Feed-a-Gene

Adapting the feed, the animal and the feeding techniques to improve the efficiency and sustainability of monogastric livestock production systems

Precision feeding in growing-finishing pigs

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INTRODUCTION

Precision feeding is a concept that relies on the existence of between-animal variation and involves the use of feeding techniques that allow supply of a proper amount of nutrients to individual pigs in a pen based on their actual growth performance and related nutrient requirements. It contributes to the development of concepts to improve nutrient utilization and reduce feeding cost and nutrient excretion. An animal weighing and a feeding station allowing to supply a mixture of at least two diets are required as hardware and a software based Decision Support System (DSS) is attached to calculate nutrient (Lys) requirements of individual animals on a daily basis based on predicted daily body weight gain and feed intake.

OBJECTIVES

- Evaluation of a precision feeding system and the in FaG developed version of the DSS for feeding growing finishing pigs, monitoring daily performance (weight gain and feed intake) in growing-finishing pigs.
- Evaluation of effects of birth weight (< 1.2 kg and > 1.6 kg) and breeding value for protein deposition and effects of using a 3-phase feeding regime or a precision fed (using a mix of two diets differing in concentration of SID Lys) on feed intake, growth performance, nitrogen and Lys efficiency in pigs.

MATERIALS AND METHODS

- A unit for growing-finishing pigs with 12 pens with 12 pigs each was used of which four pens with in total 48 pigs were equipped with a prototype of an Exafan (Spain) feeding station connected to a front leg weighing scale.
- Male pigs (Tempo male x (NL x Y) female; Topigs Norsvin) were used throughout the starter, grower and finishing phase (BW 22 - 110 kg).
- Per pen, 6 low, and 6 high birth weight pigs were allocated balanced for litter of origin. Within both groups pigs had either a high (mean +12 g/d) or a low (mean -2 g/d) genetic capacity for protein deposition, based on genome sequence information of the individual pigs (Topigs Norsvin).
- Per pen 4 pigs (one per treatment) were control fed according to a 3-phase feeding system and 8 pigs (two per treatment) were precision fed based on their actual requirement for lysine based on calculations with the FaG DSS after a 2-weeks period of adaptation.
- Two diets were used: Diet A, EW 1.13; crude protein 166 g/kg; SID lysine 8.7 g/EW and Diet B, EW 1.12, CP 111 g/kg, SID lysine 4.8 g/EW.
- Animals were fed in a fixed ratio per phase (100-0%, 82-18%, 59-41%; ratio A/B) or precision fed by supplying diets A and B in a variable ratio according to the actual performance of individual pigs (feed intake and body weight gain) and related calculated Lys requirements.

- Feed intake and body weight gain were monitored on a daily basis of all individual pigs.
- Protein and lysine intake and retention in the body and N- and Lys-efficiency of each pig were calculated.

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. 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.

RESULTS

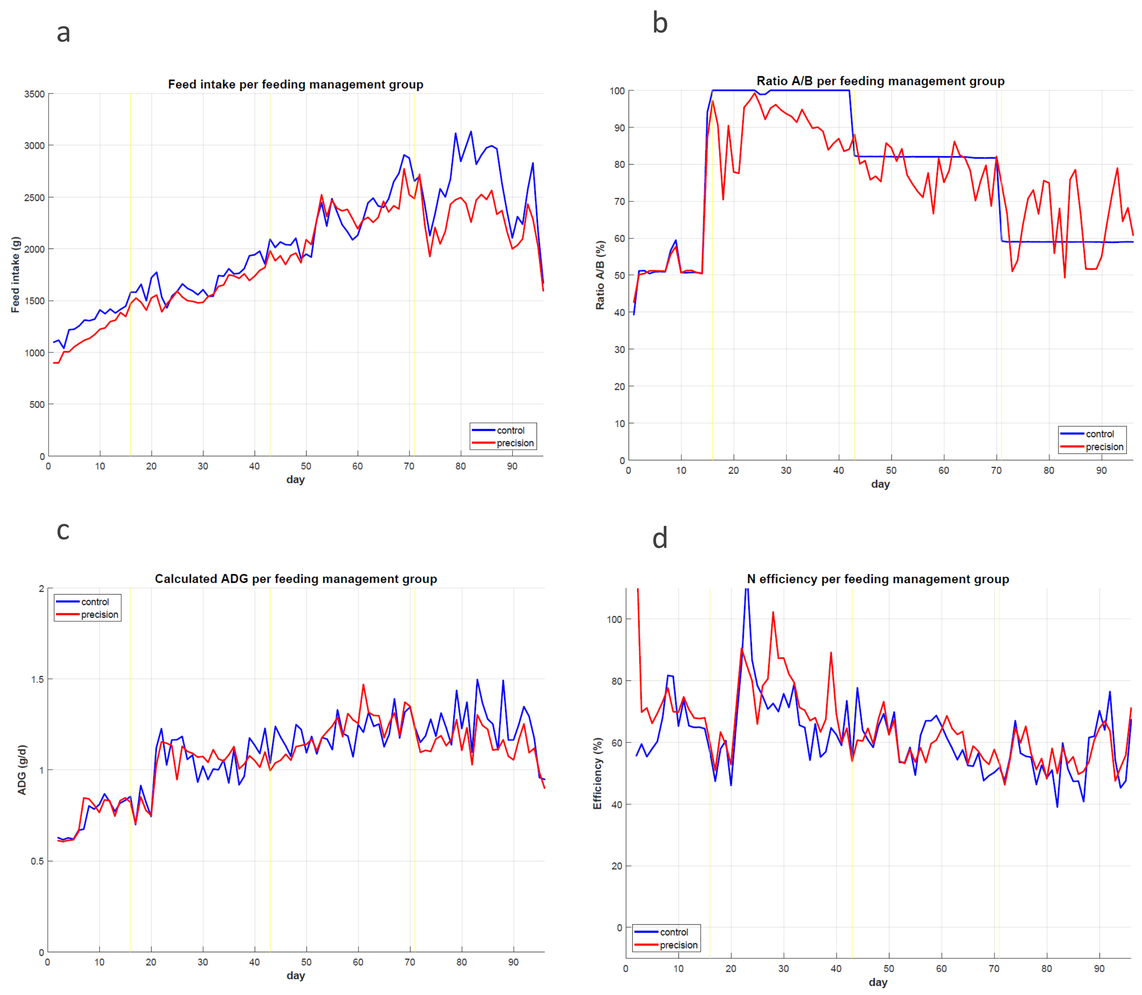

Figure 1. Feed intake (a), provided ratio of diet A and B (b), calculated ADG (c) and efficiency of N utilization (d) of 3-phase (C, control) and precision fed (P) pigs throughout the study.

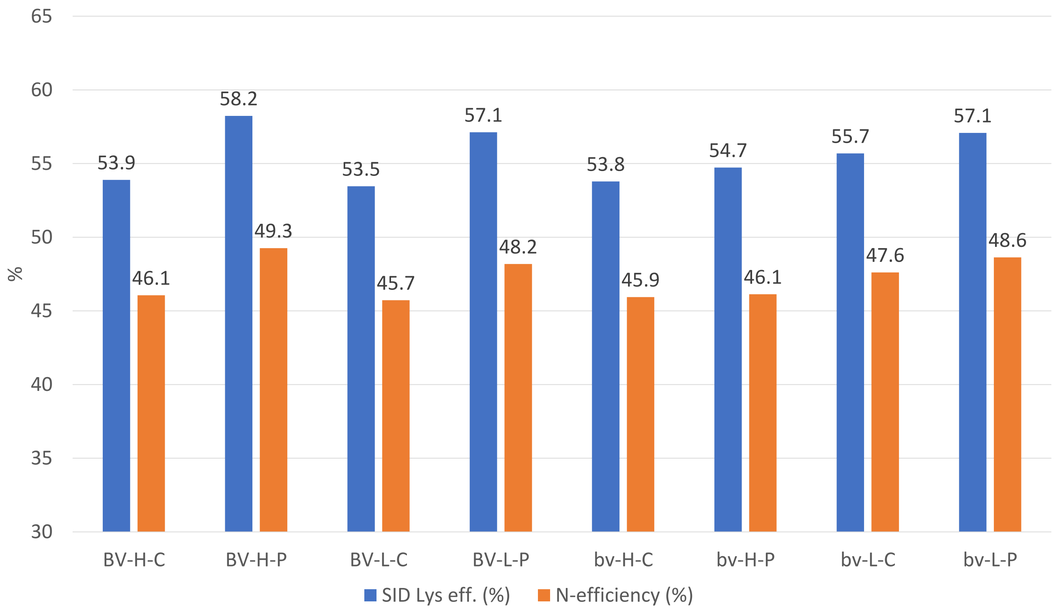

Figure 2. SID Lys and N-efficiency (%) of pigs with a high or low capacity to deposit protein (BV vs. bv), a high or low birth weight (H vs. L), either fed via a 3-phase system (C) or precision fed (P) throughout the study.

CONCLUSIONS

- Precision feeding in pigs is technically feasible with the Exafan feeding stations and DSS developed in Feed-a-Gene.
- In the present, rather small scale study with a limited number of animals, birth weight and genetic capacity to deposit protein inconsistently affected parameters related to growth performance and N-efficiency in pigs.
- Precision feeding relative to a 3-phase feeding system tended to improve N- and Lys utilization.
- Accuracy of prediction of “next day” FI and BWG of individual animals based on historic FI and BWG data using the algorithms in the FaG DSS requires further improvement.

CONTACT

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