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Effect of Floor Feeding Creep Feed on the Growth Performance and Mortality of Pigs After Weaning[1,2]

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Summary

A total of 264 litters (PIC × Duroc (n = 180) or Choice Genetics × Duroc (n = 84)) corresponding to 2,497 nursery pigs were used in a 40-d trial (4-d pre-weaning and 36-d post-weaning) to determine the effect of floor feeding different pellet sizes of creep feed or lactation feed on the growth performance and mortality of pigs after weaning. Treatments were applied in the farrowing house for 4 d prior to weaning and consisted of a control (no creep feed), standard (1/8 in.) creep pellet, large (1/2 in.) creep pellet, or sow lactation feed. For each treatment, approximately 0.50 lb of creep feed per day, equally divided into 2 feedings (AM and PM) was provided on the mat in farrowing stalls. At weaning (approximately d 19 of age), pigs were transported to the nursery facility and randomized to pen within creep feeding treatment group. A total of 96 pens (48 feeders) were used, with one barrow pen and one gilt pen per feeder. Thus, feeder (2 pens) was the experimental unit. There were 26 pigs per pen (52 pigs per feeder) and 12 replications per creep feeding treatment. For creep feeding during lactation, floor feeding different pellet size creep feed or lactation feed had no effects on the percentage of piglets that consumed creep feed (eaters). For the first week post-weaning, pigs fed standard or large pellet creep feed had increased ($P < 0.001$) ADG compared to pigs fed sow lactation feed or no creep feed. However, this was not driven by an improvement in ADFI. This resulted in an improved ($P < 0.001$) F/G for pigs fed large pellet creep feed compared to pigs fed sow lactation feed or no creep feed, with pigs fed standard pellet creep feed intermediate. No differences in ADG, ADFI, or F/G were observed throughout the remainder of the nursery period. On a per pig placed basis, pigs fed large pellet creep feed had increased total BW gain ($P = 0.024$), ADG ($P = 0.027$), and improved F/G ($P = 0.021$) compared to pigs fed sow lactation feed, with the other two treatment groups intermediate. This response was a direct reflection of decreased ($P = 0.050$) total removal rate for pigs fed large pellet creep feed. In summary, floor

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feeding large pellet creep feed in lactation appears to improve nursery pig growth performance and fallout rates compared to creep feeding sow lactation feed, with standard pellet creep feed or no creep feed having an intermediate effect.

Introduction

Creep feeding is commonly used to acclimate pigs to solid feed prior to weaning. While the industry understands the value of creep feeding as a strategy to better prepare pigs for weaning, on-farm application is challenging. This is largely because creep feeders are difficult to clean and maintain. Therefore, many production companies have chosen to apply sow lactation feed directly on farrowing stall mats as an alternative to creep feeding. However, there are limited research data supporting whether or not this strategy is effective at creating eaters and/or influencing post-wean performance. There is also the concern that by applying feed directly on farrowing stall mats, most of the feed will be pushed into the pits rather than consumed. By creep feeding a larger (1/2 in.) pellet, feed wastage may be minimized. Additionally, there are little published data demonstrating the benefit of creep feeding on post-wean mortality and removal rates in a commercial setting. Therefore, the objective of this study was to assess the effect of floor feeding different pellet sizes of creep feed or lactation feed on the development of eaters prior to weaning, as well as the growth performance and mortality of pigs after weaning.

Materials and Methods

The Kansas State University Institutional Animal Care and Use Committee approved the protocol used in these experiments.

A total of 264 litters (PIC × Duroc (n = 180) or Choice Genetics × Duroc (n = 84)) were used during one lactation period at a commercial sow farm in Iowa. Sows were fed a corn-soybean meal-10% wheat midds-based lactation diet throughout the experimental period. On d -5 (5 d prior to weaning), farrowing information was collected and used to allot litters of pigs to 1 of 4 treatments in a randomized complete block design with day of birth considered the blocking factor. Additionally, treatments were balanced for dam genetic line, sow parity, and litter size. Creep feeding treatment application begin on d -4 and included a control (no creep feed), standard (1/8 in.) creep pellet, large (1/2 in.) creep pellet, or sow lactation feed. For each treatment, approximately 0.50 lb of creep feed per day, equally divided into 2 feedings (AM and PM) was provided on the mat in farrowing stalls. Litters of pigs assigned to the pelleted creep feed treatments were fed a common corn-soybean meal-based phase 1 diet that contained a microbially enhanced soybean product and 17.5% lactose. The diet also contained the indigestible marker, red iron oxide at 0.6%. Litters assigned to sow lactation feed were fed a diet formulated to a standard lactation diet that also contained the indigestible marker, red iron oxide. All litters were tagged based on assigned treatment to track treatments through the nursery. On d -1, rectal swabs were taken from the litters provided creep feed using a cotton-tipped applicator. The color of each swab was visually examined and pigs were categorized as eaters when the fecal color was red.

At approximately 19 d of age, pigs were weaned and transported to a commercial research nursery in Minnesota. Upon arrival to the nursery, pigs were randomized to pen within creep feeding treatment group. A total of 96 pens (48 feeders) were used for growth performance data, with one barrow pen and one gilt pen per feeder. Thus, feeder

(2 pens) was the experimental unit. There were 26 pigs per pen (52 pigs per feeder) and 12 replications per creep feeding treatment.

Each pen was equipped with a 5-hole stainless steel feeder (36 in. × 6 in.) and cup waterer to allow *ad libitum* access to feed and water. Additionally, an automated feeding system (FeedPro; Feedlogic Corp., Willmar, MN) was used to measure and record daily feed additions to individual pens. Pens of pigs were weighed and feed disappearance measured weekly to determine ADG, ADFI, and F/G.

Pens of pigs were fed according to a standard nursery feeding program. Diets were fed in 3 different phases and were based on a feed budget. Phase 1 feed budget was provided at 4 lb per pig, phase 2 feed budget was provided at 12 lb per pig, and phase 3 feed budget was provided at 35 lb per pig. Pigs were weighed off-test prior to completing their phase 3 budget due to a PRRSV outbreak. Phase 1 diets were in pellet form (1/8 in.) and were the same formula as the creep pellets. Phase 2 and 3 diets were in meal form.

Data analysis

Nursery data were analyzed as a completely randomized design using the GLIMMIX procedure of SAS v. 9.4 (SAS Institute, Inc., Cary, NC) with feeder as the experimental unit. Treatment was considered a fixed effect and no random effect was used. A binomial model was used to determine removal and mortality percentages. Results were considered significant at $P \leq 0.05$.

Results and Discussion

Floor feeding different pellet sizes of creep feed or lactation feed had limited effects on the percentage of pigs consuming creep feed ((eaters); Table 1). We expected a higher percentage of eaters based on previous creep feeding research. The low number of eaters may be attributed to the amount and frequency in which creep feed was provided to litters as well as the short duration of creep feeding prior to weaning. The passage rate in relation to when solid feed was last consumed may have also had an effect, as well as the choice of marker may have made it more difficult to determine eaters. Additionally, floor feeding creep feed could have resulted in greater feed wastage which limited consumption.

From d 0 to 8 after weaning, pigs fed standard or large pellet creep feed had increased ($P < 0.001$) ADG compared to pigs fed sow lactation feed or no creep feed (Table 2). This resulted in increased ($P < 0.001$) BW on d 8 for pigs fed pelleted creep feed. However, no differences were observed in ADFI. This resulted in improved ($P < 0.001$) F/G for pigs fed large pellet creep feed compared to pigs fed sow lactation feed or no creep feed, with pigs fed standard pellet creep feed intermediate. No differences in ADG, ADFI, or F/G were observed throughout the remainder of the nursery period. However, a tendency was observed for overall ADG in which pigs that were fed the pelleted creep feed had numerically increased ($P = 0.056$) ADG compared to pigs fed sow lactation feed. Pigs fed pelleted creep feed also tended to have heavier ($P = 0.066$) final BW.

On a per pig placed basis, pigs fed large pellet creep feed had increased total BW gain ($P = 0.024$) and ADG ($P = 0.027$) compared to pigs fed sow lactation feed, with the other two treatment groups intermediate. No differences were observed in total feed

intake or ADFI, which resulted in improved ($P = 0.021$) F/G for pigs fed large pellet creep feed.

The differences observed in growth performance on a per pig placed basis were due to differences observed in total removals. Pigs fed large pellet creep feed had reduced ($P = 0.050$) total mortality and removals compared to pigs fed sow lactation feed, with the other two treatment groups intermediate. This was driven by the percentage of pigs removed from the trial as opposed to mortalities. Although not significant, pigs fed sow lactation feed tended to have increased ($P = 0.085$) mortalities after removal compared to the other three treatment groups.

In summary, floor feeding creep feed had limited effects on the percentage of pigs consuming creep feed. However, feeding large pellet creep feed appears to improve pig growth performance and reduce fallout rates in the nursery compared to creep feeding sow lactation feed, with standard pellet creep feed or no creep feed having an intermediate effect.

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Table 1. Effect of creep feeding on the development of eaters[1]

	Treatment[2]		
Item	**Standard pellet**	**Large pellet**	**Lactation feed**
Pigs swabbed	686	680	681
Eaters, n	36	36	37
Eaters, %	5.2	5.3	5.4

[1] A total of 2,047 pigs (PIC × Duroc (n = 180) or Choice Genetics × Duroc (n = 84)) were swabbed using a cotton-tipped applicator to determine those which consumed creep feed. The color of each swab was visually examined and pigs were categorized as eaters when the fecal color was red.

[2] Treatments were applied in the farrowing house for 4 d prior to weaning and consisted of a control (no creep feed), standard (1/8 in.) creep pellet, large (1/2 in.) creep pellet, or sow lactation feed. For each treatment, approximately 0.50 lb of creep feed per day, equally divided into 2 feedings (AM and PM) was provided on the mat in farrowing stalls.

Table 2. Effect of creep feeding on post-weaning growth performance[1]

	Treatment[2]					
Item	No creep feed	Standard pellet	Large pellet	Lactation feed	SEM	*P* =
Count d 0	624	624	625	624	---	---
Count d 36	549	555	564	531	---	---
Body weight, lb						
d 0	11.2	11.3	11.3	11.1	0.10	0.457
d 8	13.1[b]	13.6[a]	13.8[a]	13.1[b]	0.12	<0.001
d 15	16.7	16.9	17.1	16.5	0.17	0.094
d 21	20.6	20.7	21.1	20.0	0.26	0.062
d 29	26.1[a,b]	26.2[a,b]	26.4[a]	25.2[b]	0.31	0.046
d 36	31.2	31.6	31.7	30.4	0.38	0.066
d 0 to 8						
ADG, lb	0.23[b]	0.28[a]	0.31[a]	0.24[b]	0.012	<0.001
ADFI, lb	0.35	0.36	0.36	0.33	0.011	0.239
F/G[3]	1.52[a]	1.29[a,b]	1.16[b]	1.38[a]	0.029	<0.001
d 8 to 15						
ADG, lb	0.51	0.49	0.47	0.49	0.020	0.558
ADFI, lb	0.52	0.50	0.52	0.48	0.019	0.437
F/G[3]	1.02	1.02	1.11	0.98	0.045	0.509
d 15 to 21						
ADG, lb	0.62	0.61	0.66	0.57	0.031	0.275
ADFI, lb	0.77	0.75	0.77	0.71	0.026	0.370
F/G[3]	1.24	1.23	1.17	1.25	0.031	0.515
d 21 to 29						
ADG, lb	0.65	0.65	0.65	0.62	0.018	0.582
ADFI, lb	1.02	1.00	1.01	0.96	0.018	0.148
F/G[3]	1.57	1.54	1.55	1.55	0.014	0.874
d 29 to 36						
ADG, lb	0.67	0.70	0.69	0.65	0.023	0.404
ADFI, lb	1.15	1.18	1.16	1.12	0.024	0.339
F/G[3]	1.72	1.69	1.68	1.72	0.013	0.832
d 0 to 36						
ADG, lb	0.52	0.53	0.54	0.50	0.011	0.056
ADFI, lb	0.75	0.74	0.75	0.71	0.014	0.100
F/G[3]	1.44	1.40	1.39	1.42	0.008	0.242

continued

Table 2. Effect of creep feeding on post-weaning growth performance[1]

	Treatment[2]					
Item	No creep feed	Standard pellet	Large pellet	Lactation feed	SEM	*P* =
d 0 to 36, per pig placed[4]						
Total gain, lb	16.2[a,b]	16.8[a,b]	17.3[a]	14.7[b]	0.60	0.024
ADG, lb	0.45[a,b]	0.47[a,b]	0.48[a]	0.41[b]	0.017	0.027
Total feed intake, lb	25.4	25.7	26.0	24.0	0.59	0.087
ADFI, lb	0.71	0.72	0.72	0.67	0.016	0.083
F/G[3]	1.58[a,b]	1.53[a,b]	1.50[b]	1.63[a]	0.013	0.021
Mortality/removal analysis, %						
Removal	9.8	9.1	8.5	13.1	1.35	0.045
Mortality after removal[5]	1.0	1.1	1.6	2.7	0.65	0.085
Mortality in pen	2.2	1.9	1.3	1.8	0.59	0.645
Total mortality[6]	3.2	3.0	2.9	4.5	0.83	0.398
Total mortality and removals[7]	12.0[a,b]	11.1[a,b]	9.8[b]	14.9[a]	1.43	0.050

[1] A total of 264 litters (PIC × Duroc (n = 180) or Choice Genetics × Duroc (n = 84)) corresponding to 2,497 nursery pigs were used in 40-d trial (4 d pre-weaning and 36 d post-weaning).

[2] Treatments were applied in the farrowing house for 4 d prior to weaning and consisted of a control (no creep feed), standard (1/8 in.) creep pellet, large (1/2 in.) creep pellet, or sow lactation feed. For each treatment, approximately 0.50 lb of creep feed per day, equally divided into 2 feedings (AM and PM) was provided on the mat in farrowing stalls.

[3] Feed-to-gain was calculated from G/F.

[4] Total gain per pig placed = (total pen weight at the end of the trial – total pen weight at the beginning of the trial) ÷ pig inventory on d 0.

ADG per pig placed = total gain per pig placed ÷ total days on trial.

Total feed intake per pig placed = total feed intake ÷ pig inventory on d 0.

ADFI per pig placed = total feed intake per pig placed ÷ total days on trial.

F/G per pig placed = total feed intake per pig placed ÷ total gain per pig placed.

[5] Mortality after removal = count of pigs that died after removal ÷ initial pen inventory.

[6] Total mortality = (mortality after removal + mortality in pen) ÷ initial pen inventory.

[7] Total removals = (removal + mortality in pen) ÷ initial pen inventory.