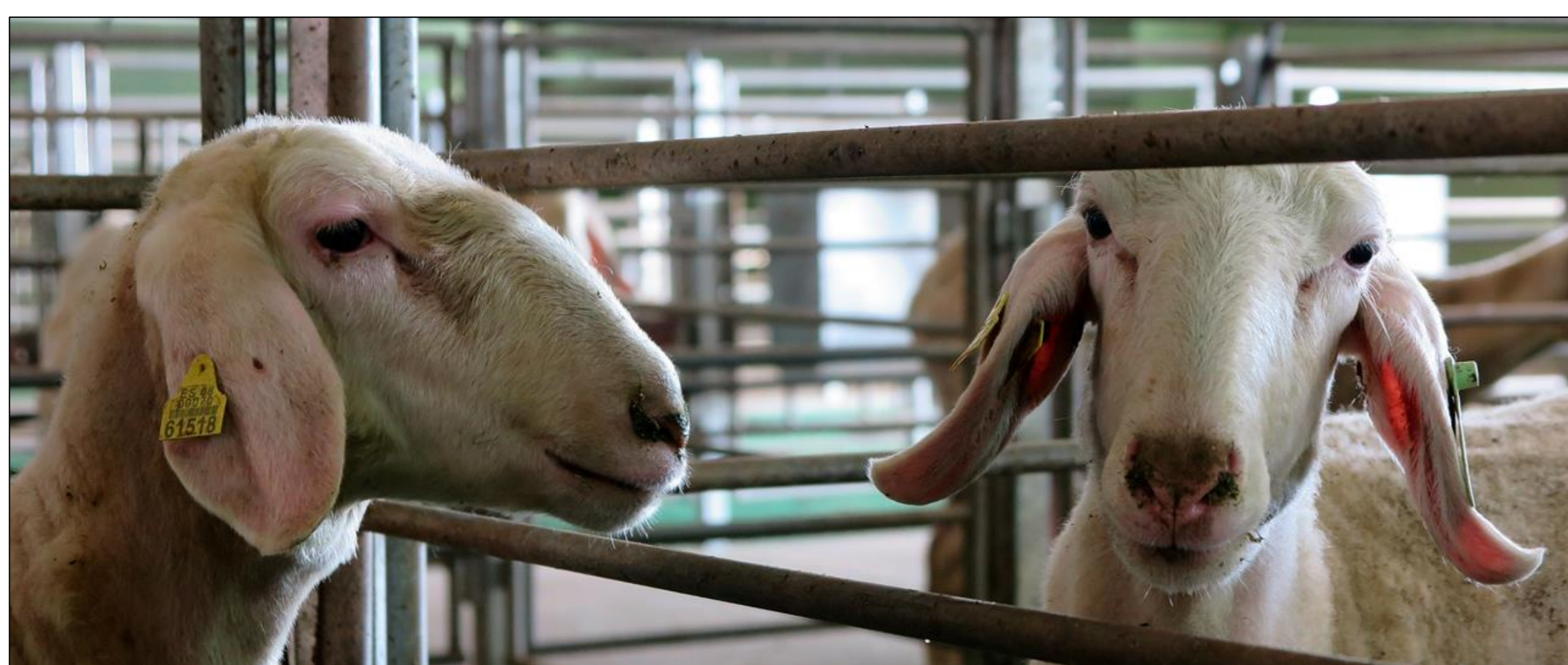
MATERIALS AND METHODS

40 lactating Assaf ewes (housed in individual pens and fed *ad libitum* a 50:50 TMR)
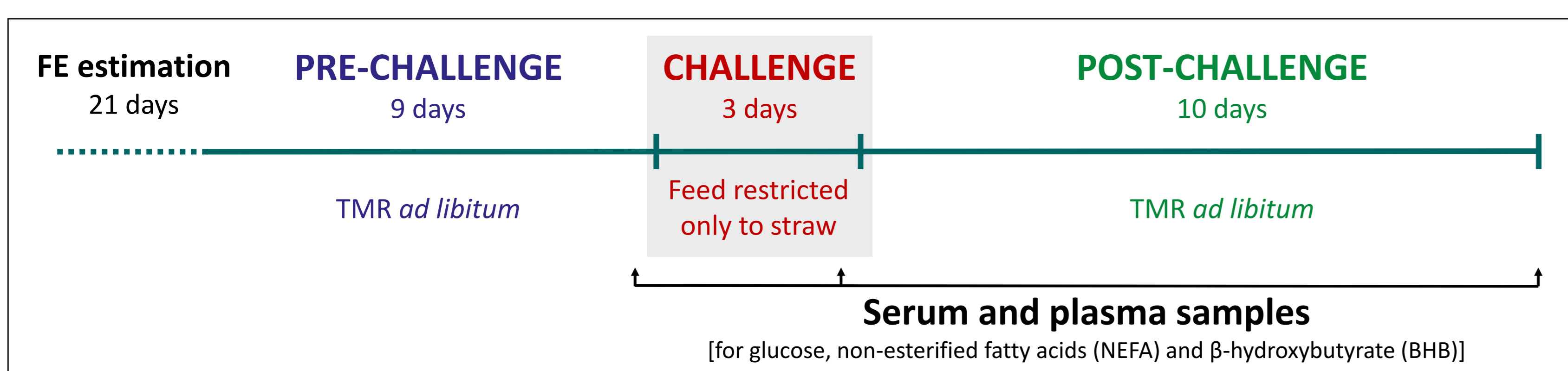
FE estimation (Feed intake + dairy performance monitored over 3 weeks)

Actual intake – predicted intake [based on net energy requirements for maintenance, production and weight change (INRA, 2018)]

Selection of
- **H-FE**: least efficient ewes (n = 9)
- **L-FE**: most efficient ewes (n = 9)

Nutritional challenge

FE estimation 21 days	PRE-CHALLENGE 9 days	CHALLENGE 3 days	POST-CHALLENGE 10 days
	TMR *ad libitum*	Feed restricted only to straw	TMR *ad libitum*

Serum and plasma samples
[for glucose, non-esterified fatty acids (NEFA) and β-hydroxybutyrate (BHB)]

Statistical analysis

- Repeated measurement analysis, animals nested within the group.
- Fixed effects of group (Gr: H-FE and L-FE), period (Pe: pre-challenge, challenge and post-challenge) and their interaction (Gr × Pe).
- Means adjusted for multiple comparisons using Bonferroni's method.

RESULTS AND DISCUSSION

P-values for the effects of group (Gr), period (Pe) and their interaction (Gr×Pe) are shown below each panel.
A, B, C Superscripts indicate significant differences (P < 0.05) due to the effect of Period.
a, b, c Superscripts indicate significant differences (P < 0.05) due to the effect of Group × Period.

☐ H-FE   ▨ L-FE

GLUCOSE

Significant drop

Pre-challenge levels not recovered

Gr > 0.10 | Pe <0.01 | Gr × Pe > 0.10

NON-ESTERIFIED FATTY ACIDS (NEFA)

Significant increase

The lowest values in the post-challenge

Gr > 0.10 | Pe < 0.01 | Gr × Pe > 0.10

β-HYDROXYBUTYRATE (BHB)

Higher levels only in **H-FE** ewes

Might this have prevented a stronger drop in glycaemia in more efficient ewes?

Gr < 0.05 | Pe < 0.05 | Gr × Pe < 0.05
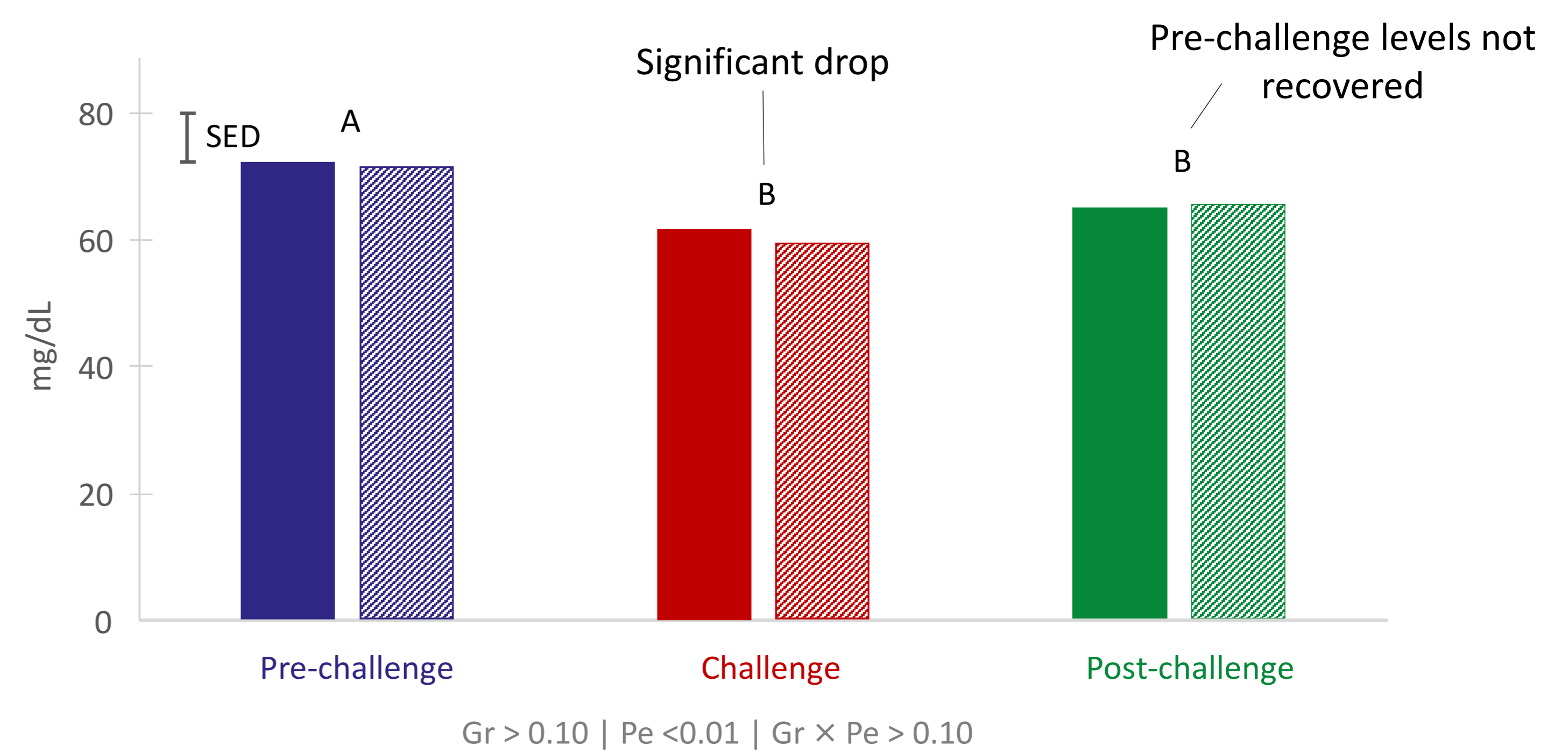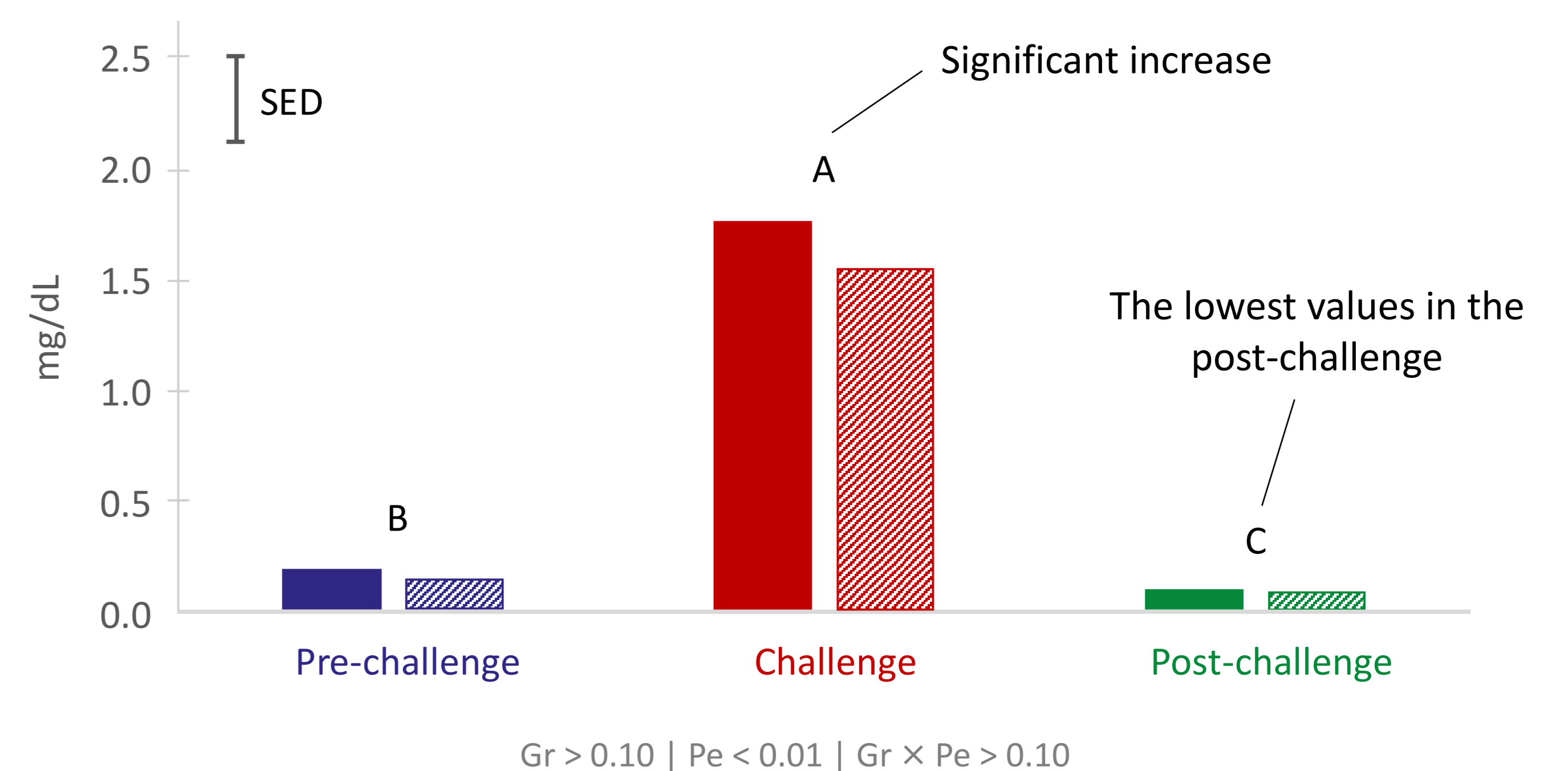
CONCLUSIONS

Results on **blood serum metabolites** may suggest that **selection for high FE dairy ewes would not negatively influence their resilience**, as more (H-FE) and less (L-FE) efficient ewes responded to and recovered from the acute nutritional challenge similarly.