Effect of Weaning Age on Nursery Pig Performance

A.S. Leaflet R2170

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Summary and Implications

Weaning age is an extremely important management decision in commercial pork production. The decision is based upon many factors which include sow performance, herd health, pig performance and costs and revenues associated with these factors such as lactation space utilization, and weaned pig value. The industry shifted to weaning litters at earlier ages in order to improve piglet health throughout the nursery and grow finish phases of production. In order to avoid transmission of pathogens from sow to piglet, the Segregated Early Weaning (SEW) concept was developed. This process consists of farrowing sows on the same site as the rest of the breeding herd, weaning piglets from 10 to 21 days and decreasing the amount of medication that is administered (Harris, 2000). Applying these management practices impacts subsequent piglet growth performance. Limited research has been conducted to determine the weaning age that results in optimum performance of the pig in its early stages of development and still provides protection to a variety of pathogens. The objective of this study was to quantify the effects of two weaning ages on nursery pig performance in a commercial production system.

Introduction

The swine industry has shifted to weaning sows and their litters at earlier ages in order to improve farrowing crate utilization, increase pigs per sow per year and improve piglet health and the operations throughput (Harris, 2000). The influence of weaning age on subsequent piglet nursery performance and grow-finish performance can be tools that producers can utilize to optimize production and maximize profitability on their operations.

On commercial farms, weaning age is generally an outcome determined from the number of sows farrowing each week, and lactation space available (Main et al., 2004). Many producers and scientists have begun to reevaluate weaning age decisions, looking at the growth differences and herd health issues between pigs that have been weaned at different ages. As a result during the past few years, we have seen a shift back towards older weaning ages. Even though a majority of the benefits of weaning at a later age are observed during the early postweaning period, the effect has been reported to persist through the nursery and grow-finish phases (Main et al., 2004).

Thus, the objective of this research was to determine the effect of weaning age on nursery pig growth performance.

Materials and Methods

Animals and Procedures

This experiment was conducted using Danbred N.A. (Columbus, NE) maternal line barrows and gilts from purebred Landrace sows from a commercial maternal line multiplication herd (H & K Enterprises, Nevada, IA). All breeding, farrowing and weaning information was recorded and input into PigWIN® (Little Canada, MN) and all relevant data was extracted from that program and utilized for the analysis in this study. At birth, each litter was assigned to one of two weaning age treatments. The first weaning age treatment averaged 15 days of age at weaning and included pigs that were weaned at 14, 15 and 16 days. The second weaning age treatment averaged 20 days at weaning and included pigs that were weaned at 19, 20 and 21 days.

Pigs

A total of 89 pens, each containing 26-28 pigs (n=2,411) was used in the trial. Data was from Yorkshire x Landrace crossbred pigs from 339 litters. All litters were produced by purebred Landrace sows in their first to eleventh parities (Table 1). Each piglet was individually identified, weighed and sex was determined within 24 h of birth. By day seven, all boars were castrated.

On weaning day, piglets within each weaning age treatment were weighed and randomly assigned to a nursery pen. Body weights were recorded at birth, weaning, and 42 day postweaning. Growth and feed efficiency were calculated using weaning weights taken on weaning day. Pigs remained in their pen until 42 day postweaning when they were weighed and identified, recorded at off-test weight.

Pigs were housed in a mechanically ventilated, heated, totally confined nursery rooms with plastic slatted flooring. Each nursery room contained eight pens, four for each weaning age treatment with 26-28 barrows and gilts per pen. Each pen was equipped with a single-sided stainless steel self-feeder (30 in linear trough space/pen) and two nipple drinkers, allowing ad libitum feed and water consumption. Pigs were housed in 8 ft x 10 ft nursery pens, allowing pigs 2.86-3.08 ft^2 per pig. Pigs were removed from test pens due to death or if a condition existed in which the pig did not respond to medical treatment (non-ambulatory). Pigs were fed a four phase diet regime from weaning to 42 d postweaning with

feed disappearance recorded on a pen basis. A feed budget was developed in which each pig was provided 2.76 lb of a 1.70 % lysine pellet, 13.54 of a 1.50 % lysine diet, 27.71 of a 1.30 % lysine diet and the remainder was a 1.20 % lysine diet.

Statistical Procedures

All statistical procedures were conducted using the PROC MIXED procedure of SAS (Cary, NC). When the fixed effects were a significant source of variation, fixed level differences were determined using the PDIFF option of SAS.

Records with off-test weight greater than 73.98 lb or less than 13 lb; or ADG greater than 3.39 lb/d or less than -0.18 lb/d were excluded from the analyses because the authors felt that the extended records were not a result of the treatments but were more likely related to management factors. Pig was the experimental unit for all traits measured on the individual animal. Pen was the experimental unit for traits where individual data collection was not possible such as G:F, ADFI and feed cost/lb gain. Fixed effects of weaning age treatment, and pen (weaning age treatment) were included in the model when analyzing ADG. Birth weight and parity of dam were included as linear covariates in the ADG analyses. Fixed effects of weaning age group and pen (weaning age treatment) were included in the models for ADFI and G:F.

A chi-square test for proportions was utilized to evaluate differences in mortality and morbidity among weaning age treatments (Wolter et al., 2002). Morbidity, defined as pigs removed from test due to non-ambulatory conditions (injured, small, sick) and mortality within weaning age treatment.

Results and Discussion

The birth weight covariate was a significant ($P < 0.01$) source of variation when ADG was analyzed. Pigs weaned at 20 d had a 0.17 lb/d greater nursery ADG when compared to pigs weaned at 15 days of age, 42 days postweaning (Table 2). In the trial, weaning weight increased ($P < 0.0001$) with increasing weaning age. Furthermore, the variation in allotment weight (i.e. the coefficient of variation for weaning weight) was decreased as weaning age increased. Pigs weaned at 20 days had a lower ($P < 0.03$) morbidity (2.07, 1.01 %) when compared to pigs weaned at 15 days of age during the 42 day nursery phase (Table 2). Parity of dam was a significant ($P < 0.01$) source of variation for ADG from weaning through the 42 day nursery phase of production.

Pigs weaned at 20 day had a greater ($P < 0.02$) nursery ADFI (1.41 lb/d) when compared to pigs weaned at 15 d of age (1.26 lb/d) (Table 2). No significant ($P = 0.89$) differences existed in G: F between pigs weaned at 20 days and 15 days. Pigs weaned at 20 days had a 0.07 less feed cost/lb gain when compared to pigs weaned at 15 days of age, 42 days postweaning (Table 2).

Weaning age is an extremely important management decision in commercial pork production. The decision is based upon many factors which include sow performance, herd health, pig performance and the economics of these factors such as lactation space utilization, weaned pig value and the costs and revenues associated with weaning age. Results of this trial suggest that weaning pigs at 20 d may prove advantageous in commercial operations because of the improvements in nursery growth performance.

Table 1. Number of pigs and litters represented by parity in a study of the effects of two different weaning ages on nursery performance.

	Weaning Age Treatment [a]					
Parity	15 D (Number of litters)	15 D (Number of pigs)	20 D (Number of litters)	20 D (Number of pigs)	Totals (pigs)	Totals (litters)
1	48	416	42	310	726	90
2	25	201	32	262	463	57
3	20	175	18	142	317	38
4	17	107	25	179	286	42
5	17	117	16	84	201	33
6[b]	36	228	43	246	474	79
Totals	163	1244	176	1223	2467	339

[a] Average weaning age of 15 d included pigs weaned at 14, 15 and 16 d of age. Average weaning age of 20 d included pigs weaned at 19, 20 and 21 d of age.

[b] Parities greater than six were grouped together and are included in this category

Table 2. Influence of weaning age on nursery performance, in a study of two average weaning age groups (15 d and 20 d).[a]

Item	Wean Age 15 d ± SE[f]	20 d ± Se[f]	P Value
Number of pigs, n=	1205	1206	--
Weaning weight, lb	11.35^{x} ± 0.03	14.73^{y} ± 0.05	< 0.0001
Weaning weight CV, %	19.44	18.49	--
ADG[b], lb	1.57^{x} ± 0.004	1.74^{y} ± 0.01	< 0.0001
ADFI[bc]	1.26^{x} ± 0.01	1.41^{y} ± 0.01	< 0.0001
G:F[bc]	1.21^{x} ± 0.005	1.23^{x} ± 0.01	0.85
Mortality, %	0.95	0.58	0.14
Removed from test, %[d]	2.07	1.01	0.03
Off-test weight[e], lb	41.20^{x} ± 0.11	48.10^{y} ± 0.16	< 0.0001
Feed Costs/lb gain[c]	1.04^{x} ± 0.004	0.97^{y} ± 0.01	0.0005

[a]Based on 2,411 pigs, with 28 pigs/pen (mixed sexes) and 4 pens per treatment.

[b]Weaning weights were used for all growth and efficiency calculations.

[c]ADFI, G:F and Cost/lb gain were calculated on a per pen basis, using 42 day weight and pigs days.

[d] Removed from test %= Pigs removed from test plus mortalities.

[e]Off-test weight=42 day postweaning weight.

[f] Means with different subscripts in a row differ ($P < 0.05$).