

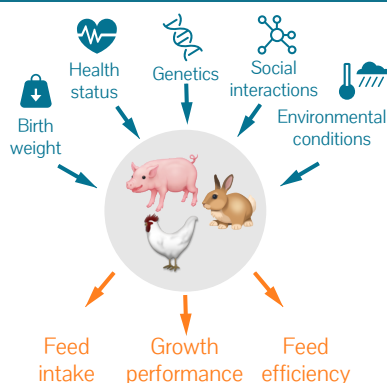


New traits for
performance
and feed efficiency

These traits will be available
for precision feeding and
breeding programmes

New animal traits for innovative livestock management strategies

The challenge



Monogastric production animals are usually kept and fed as a group. However, animals, although of the same genotype, differ in feed intake, growth performance and feed efficiency. For this reason, individual animals or characterized groups of animals have different nutrient requirements and should be fed diets differing in nutrient composition.

The background of these differences is not clear but can be related to *e.g.* genetic differences and differences in birth weight, health status, and the animal's response to social interactions, and environmental and management conditions.

Our solutions



Feed-a-Gene explored new traits related to performance and feed efficiency for potential use in future precision feeding concepts and breeding programmes in pigs, broilers and rabbits:

- ▶ Feed intake of individual animals housed in a group (broilers and rabbits)
- ▶ Faecal nutrient digestibility in individual pigs using NIRS
- ▶ Birth weight and genomic information of piglets and consequences on N-efficiency later in life
- ▶ Metabolites in blood related to feed and nutrient efficiency
- ▶ Behaviour and feed efficiency in pigs

New traits related to feed efficiency were identified, which can be used in future precision feeding concepts for production animals kept in groups and in future breeding strategies.

Novel technologies & concepts

New traits related to performance and feed efficiency were investigated in different animal species and experimental settings.

Individual feed intake in broilers and rabbits

- ▶ In rabbits and broilers, between animal variation in feed intake could be measured and related to feed efficiency.
- ▶ This trait can be used in future breeding and feeding strategies for further optimized feed efficiency.

Birth weight and genomic information of pigs and N-efficiency

- ▶ Birth weight of piglets influenced absolute growth performance but did not affect N-efficiency (N-retention as % of N-intake) later in life.
- ▶ Genomic information on protein deposition capacity of individual pigs can be used to predict actual performance, to refine nutrient requirements of pigs and optimize dietary nutrient composition.

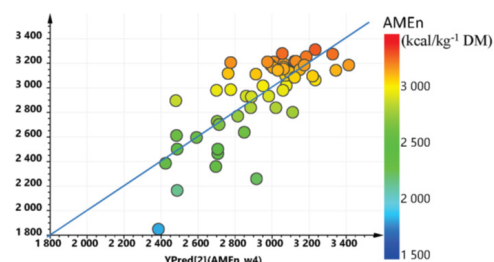
Faecal nutrient digestibility in individual pigs

- ▶ Using NIRS, faecal nutrient digestibility can be measured in individual pigs.
- ▶ This trait can be used in future breeding and feeding strategies and *e.g.* for selection of animals capable of digesting diets containing a relatively high proportion of by-products.

Blood metabolites and nutrient efficiency

- ▶ The metabolic fingerprint in blood is complex, but contains valuable information in relation to nutrient digestion and metabolism. Specific combinations of metabolites show relationships with digestive and metabolic efficiency in broilers and pigs.

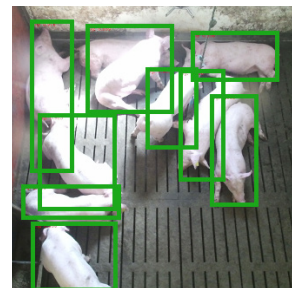
- ▶ The value of these biomarkers for practical applications should be further investigated.



Measured AMEn vs AMEn predicted from blood serum in chickens (Beauclercq et al., 2018).

Behaviour and feed efficiency

- ▶ Agonistic behaviour as determined in groups of pigs (Duroc) using Social Network Analysis had little effect on feeding behaviour and feed efficiency.
- ▶ Tracking and evaluation of behaviour of individual pigs housed in groups.
- ▶ Energy requirements for locomotion of pigs were quantified and allow for adjusting maintenance requirements for energy of pigs in different production systems.



Evaluation of behaviour of individually tracked group housed pigs (Cowton et al., 2019, in press).

Recommendations & benefits

- ▶ New traits were identified at animal level in pigs, broilers and rabbits showing relationships with performance and feed efficiency. These traits can be used for grouping animals which are more homogeneous and can be fed more precisely and for implementation in future breeding strategies.
- ▶ The validation and practical implementation of these traits in a practical setting requires further attention.

