



PROTEIN METABOLISM AND PRECISION FEEDING

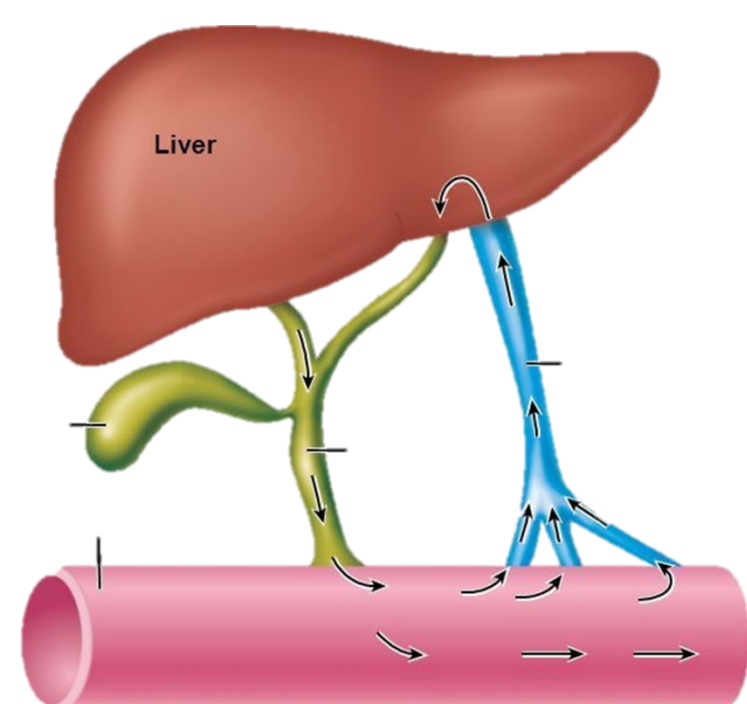
Laura Sarri, Reza Seradj, Marc Tor, Joaquim Balcells & Gabriel de la Fuente

Departament de Ciència Animal. Universitat de Lleida, Spain

BACKGROUND

- Optimizing animal nutrition is one of the key aspects in precision livestock farming. There are numerous factors that may alter pig requirements, such as age, genetic type, gender, or environmental conditions.
- Much effort has been conducted in assessing absorption efficiency by the animal, but not much is known about **post absorption efficiency** of nutrients utilization:

- Is the efficiency constant?*
- Which factors influence the capacity of using the metabolized nutrients by the animal and incorporate them into the different tissues?*



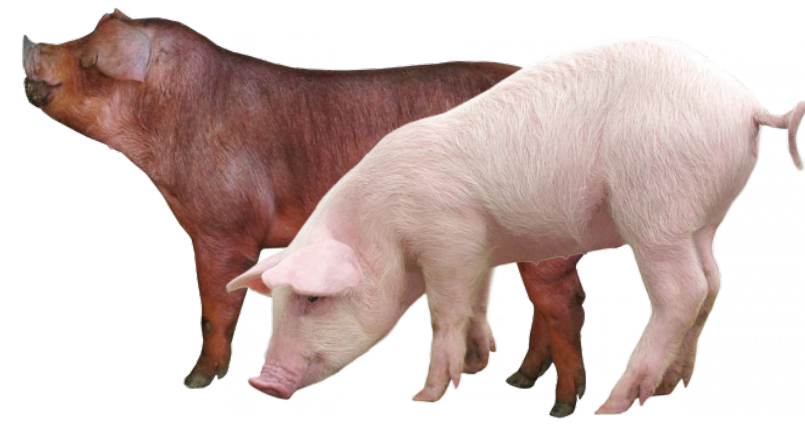
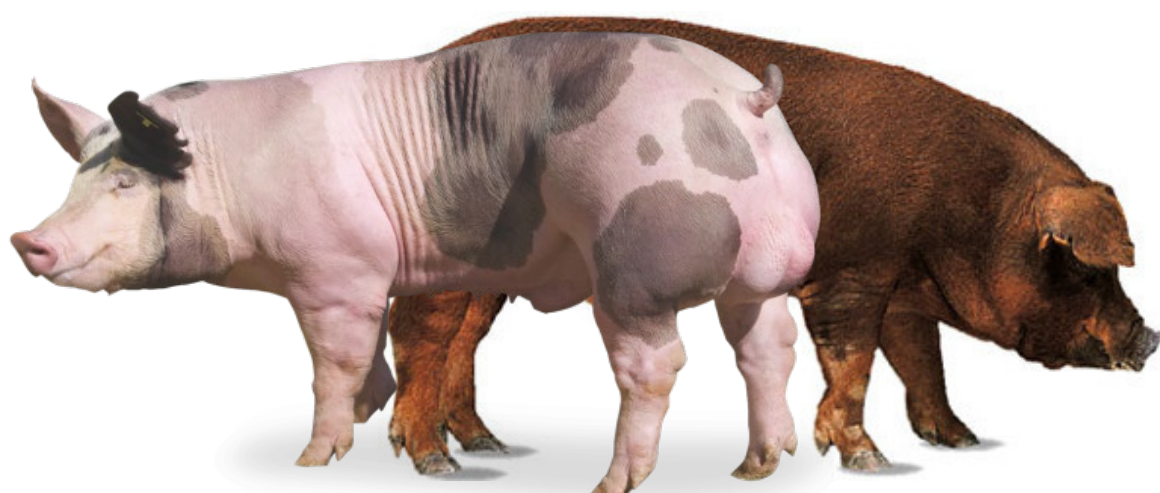
OBJECTIVES

- Determine the Protein Fractional Synthesis Rate (FSR) for different tissues:
 - Liver
 - Longissimus dorsi
 - Gluteus medius
 - Duodenum
- Establish variations due to genetic type, age and protein level in the diet

METHODOLOGY

ANIMALS AND DIETS

- 32 animals used in total:
 - 16 growing pigs (**29.4 ± 0.85 kg BW**)
 - 16 finishing pigs (**88.5 ± 1.66 kg BW**)



Purebred Duroc and **F2 pigs** (Pietrain ♂ x (Duroc x Landrace) ♀)

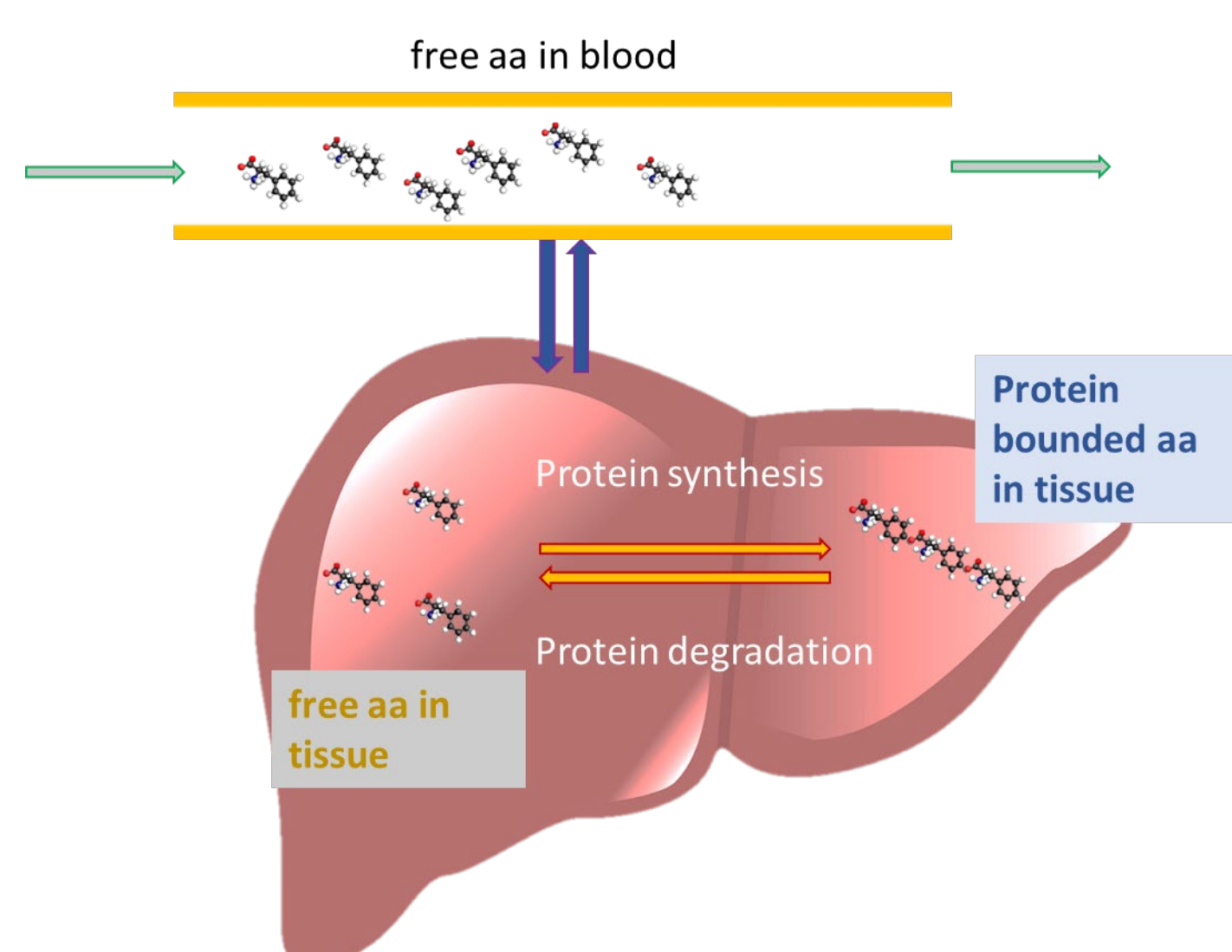
LOW PROTEIN (LP) DIET:

- 15% CP** in growing pigs
- 13% CP** in fattening pigs

STANDARD PROTEIN (NP) DIET:

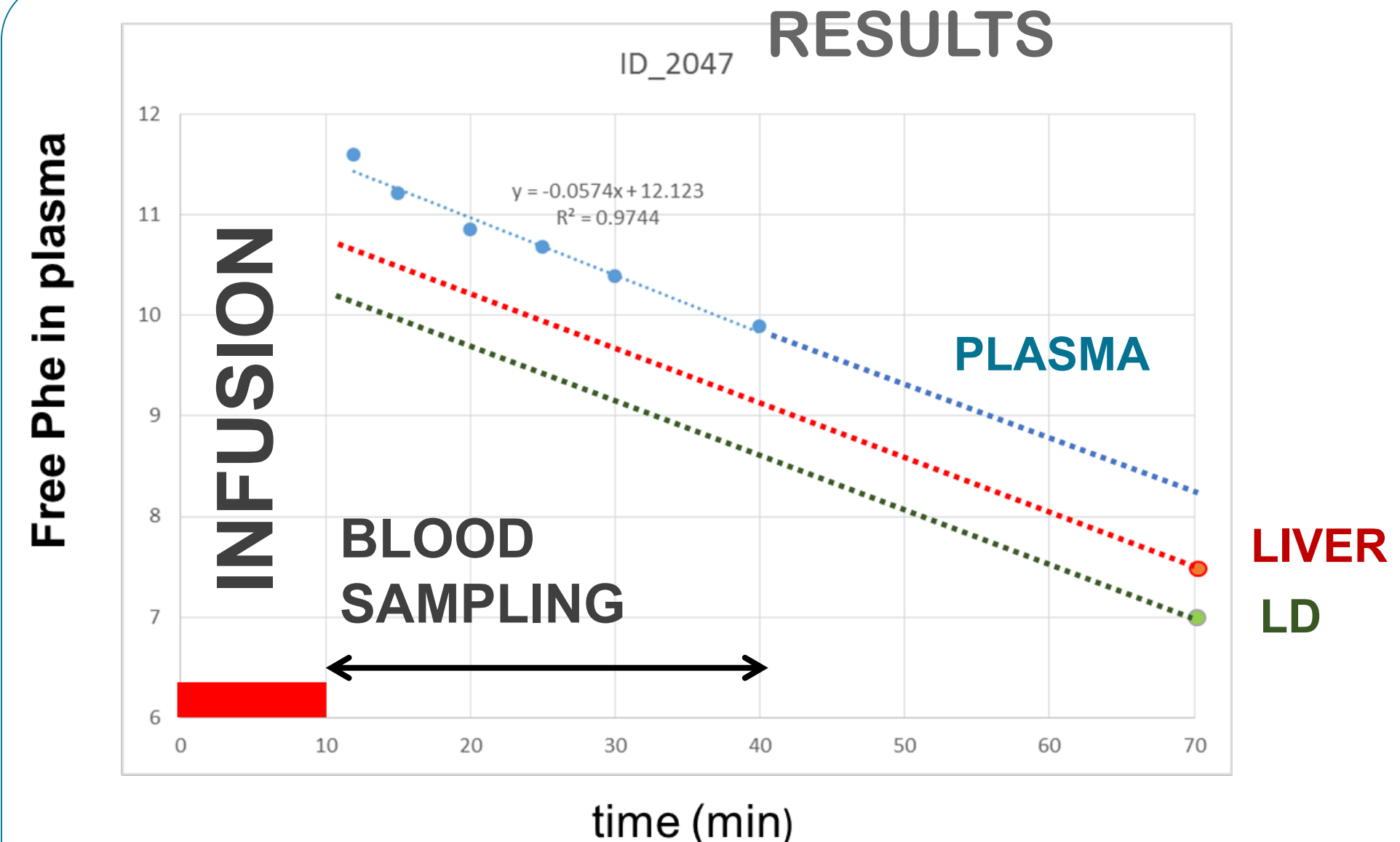
- 17% CP** in growing pigs
- 15% CP** in fattening pigs

FLOODING DOSE TECHNIQUE



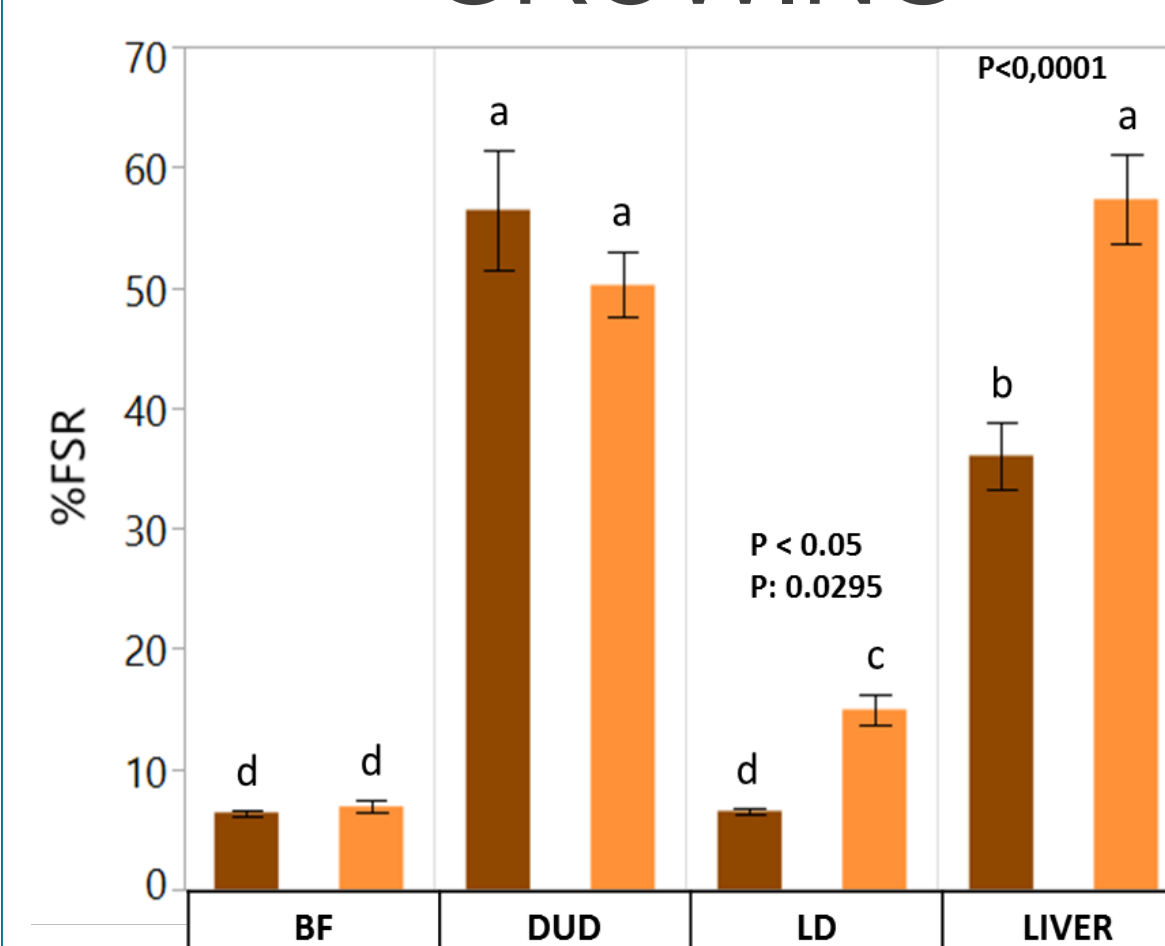
- Infusion of a saturated dose of isotope-labelled Phe in plasma**
- Determination of the Phe enrichment curve in plasma**
- Determination of both free and bound aminoacids in tissue from decay from plasma**

RESULTS

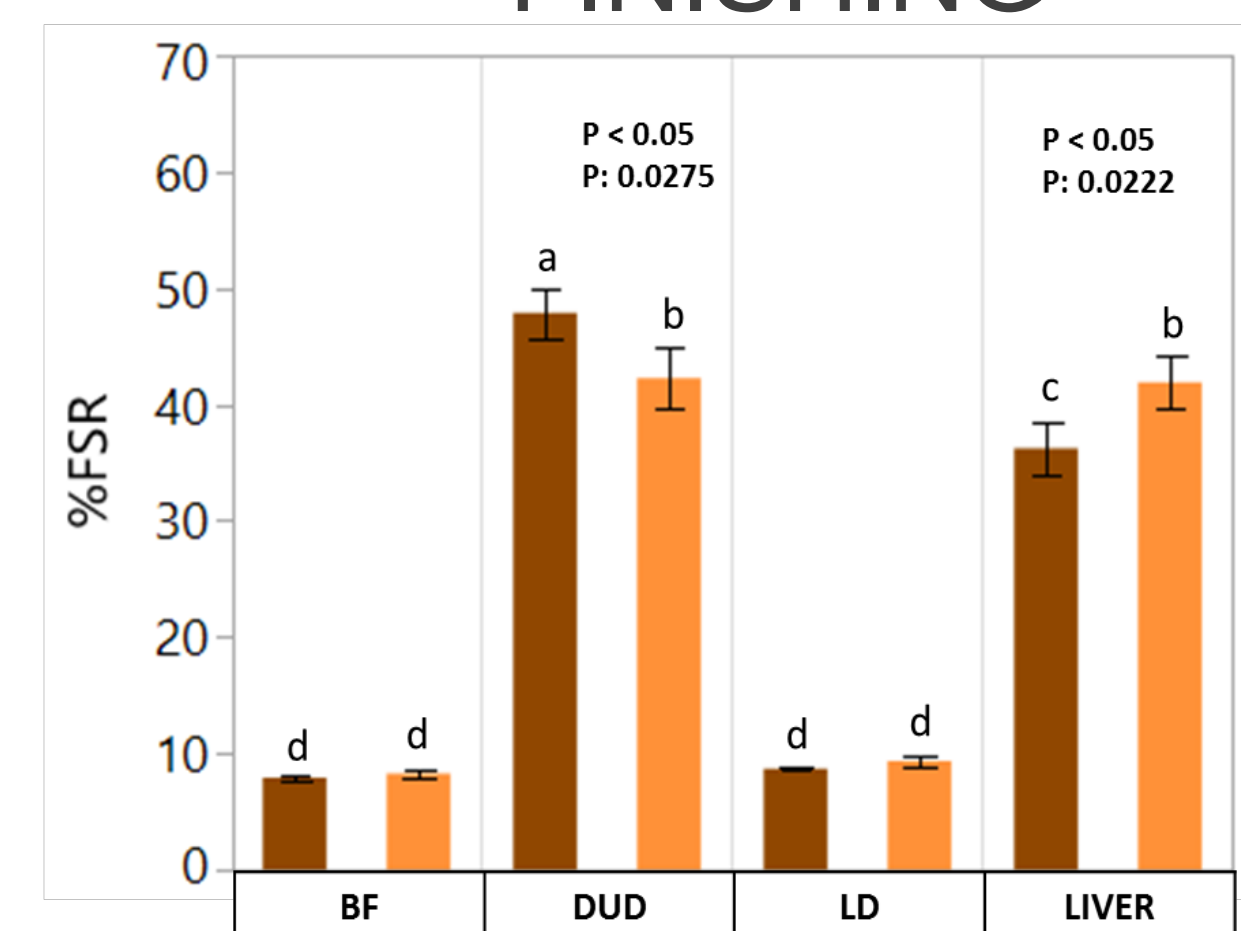


$$FSR (\%/day) = \frac{MPE_{bound}}{aveMPE_{free}} \times \frac{100}{t \text{ (days)}}$$

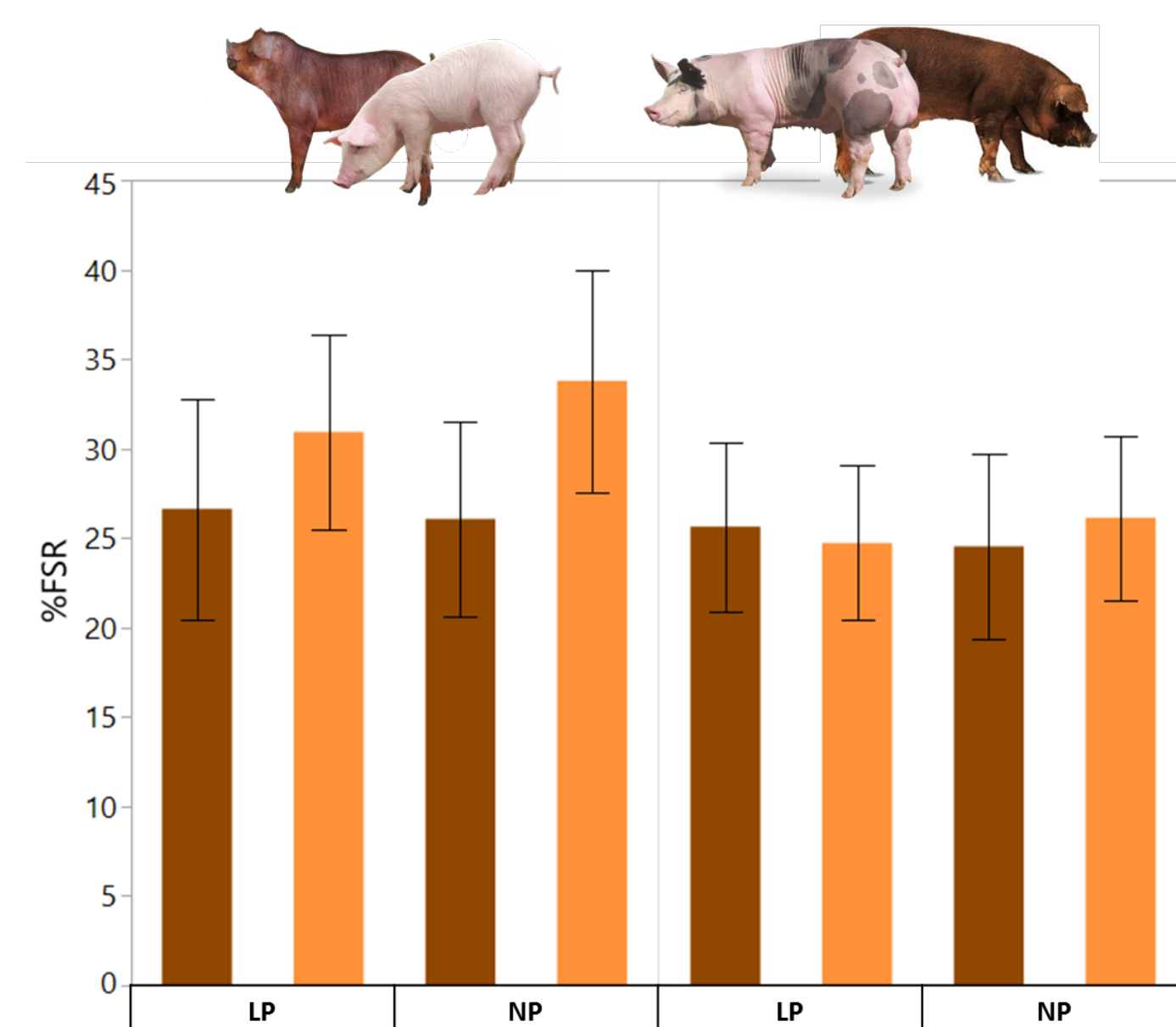
GROWING



FINISHING



- Higher FSR in growing than finishing**
- Duodenum and Liver the most active tissues**
- Differences between breeds in some tissues**



- No differences between dietary treatments**

TAKE-HOME MESSAGE

Protein synthesis is variable, it changes between breeds, tissues and physiological stages.

Under commercial conditions, dietary protein does not alter the FSR.

FSR is higher in visceral tissues in Duroc and in muscles in F2.

CONTACT

Gabriel de la Fuente

gfuente@ca.udl.cat

Joaquim Balcells

balcells@ca.udl.cat

Feed-a-Gene



Feed-a-Gene is a European H2020 project involving 23 partners which aims to adapt feeds, animals and feeding techniques to improve the efficiency and sustainability of pig, poultry and rabbit production systems. It is coordinated by INRA (France), started in March 2015 and will last 5 years. The project aims to reduce the environmental impact of monogastric livestock production by improving and diversifying animal diets and feed technologies and by integrating new selection criteria for these animals. The Feed-a-gene project further aims to develop new management systems for precision feeding and precision farming and to evaluate the overall sustainability of the different management solutions proposed in the project.



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