

Effect of genotype and Leucine level on the amino acids concentration in tissues of weaned pigs

Micol Bertocchi¹, Paolo Bosi², Diana Luise², Vincenzo Motta², Chiara Salvarani², Anisa Ribani², Samuele Bovo², Aude Simongiovanni³, Keiko Matsunaga⁴, Makoto Bannai⁴, Etienne Corrent³, Luca Fontanesi², Tristan Chalvon Demersay^{3,4}, Paolo Trevisi²

¹ Department of Agricultural, Environmental and Food Sciences, University of Molise, Campobasso, Italy

² Department of Agricultural and Food Sciences, University of Bologna, 40127 Bologna, Italy

³ Ajinomoto Eurolysine S.A.S., 75017 Paris, France

⁴ Ajinomoto Co., Inc., Tokyo 104-8315, Japan

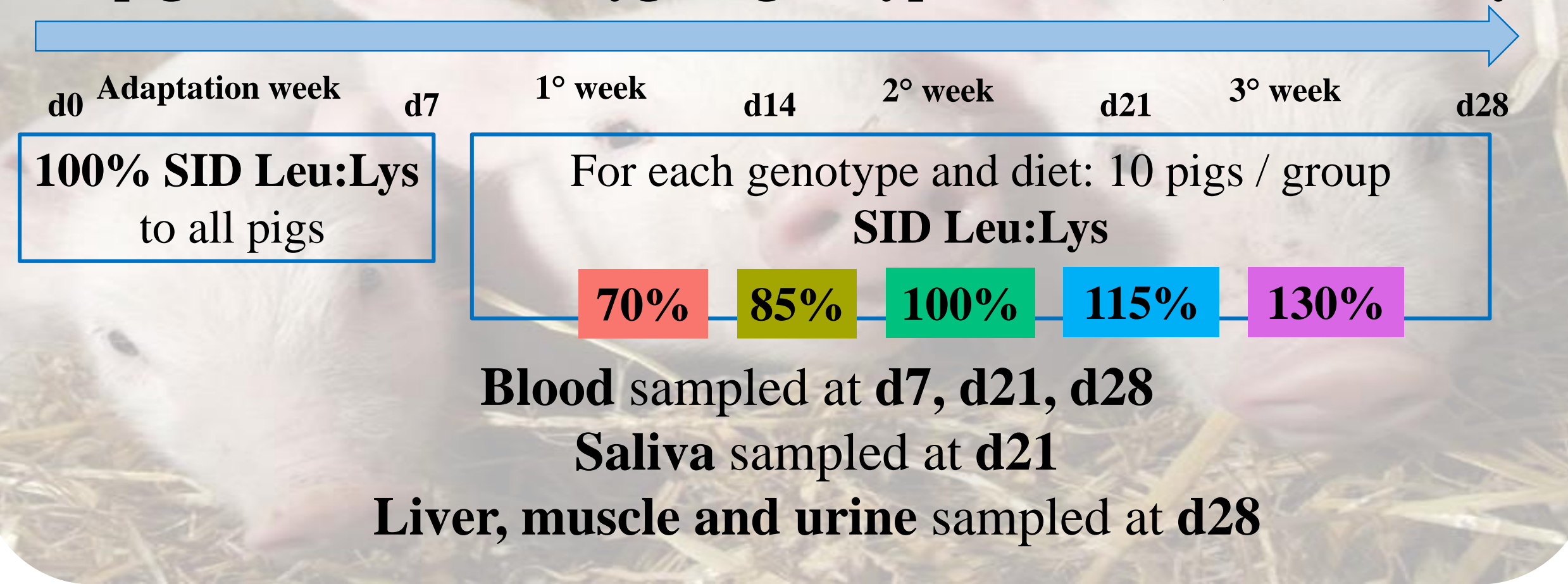


INTRODUCTION

Leucine (Leu) is a branched chain amino acid (BCAA) whose requirement is ongoing object of study. It regulates the catabolism of the 3 BCAA (i.e. Leu, Val and Ile) and its excess leads to an increase in their catabolism. Leu can influence lysine (Lys) absorption too, with possible interaction with Lys requirement too. Moreover, Lys inefficiency in protein deposition can be due to its degradation by the bifunctional protein aminoadipate-semialdehyde synthase (AASS). As consequence, modifications of this enzyme can imply different Lys efficiency and requirement.

MATERIALS AND METHODS

100 pigs - 2 (AASS homozygous genotypes) x 5 (diets, SID Leu:Lys)



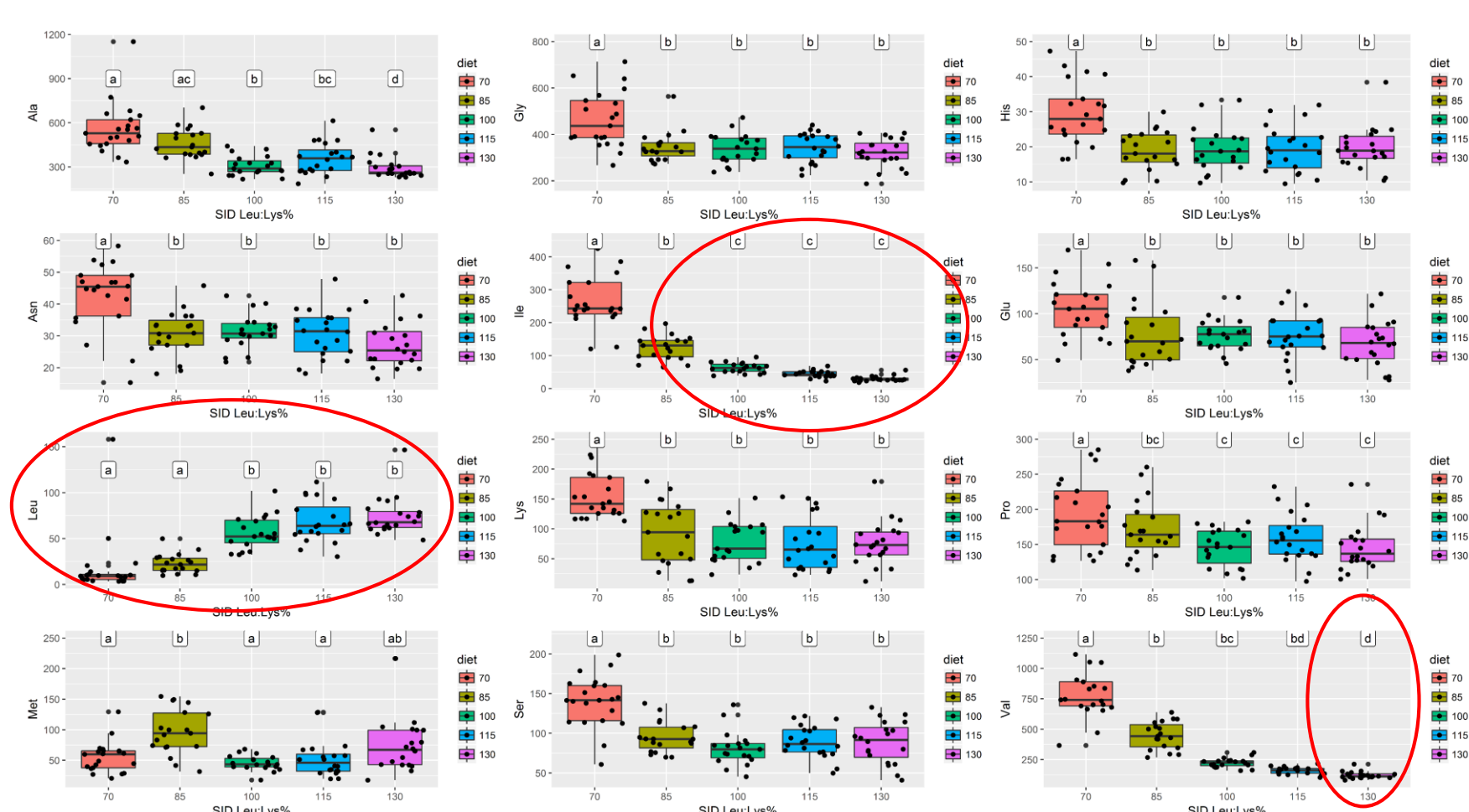
AIM

The study aimed to evaluate the AA concentration in tissues of weaned piglets with different genotype for AASS and fed diets differing for Leu level (SID Leu:Lys)

RESULTS

AASS genotype did not affect AAs level in any tissue. No differences in AAs level were seen between the groups in plasma at d7 and in saliva.

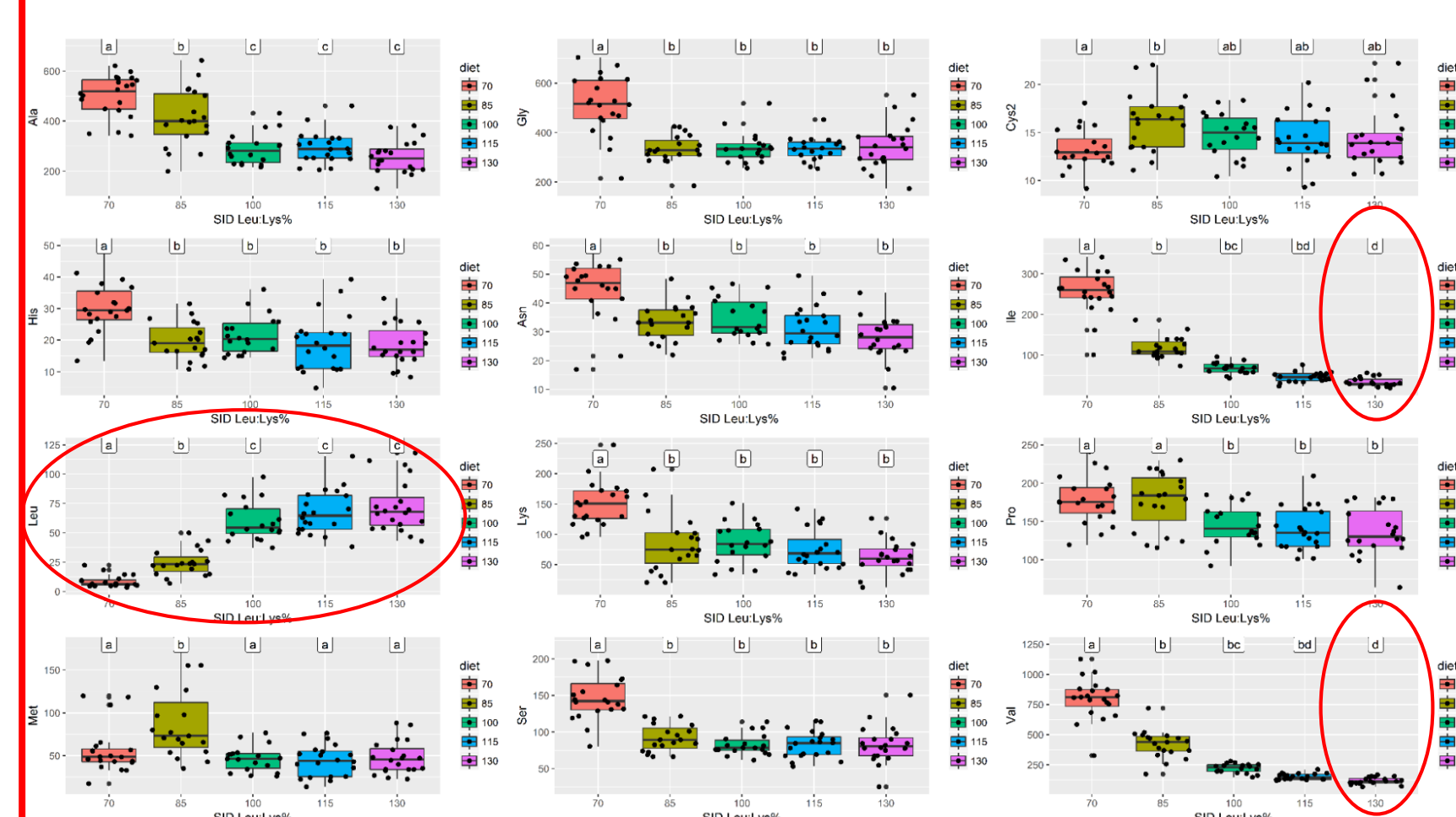
Plasma d21- 2 weeks of trial



AA level in plasma at d21 and d28:

- ✓ Higher AA levels at 70% SID Leu:Lys ($P < 0.05$), except for Leu
- ✓ Lower Leu level at 70 and 85% SID Leu:Lys ($P < 0.05$)
- ✓ At d21 lower levels of Ile from 100 to 130% and Val at 130% SID Leu:Lys ($P < 0.05$)
- ✓ At d28 lower Ile and Val levels at 130% SID Leu:Lys ($P < 0.05$)

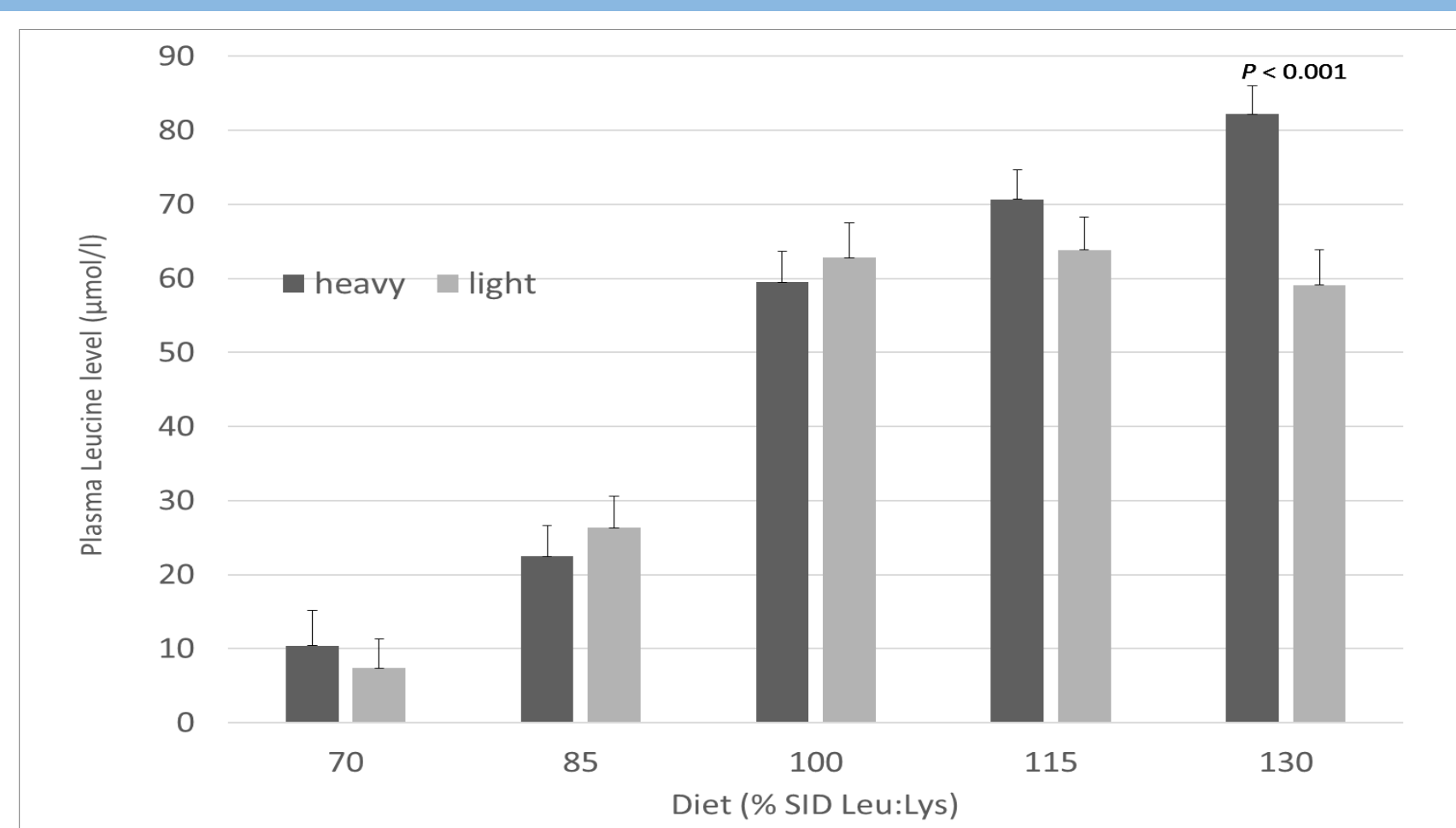
Plasma d28- 3 weeks of trial



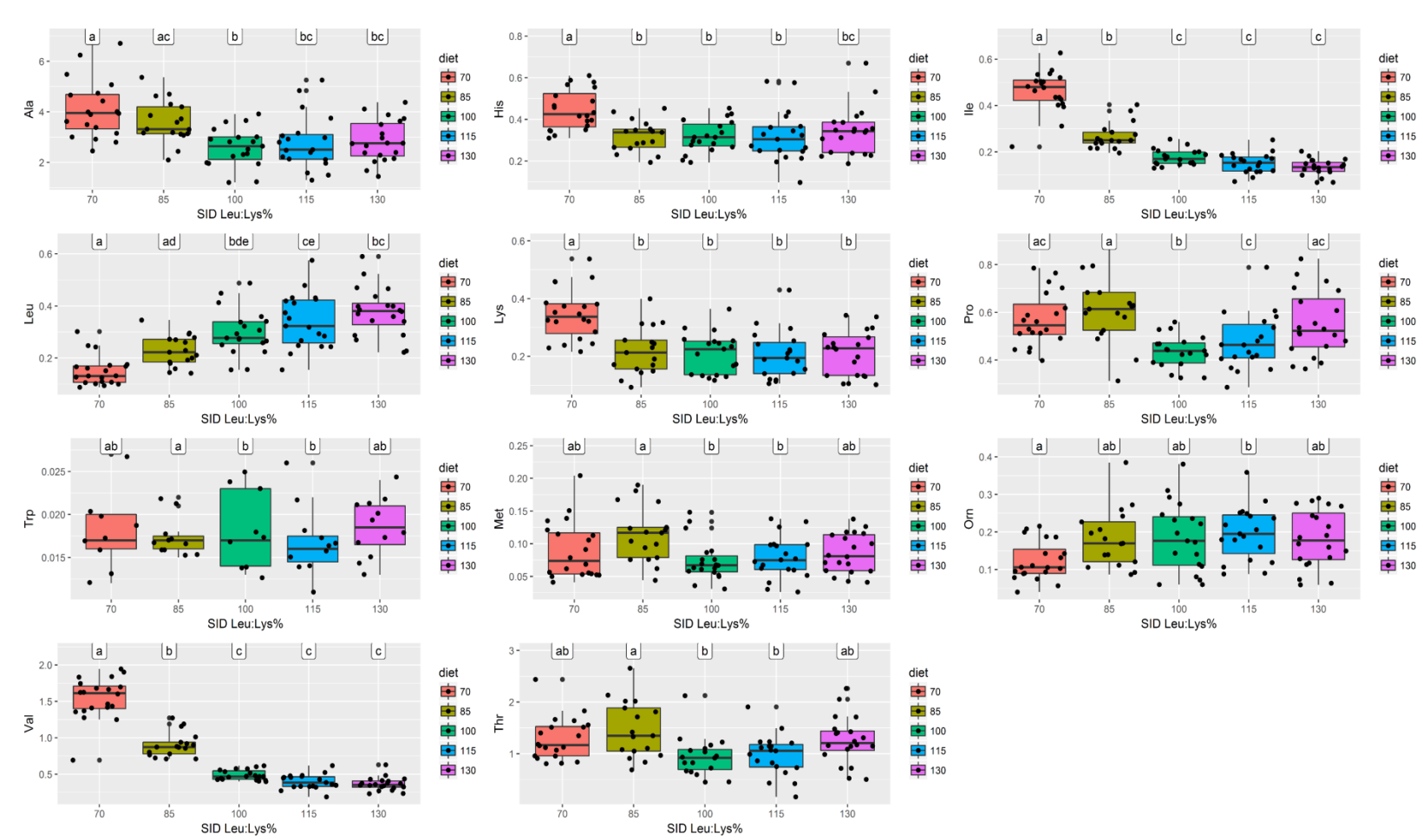
Plasma Leu level in 2 classes of BW – d28

Body weight classes – 1° week		
Heavy kg	10.5	SEM: 0.193
Light kg	7.8	SEM: 0.201

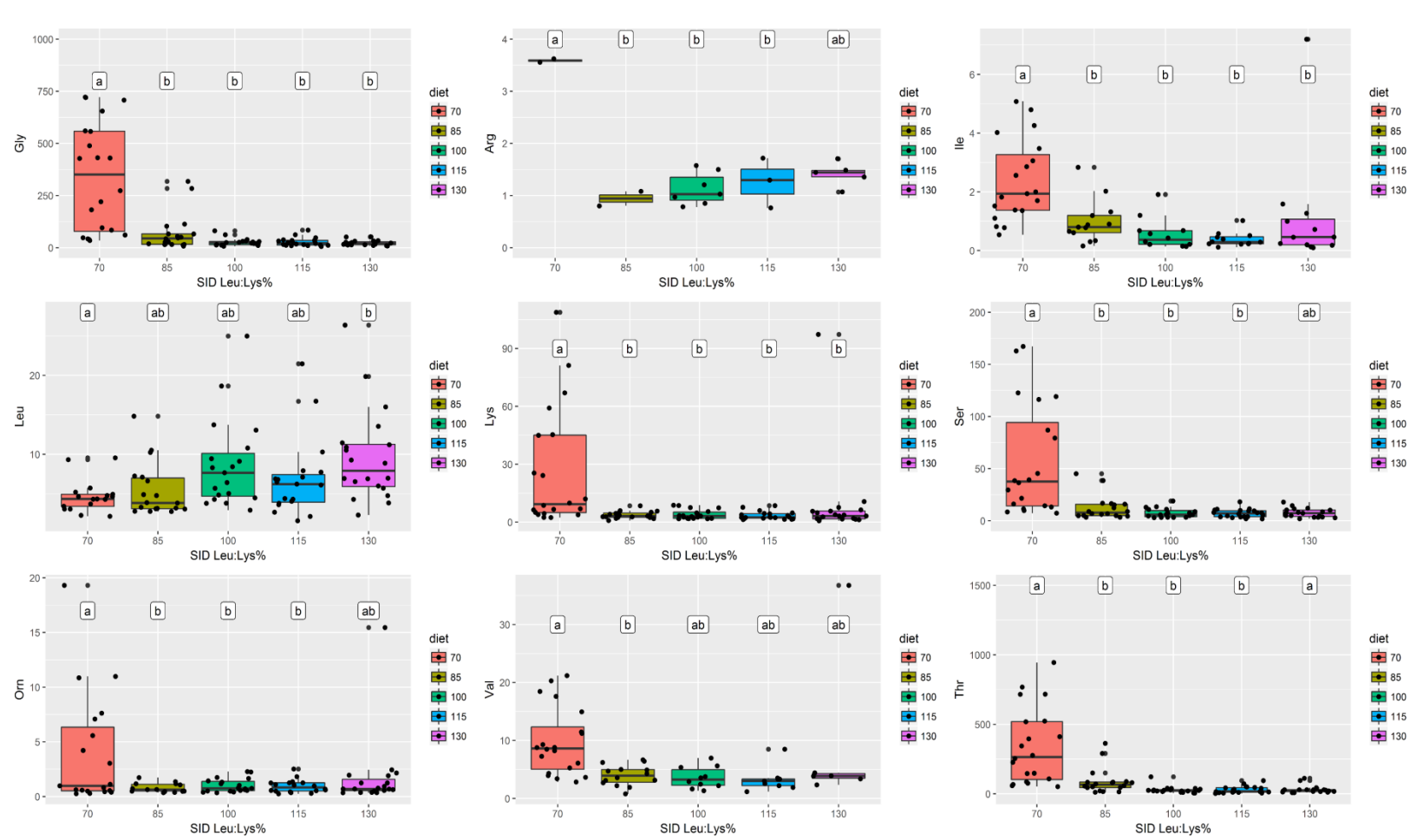
- ✓ At 130% SID Leu:Lys, plasma Leu level was higher for heavy pigs than for light pigs ($P < 0.001$)
- ✓ No differences in the other AA levels
- ✓ No differences at d 7 and d 21



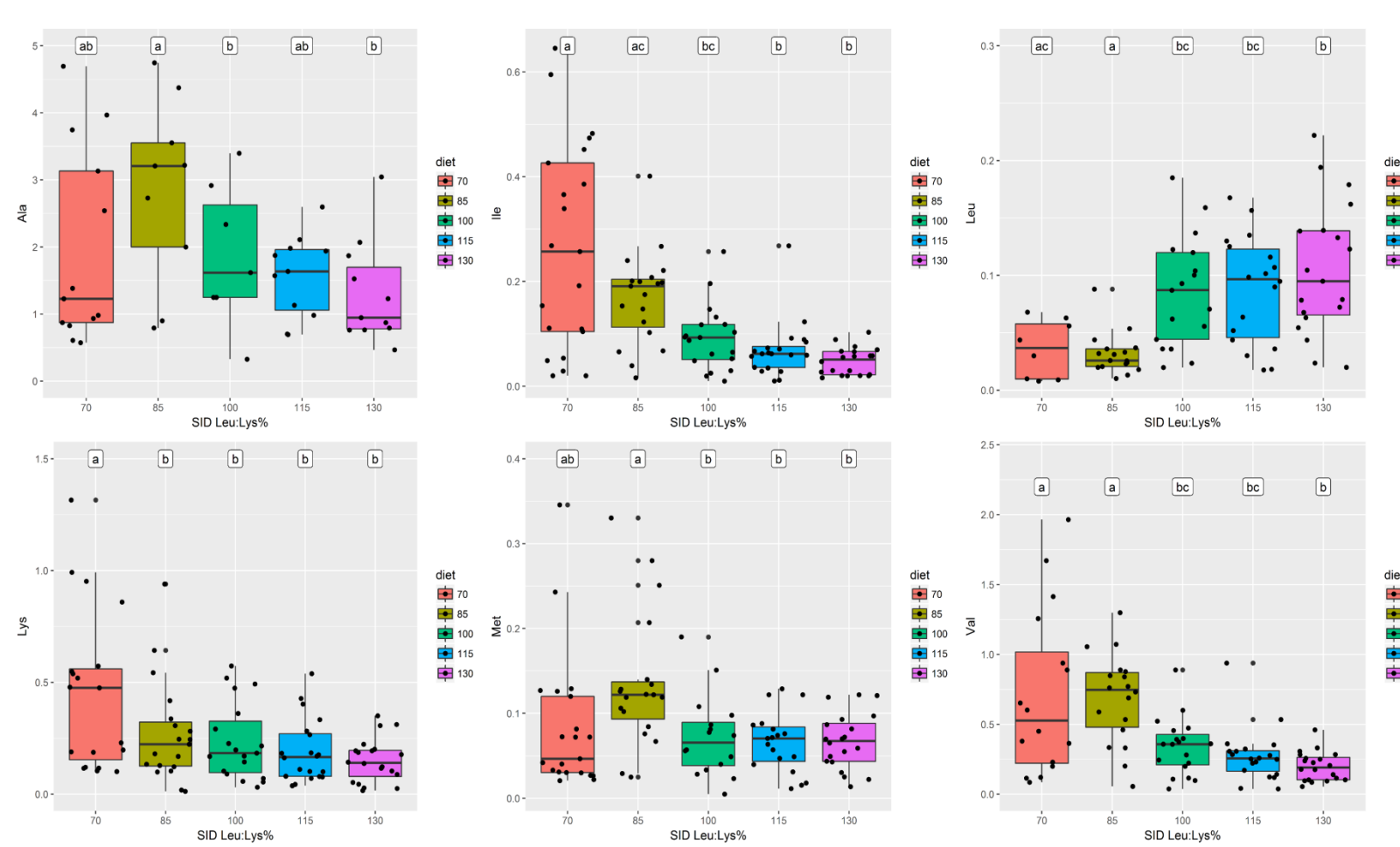
Liver d 28- 3 weeks of trial



Urine d 28- 3 weeks of trial



Muscle d 28- 3 weeks of trial



AAs level in liver, urine and muscle followed the same trend shown for plasma, with slightly less evidence

CONCLUSIONS

- ✓ High Leu deficiency (70% SID Leu:Lys) led to an increasing blood level of several dispensable and indispensable AA, probably due to a reduction in body protein synthesis as consequence of insufficient supply of Leu and responsible for AA accumulation in the plasma, given its role as essential AA.
- ✓ Over-supply of Leu (115 and 130% SID Leu:Lys) strongly decreased plasma Val and Ile levels with no effect on feed intake, since their catabolism increases as Leu level increases, negatively affecting their availability.
- ✓ Leu basal endogenous losses maybe higher in light than heavy pigs: this might explain no more increase of plasma Leu over 115% (SID Leu:Lys) in light pigs.