Effect of Weaning Age on Nursery Pig Growth Performance

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Story in Brief

Two studies were performed to determine the effect of weaning age on pig performance in the nursery. Body weights and feed intake at the end of each phase were recorded. Average daily gain, ADFI, and F/G were calculated for each pen. In Experiment 1, 270 pigs were weaned at an average of 18.2 d of age (BW = 14.11 lb) or 20.8 d of age (BW = 14.25 lb) and penned in groups of 9 pigs/pen in a wean-to-finish facility. Pigs were fed common Phase 1 (d 0 to 13) and Phase 2 (d 13 to 34) nursery diets. There were no differences in BW, ADG, ADFI, or F/G in pigs weaned to the wean-to-finish facility. In a second study, 252 pigs were weaned at an average of 18.9 d of age (BW = 13.00 lb) or 21.8 d of age (BW = 14.42 lb) and penned in groups of 7 pigs/pen in an off-site nursery facility. Pigs were fed common Phase 1 (d 0 to 13), Phase 2 (d 13 to 28), and Phase 3 (d 28 to 41) nursery diets. In Experiment 2, pigs weaned at 21.8 d of age had a greater ADG (1.24 vs. 1.14 lb/d; $P = 0.0007$) and ADFI (2.10 vs. 1.87 lb/d; $P = 0.0003$) compared to pigs weaned at 18.9 d of age. Pigs weaned at 18.9 d of age had a lower F/G during Phase 3 than those weaned at 21.8 in Experiment 2 ($P = 0.05$).

Introduction

The average weaning age of piglets in the United States ranges from 18 to 26 d depending on the size of the operation (APHIS, 2002). Recently, debate has arisen as to whether weaning age should be increased. A recent study by researchers at Kansas State University indicated that increasing weaning age from 12 to 21.5 d of age improved ADG to market weight (Main et al., 2004). However, no consensus has been achieved as to the ideal weaning age. Therefore, two experiments were conducted to determine the effect of weaning age on pigs weaned into two different environments: wean-to-finish and an off-site nursery.

Experimental Procedures

Animals and Housing. In Experiment 1, 270 pigs were weaned and transported (approximately 2 miles) to the University of Arkansas Wean-to-Finish Facility. Pigs were divided into 2 age groups of equal number representing the older (20.8 d of age) and younger (18.2 d of age) groups of pigs (135 pigs in each group). Pigs within each age group were sorted into 3 blocks based on BW and gender (90 pigs per block). Pigs were penned in groups of 9 pigs/pen and housed in 30 concrete slatted pens with mats equipped with radiant heaters, a 2-hole feeder, and nipple waterer. In Experiment 2, 252 pigs were weaned and transported (approximately 12 miles) to an off-site nursery at the University of Arkansas. Pigs were divided into 2 age groups of equal number representing the older (21.8 d of age) and younger (18.9 d of age) groups of pigs (126 pigs in each group). Pigs within each age group were sorted into 6 blocks based on BW and gender (42 pigs per block). Pigs were penned in groups of 7 pigs/pen and housed in 36 plastic slatted floored pens equipped with a 4-head feeder and 2 nipple waters.

Diets and Measurements. Pigs in Experiment 1 were fed common Phase 1 (d 0 to 13) and Phase 2 (d 13 to 34) nursery diets, while those in Experiment 2 were fed common Phase 1 (d 0 to 13), Phase 2 (d 13 to 28), and Phase 3 (d 28 to 41) nursery diets (Table 1).

Individual pig weights were measured initially as well as at the completion of each nursery phase (d 0, 13, and 24 for Experiment 1 and d 0, 13, 28, and 41 for Experiment 2). Pen was the experimental unit. Feed intake was determined for each pen during each nursery phase. Average daily gain, ADFI, and F/G were calculated.

Statistical Analysis. Performance data were analyzed as a complete block design with pen as the experimental unit. The data were analyzed using the GLM procedure of SAS (SAS Inst., Inc., Cary, N.C.) with the model including the main effect of block and age group. Least squares means for BW, ADG, ADFI, F/G, and age were compared using least significant differences. A P-value of < 0.05 was considered significant.

Results and Discussion

In Experiment 1, there were no differences in ADG, ADFI, or F/G in either of the nursery phases between the older and younger weaning groups reared in the wean-to-finish facility (Table 2). Initial BW of the older weaning group was greater compared to the younger weaning group ($P < 0.0001$). This difference continued through the end of Phase 1 ($P = 0.04$), but both groups were similar in weight at the end of Phase 2 ($P > 0.41$). Although the older weaning group began at a heavier weight, those pigs were not able to maintain their weight advantage through the end of the study, indicating the younger weaning group was able to compensate for the difference by the end of Phase 2.

In Experiment 2, older pigs weaned to an off-site nursery had greater ADG at the end of Phase 1 ($P = 0.004$), Phase 2 ($P = 0.006$), Phase 3 ($P = 0.003$), and throughout the nursery period ($P = 0.0007$) compared to younger pigs (Table 3). Additionally, ADFI was increased in older pigs during Phase 1 ($P = 0.006$), Phase 2 ($P = 0.002$), Phase 3 ($P = 0.0002$), and throughout the nursery period ($P = 0.0003$). Pigs from the younger weaning group had lower F/G during Phase 3 ($P = 0.05$) than the older weaning group. There were no differences in F/G in any of the other periods measured. Initial body weight was not different; however, the older pigs were heavier after Phase 1 ($P = 0.02$), Phase 2 ($P = 0.009$), and Phase 3

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(P = 0.003). Pigs weaned into the off-site nursery were believed to have been reared in a cleaner environment than those reared in a wean-to-finish facility, giving them a potential immune benefit. Pigs in Phase 1 appeared to have similar BW and ADFI between the two experiments, however by the end of Phase 2 those in the off-site nursery appeared to be heavier and have increased daily intake. Additionally, the older pigs in Experiment 2 began with a slight weight advantage and were able to maintain the greater weight by eating more than the younger group of pigs throughout the nursery period.

Implications

Results of these studies indicate there is potential for improved growth performance when pigs are weaned at an older age. In the off-site nursery, pigs weaned at 21.8 d of age had improved overall growth performance compared to pigs weaned at 18.9 d of age. However, it appears that the increased performance throughout the nursery period in the group weaned at 21.8 d of age can be attributed to increased food intake, and not improved feed efficiency.

Literature Cited

APHIS. March 2002. Info Sheet. Swine Nursery Management.
Main, R. G., et al. 2004. J. Anim. Sci. 82:1499-1507.

Table 1. Composition of nursery diets.

	Experiment 1		Experiment 2		
Ingredients	Phase 1	Phase 2	Phase 1	Phase 2	Phase 3
Yellow corn	24.32	48.52	23.87	42.97	54.91
Rolled oats	15.0	---	15.0	5.0	---
Whey	10.0	---	10.0	15.0	6.25
Nutripro[a]	6.0	---	---	---	---
Soybean meal – 48% CP	7.0	30.5	7.0	21.8	25.9
Menhaden fish meal	7.0	2.0	7.0	3.0	2.5
Plasma[b]	5.0	1.0	5.0	2.4	---
Blood Meal	2.0	1.5	2.0	1.25	2.5
Lactose	15.5	8.1	15.5	---	---
Salt	0.5	0.5	0.5	0.5	0.5
Calcium carbonate	0.36	0.67	0.02	0.55	0.61
Dicalcium phosphate	1.15	1.45	1.36	1.19	1.23
Fat, yellow grease	4.0	4.0	---	3.88	3.69
Soybean protein concentrate	---	---	7.57	---	---
Soybean oil	---	---	3.07	---	---
$CuSO_4$	0.05	---	0.09	0.09	0.09
Zinc oxide	0.25	---	0.35	0.35	---
DL Methionine	0.16	0.11	0.13	0.15	0.13
L-Lysine HCL	0.17	0.14	0.09	0.25	0.18
Threonine	---	0.08	0.02	0.09	0.08
Isoleucine	0.11	---	---	---	---
Ethoxyquin	0.03	0.03	0.03	0.03	0.03
Neo-Terromycin 10/5	1.0	1.0	1.0	1.0	1.0
Vitamin premix[c]	0.25	0.25	0.25	0.25	0.25
Mineral premix[d]	0.15	0.15	0.15	0.25	0.15

[a] Nutripro (Land O'Lakes, Inc., Fort Dodge, IA).
[b] AP-920 (American Protein Corporation, Ames, IA).
[c] Supplied 11,023 IU vitamin A, 1,653 IU vitamin D_3 as D-activated animal sterol, 44 IU vitamin E, 4.4 mg vitamin K as menadione sodium bisulfite complex, 33 mg pantothenic acid as D-calcium pantothenate, 55 mg niacin, 10 mg riboflavin, and 44 μg vitamin B_{12} per kilogram of feed.
[d] Supplied 0.30 mg Se as sodium selenite, 40 mg Mn as manganous oxide, 165 mg Zn as zinc oxide, 165 mg Fe as ferrous sulfate, 17 mg Cu as copper sulfate, and 0.30 mg of I as calcium iodate per kilogram of feed.

Table 2. Effect of weaning age on piglets reared in a wean-to-finish nursery.

	Weaning age			
Trait	Older	Younger	SE	P-value
Age, d	20.8	18.2	0.09	<0.0001
BW, lb				
d 0	14.25	14.11	0.01	<0.0001
d 13	23.17	22.40	0.26	0.04
d 34	50.81	50.27	0.46	0.41
Phase 1 (d 0 to 14)				
ADG, lb	0.69	0.64	0.02	0.10
ADFI, lb	0.82	0.79	0.02	0.46
F/G	1.19	1.25	0.03	0.20
Phase 2 (d 13 to 34)				
ADG, lb	1.32	1.33	0.02	0.55
ADFI, lb	1.97	1.93	0.04	0.40
F/G	1.50	1.46	0.02	0.19
Total (d 0 to 34)				
ADG, lb	1.07	1.06	0.01	0.57
ADFI, lb	1.53	1.49	0.03	0.31
F/G	1.43	1.41	0.02	0.45

Table 3. Effect of weaning age on piglet performance in an offsite nursery.

	Weaning age			
Trait	Older	Younger	SE	P-value
Age, d	21.8	18.9	0.12	<0.0001
Weight, lb				
d 0	14.42	13.00	0.53	0.07
d 13	23.28	20.66	0.73	0.02
d 28	43.68	39.36	1.09	0.009
d 42	65.17	59.61	1.22	0.003
Phase 1 (d 0 to 13)				
ADG, lb	0.68	0.59	0.02	0.004
ADFI, lb	0.86	0.75	0.03	0.006
F/G	1.26	1.26	0.03	0.99
Phase 2 (d 13 to 28)				
ADG, lb	1.36	1.24	0.03	0.006
ADFI, lb	2.24	1.99	0.05	0.002
F/G	1.64	1.60	0.03	0.33
Phase 3 (d 28 to 42)				
ADG, lb	1.65	1.56	0.02	0.003
ADFI, lb	3.16	2.86	0.05	0.0002
F/G	1.92	1.84	0.03	0.05
Total (d 0 to 42)				
ADG, lb	1.24	1.14	0.02	0.0007
ADFI, lb	2.10	1.87	0.04	0.0003
F/G	1.69	1.65	0.02	0.06