Simulating breeding progress of protein efficiency and correlated traits in pigs

Approximate start date: ASAP (start of 2024)
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Project description

To reduce the environmental footprint of pork production, improving the protein efficiency of fattening pigs is crucial. Differences in protein efficiency, i.e., the ability to incorporate dietary protein into the body, are heritable (Kasper *et al.*, 2019; Ewaoluwagbemiga *et al.*, 2023). Thus, protein efficiency can be increased through breeding. However, phenotyping for this trait is difficult and expensive, and it is unclear whether the increase in genetic gain is sufficient when co-selecting genetically correlated traits, such as FCR and ADG. In this project, we will investigate the opportunities and limitations of co-selecting for protein efficiency with correlated conventional breeding goals, using available data on genetic parameters from a previous experiment on protein efficiency in pigs. It is planned to use breeding programme simulations, such as AlphaSimR (Gaynor *et al.*, 2021) or MoBPS (Pook *et al.*, 2020) for in-silico comparison of breeding programmes.
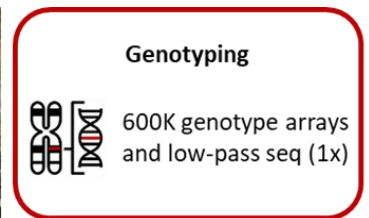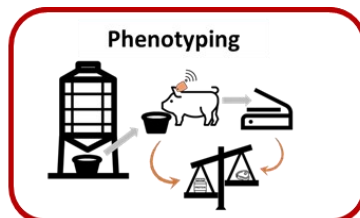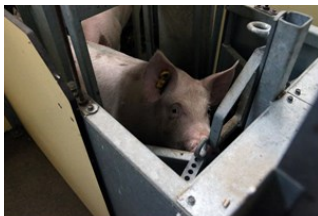
Prerequisites

This project requires at least a basic knowledge of R and some enthusiasm for pig breeding. Basic knowledge of quantitative genetics is desired.

Literature

Ewaoluwagbemiga, EO, Bee, G & Kasper, C, 2023, Genetic analysis of protein efficiency and its association with performance and meat quality traits under a protein-restricted diet. *Genetics Selection Evolution* 55: 35 ([PDF](#))

Gaynor, C, Gorjanc, G & Hickey, JM, 2021, AlphaSimR: an R package for breeding program simulations. *G3 Genes Genomes Genetics* 11: jkaa017

Kasper, C, Ruiz-Ascacibar, I, Stoll, P & Bee, G, 2019, Investigating the potential for genetic improvement of nitrogen and phosphorus efficiency in a Swiss Large White pig population using chemical analysis. *Journal of Animal Breeding and Genetics* 137 (6): 545-558 ([PDF](#))

Pook, T, Schlather, M & Simianer, H, 2020, MoBPS - Modular Breeding Program Simulator. *G3 Genes Genomes Genetics* 10: 1915–1918

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