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Pelleting of diet ingredients: Diet selection and performance in choice-fed growing pigs

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Abstract

An experiment was completed with individually housed growing pigs to examine whether pigs can compose their optimal diet when allowed a choice of three different pellets. Forty cross-bred pigs (20 castrates and 20 gilts) with an initial live weight of 22.0 ± 2.1 kg were allocated to either a complete control diet (C) or to a choice feed diet (CF) during a 4-week period. The C pigs received a complete feed as one pellet, whereas CF pigs could select their diet out of three pellets being: an energy-rich, protein-rich or premix-rest pellet. The CF pigs were offered their pellets in one feeding trough, which was divided in three compartments. All diets were administered *ad libitum*. Gilts fed the CF diet selected a higher crude protein (CP) diet than barrows (222 and 193 g/kg DM, respectively), whereas the C pigs, both gilts and castrates, were fed a diet with the same CP content (*i.e.*, 204 g/kg DM; treatment by sex interaction; P<0.05). No other treatment and sex interactions occurred. Pigs fed the C diet had a higher net energy (NE) intake than pigs fed the experimental diet (13.8 MJ/d *versus* 10.3 MJ/d; P<0.001). The NE intake by gilts tended (P=0.08) to be lower than that by barrows (12.6 MJ/d *versus* 11.4 MJ/d). Intake of the premix-rest pellet in the CF pigs was very low (15 g/d; 13 g/kg of DM intake). Daily weight gain of the piglets was considerably lower in the CF *versus* the C pigs (779 g/d *versus* 541 g/d; P<0.001). Results show that pigs were not able to select a diet to meet their requirements for optimal growth when pelleted diet ingredients were offered free choice in three compartments. Research is required to investigate whether the inability to choose an optimal diet is due to specific organoleptic aspects such as taste, flavour or physical quality of the

Abbreviations: C, control group; CF, choice feeding group; E pellet, energy-rich pellet; P pellet, protein-rich pellet; P/R pellet, premix/rest pellet

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pellets. When this is clear, our approach can be used to study dietary components, such as secondary compounds or consequences of different feed treatments.

Keywords: Feed technology; Diet selection; Choice feeding; Pigs

1. Introduction

In natural conditions animals select their diet from several components. Under confinement management pigs are able to select a diet to meet their requirements for protein when given a choice of diets high and low in protein content (Kyriazakis, 1994; Ferguson et al., 1999; Lawlor et al., 2003). Additionally, it was demonstrated that pigs are able to change their feeding behaviour to optimize intake of a specific amino acid (Ettle and Roth, 2004, 2005). Thus, it seems possible to feed each pig to its amino acid requirement by using choice feeding systems and, consequently, increase efficiency of feed use in pig husbandry.

A related tool, especially to the feed manufacturer, is pelleting separate dietary ingredients and subsequently combining these pellets to create a complete diet ("cafeteria diets"; Ammann, 1989). In this way, process conditions, such as grinding and pelleting, can be adjusted to create optimal physical quality and feeding value in each individual diet ingredient, or group of ingredients (Skoch et al., 1981; Behnke, 1995; Thomas et al., 1997). Additionally, medicated feeds can be made on small press units especially developed for this purpose (Ammann, 1989). This approach of mixing pellets made from different groups of ingredients and feeding them in one trough was examined by van der Poel et al. (1997), who found no indication that pigs selected some pellets over others. In addition, no effect on daily gain, feed intake or feed conversion efficiency occurred.

However, it is not clear whether comparable results will be obtained when feeding the pre-manufactured pellets, or groups of ingredients, in a choice feeding setting. When a pig is able to select its individual optimal diet from a number of pelleted ingredients, the advantages of such a system may be substantial as, with this feeding system the specific requirements for energy, protein and trace elements of individual pigs, and differences between ages, genotypes and sexes can be modified by the pigs. In a conventional system, where all pigs have access to the same complete feed, this is not possible and therefore choice-feeding systems for pigs may have advantages over single feeding systems (Kyriazakis et al., 1990).

The objective of the current study was to determine whether pigs can select their optimal diet when they could make a choice of three different pellets, each fed in a separate trough.

2. Materials and methods

2.1. Diets and processing conditions

One control diet was formulated in accordance with CVB (2003). The choice feeding diet was composed of the same ingredients as used in the control diet, but in three