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Effects of an abrupt change between diet form on growth performance of finishing pigs

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ABSTRACT

A total of 200 finishing pigs (PIC TR4 × 1050; initially 60 ± 4.7 kg) were used in a 58 days growth assay to determine the effects of an abrupt change in diet form from meal to pelleted and pelleted to meal diets on growth performance and carcass measurements. The experiment was designed as a randomized complete block design with 5 pigs per pen and 10 pens per treatment. Diets were fed in 2 phases, day 0–36 and day 36–58 for phase 1 and 2, respectively. Treatments were meal to meal, meal to pelleted, pelleted to meal, and pelleted to pelleted diets for Phases 1 and 2 of the experiment, respectively. For Phase 1 (day 0–36), pigs fed the mean of the pelleted diet had increased ($P < 0.01$) ADG and G:F compared to pigs fed the mean of the meal diet. For Phase 2 (day 36–58), pigs fed the pelleted diet had increased ($P < 0.01$) ADG and G:F compared to pigs fed the meal diets. Pigs fed the pelleted diet from day 0 to 58 had increased ($P < 0.01$) ADG and G:F compared to pigs fed the meal diet from day 0 to 58. For day 0–58, pigs fed the pelleted diet for either Phase 1 or 2, but not both, tended to have decreased ($P < 0.11$) ADG and G:F compared to those fed the pelleted diet for the entire experiment. Pigs fed the meal then pelleted diet did not differ ($P > 0.27$) in performance compared to those fed the pelleted then meal diet. No differences ($P > 0.19$) were observed in dressing percentage, fat thickness, loin depth, or percentage fat free lean index. In conclusion, pigs fed the pelleted diet the entire experiment had increased ADG compared to pigs fed the meal diet. Pigs fed the pelleted diet had the greatest G:F, pigs fed meal the worst, and pigs fed pellets for only part of the grow-finish phase fell between the other treatments.

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1. Introduction

Feed processing technologies can be used to maximize feed utilization. Pelleting swine diets has been shown to improve efficiency of gain (Wondra et al., 1995a). However, adding the necessary infrastructure to allow for pelleting a diet consist of a high initial cost, along with decreasing production rates, and increasing energy usage, which leads to higher feed cost for the producer. This could be a potential problem with an increase in pork and chicken demands.

Not being able to achieve adequate production rates could be a problem for some feed manufactures. Therefore, swine producers may not be able to feed pelleted diets throughout the entire growing-finishing phase. Data has not been reported on the effects of switching from meal to pelleted diets and vice versa and if feeding pelleted diets throughout the entire

Abbreviations: ADG, average daily gain; ADFI, average daily feed intake; G:F, g of gain per kg of feed.

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Table 1
Composition of diets (as-fed basis).

Item (g/kg)	Phase 1[a]	Phase 2[b]
Corn	792.5	847.0
Soybean meal	171.5	119.0
Choice white grease	10.0	10.0
L-Lysine HCl	3.4	3.5
DL-Methionine	0.70	0.48
L-Threonine	1.17	1.10
L-Tryptophan	0.23	0.37
Monocalcium phosphate	7.2	5.4
Limestone	9.1	8.9
Salt	2.5	2.5
Vitamin premix[c]	0.8	0.8
Mineral premix[d]	0.4	0.4
Folic acid[e]	0.01	0.01
Antibiotic[f]	0.5	0.5
Calculated analysis (g/kg)		
Standardized ileal digestible lysine	8.8	7.6
Calcium	5.5	5.0
Phosphorus	4.9	4.3

[a] Diets fed in meal or pelleted form from day 0 to 36.
[b] Diets fed in meal or pelleted form from day 36 to 58.
[c] Supplied (per kilogram of diet) 1764 IU vitamin A from vitamin A acetate, 265 IU vitamin D from vitamin D_3, 7.05 IU vitamin E D-α-tocophorol acetate, 0.71 mg vitamin K from menadione nicotinamide bisulfite, 6.2 μg vitamin B_{12} from cyanocobalamin, 7.9 mg niacin from niacinamide, 4.4 mg pantothenic acid from calcium pantothenate, and 1.32 mg riboflavin from crystalline riboflavin.
[d] Provided (per kilogram of diet) 39.7 mg manganese from manganese oxide, 165 mg iron from iron sulfate, 165 mg zinc from zinc oxide, 16.5 mg copper from copper sulfate, 0.298 mg iodine from calcium iodate, and 0.298 mg selenium from sodium selenite.
[e] Provided (per kilogram of diet) 1 mg folic acid.
[f] Tylan 40 (Elanco Animal Health, Greenfield, IN) provided 44 mg of tylosin as tylosin phosphate per kg of complete diet. For control of swine dysentery associated with Brachyspira hyodysenteriae, and for control of porcine proliferative enteropathies (ileitis) associated with Lawsonia intracellularis.

grower and finisher stage is necessary to achieve performance benefits. Therefore, our objective was to determine the effects of abrupt changes between meal and pelleted diets on growth performance of finishing pigs.

2. Materials and methods

All experimental procedures were approved by the Institutional Animal Care and Use Committee at Kansas State University.

2.1. Experimental design

All feed processing was completed at a commercial feed mill (Key Feeds, Clay Center, KS). For all diets, corn was milled through a hammer mill (Jacobseen P24209 Series 2) with a screen size of 3.18 mm (full circle screen). The ASAE (1983) standard method was used to determine the particle size of milled corn. Tyler sieves, with numbers 6, 8, 10, 14, 20, 28, 35, 48, 65, 100, 150, 200, 270, and a pan, were used for particle size determination. A Ro-Tap® shaker (W. S. Tyler, Mentor, OH) was used to sift the 100 g samples for 10 min. A geometric mean particle size (dgw) was calculated by measuring the amount of ground grain remaining on each screen. The pelleted diets were pelleted in a 125 horsepower pellet mill (Century, California Pellet Mill, San Francisco) and the die had 4.8 mm openings. Pellets were analyzed for pellet durability index (ASAE, 1987) and modified pellet durability index by altering the procedure by adding 5 13-mm hexagonal nuts prior to tumbling.

A total of 200 finishing pigs (TR4 × PIC 1050; Hendersonville, TN) with an average initial body weight of 60 ± 4.7 kg were used in a 58-day growth assay. The pigs were weighed prior to the experiment and blocked by body weight. Pigs were then assigned to concrete slatted flooring pens (3 barrows and 2 gilts placed in each pen) that were 2.44 m × 1.53 m. Each pen consisted of a nipple waterer and single-hole self-feeder allowing ad libitum consumption of feed and water. There were a total of 40 pens, with 5 pigs per pen 10 pens per treatment. All diets (Table 1) were the same formulation fed in either meal or pellet form. Diets were fed in 2 phases, day 0–36 and day 36–58 for phase 1 and 2, respectively. All nutrients met or exceeded NRC recommendations (NRC, 1998). Treatments were meal to meal, meal to pelleted, pelleted to meal, and pelleted to pelleted diets for phases 1 and 2 of the experiment. Pigs and feeders were weighed on day 0, 36, and 58 to determine ADG, ADFI, and G:F. Feed wastage was not prevented in any manner; therefore, ADFI is a measure of feed disappearance. On day 58 of the experiment, pigs (average body weight of 128 ± 2.37 kg) were tattooed and shipped to a commercial abattoir (Farmland Foods, Inc.; Crete, NE) for slaughter the following morning. Measurements were acquired