

Developing Weaning Pig Programs Based on Age and Weight

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Summary

Pigs were divided at weaning into 2 weight groups and 2 age groups and fed 3 different amounts of a Phase 1 diet to examine whether weaning feeding programs should be tailored to the age and/or weight of the pig. Bodyweight at weaning, but not age resulted in improved performance at day 53 post-weaning. Feeding program had no effect on growth or feed efficiency performance, or the variability in growth.

Introduction

Feeding the newly weaned pig is becoming an increasingly complex challenge, as multiple forces present themselves to pork producers. These forces include needs for lower cost, less antibiotic usage, improved performance and reduced variability. In this experiment, the impact of both the pig weight and age at weaning, as well as the quantity of each phase of diet offered to the pig were evaluated. We hypothesized that the lighter pig, and the younger pig within the lighter sub-group, would respond more to the higher quality diets; and therefore they would improve relative to similar pigs fed a poorer diet. This would result in improved overall performance and a reduction in body weight variability at the time of nursery exit.

Experimental Procedure

The experiment was designed using a 2 x 2 x 2 x 3 arrangement of treatments; 2 weight blocks of pigs, 2 ages of pigs, 2 dietary treatments, and 3 intake treatments. Since neither dietary nor intake treatment affected the results, data is reported averaged across these treatments. Four nursery rooms, each configured to provide 24 pens per room (8 pigs per pen, 768 pigs in total) were used for this experiment. At weaning, all available pigs were weighed individually and assigned to either the heavy or light block. Within each weight block, pigs were divided into the youngest and oldest. Groups were then randomly assigned to diet and intake treatments. The 3 intake treatments are summarized in Table 1. Diets were commercial nursery diets. As pigs were switched from phase 1 to 2 to 3 etc they received less spray dried whey, blood cells and supplemental amino acids.

Table 1. Summary of Feed Intake Treatments

	Feed Intake Treatment		
	Low	Medium	High
	kg/pig		
Phase 1	0	0.5	1.0
Phase 2	0	0.5	1.0
Phase 3	10	9	8
Phase 4	11	11	11
Phase 5	To end of trial	To end of trial	To end of trial

Results and Discussion

Diet nor intake treatment affected performance ($P > 0.05$). Initial body weight group affected final BW (Table 2), ADG (Table 3) and ADFI (Table 4) throughout the trial ($P < 0.001$). Initial age affected BW and feed intake, but surprisingly had no effect on ADG or feed efficiency. Within a weight block, the older pigs began the trial 40 to 70 grams heavier than the younger pigs. The effect of initial weight and age on BW was observed at each weigh point, but

Table 2. Effect of Initial Weight or Age, or Intake Treatment on Body Weight

Weight block		Heavy			Light		
Intake treatment		Low	Medium	High	Low	Medium	High
		Body weight (kg)			Body weight (kg)		
d 0	Young	6.98	6.96	7.02	4.92	4.92	4.93
	Old	7.07	7.05	7.06	5.01	4.94	4.94
d 8	Young	7.43	7.64	7.69	5.36	5.43	5.47
	Old	7.93	7.83	7.94	5.72	5.76	5.78
d 15	Young	9.37	9.36	9.51	6.77	6.83	7.03
	Old	10.12	9.98	10.03	7.38	7.64	7.56
d 22	Young	12.88	12.90	13.14	9.56	9.58	9.93
	Old	13.89	13.47	13.62	10.49	10.77	10.82
d 28	Young	16.99	16.99	17.22	12.97	12.89	13.27
	Old	18.12	17.61	17.68	14.11	14.41	14.32
d 35	Young	22.01	22.06	22.28	17.23	17.21	17.65
	Old	22.99	22.53	22.73	18.63	19.01	18.46
d 53	Young	36.12	36.95	36.68	31.04	30.87	31.06
	Old	37.13	36.26	36.63	32.03	32.62	31.82

Proc Mixed repeated measures test of fixed effects

Effect	P value	Effect	P Value
Weight	0.0001	Intake	0.35
Age	0.0001	Weight x age	0.12

Table 3. Effect of Initial Weight or Age, or Intake Treatment on Average Daily Gain

Weight block		Heavy			Light		
Intake treatment		Low	Medium	High	Low	Medium	High
		Average daily gain (kg/d)			Average daily gain (kg/d)		
d 0 – 8	Young	0.16	0.16	0.17	0.12	0.13	0.14
	Old	0.20	0.20	0.20	0.16	0.18	0.17
d 9 – 15	Young	0.28	0.24	0.26	0.21	0.20	0.23
	Old	0.32	0.31	0.30	0.24	0.27	0.26
d 16 – 22	Young	0.50	0.51	0.52	0.39	0.38	0.41
	Old	0.54	0.50	0.51	0.45	0.45	0.46
d 23 – 28	Young	0.69	0.70	0.64	0.52	0.55	0.56
	Old	0.70	0.69	0.69	0.60	0.60	0.59
d 29 – 35	Young	0.72	0.73	0.72	0.61	0.62	0.63
	Old	0.70	0.70	0.72	0.65	0.66	0.60
d 36 – 53	Young	0.79	0.83	0.80	0.75	0.76	0.76
	Old	0.79	0.76	0.77	0.75	0.76	0.74
d 0 – 53	Young	0.56	0.57	0.55	0.48	0.49	0.49
	Old	0.57	0.55	0.56	0.51	0.53	0.51

Proc Mixed repeated measures test of fixed effects

Effect	P value	Effect	P value
Weight	0.0001	Intake	0.84
Age	0.68	Weight x age	0.06

Table 4. Effect of Initial Weight or Age, or Intake Treatment on Average Daily F.I.

Weight block		Heavy			Light		
Intake treatment		Low	Medium	High	Low	Medium	High
d 0 – 8	Young	0.21	0.21	0.21	0.17	0.17	0.17
	Old	0.25	0.24	0.24	0.20	0.21	0.21
d 9 – 15	Young	0.32	0.32	0.32	0.25	0.25	0.25
	Old	0.38	0.36	0.35	0.29	0.31	0.30
d 16 – 22	Young	0.61	0.60	0.61	0.46	0.47	0.50
	Old	0.64	0.60	0.63	0.51	0.53	0.54
d 23 – 28	Young	0.85	0.83	0.85	0.68	0.68	0.68
	Old	0.85	0.82	0.86	0.73	0.73	0.73
d 29 – 35	Young	0.99	1.00	1.02	0.82	0.80	0.83
	Old	1.02	0.99	1.01	0.87	0.87	0.86
d 36 – 53	Young	1.26	1.28	1.29	1.07	1.08	1.10
	Old	1.26	1.28	1.27	1.11	1.12	1.11
d 0 – 53	Young	0.82	0.82	0.84	0.69	0.69	0.71
	Old	0.85	0.82	0.84	0.73	0.74	0.73

Proc Mixed repeated measures test of fixed effects

Effect	P value	Effect	P value
Weight	0.0001	Intake	0.32
Age	0.0001	Weight x age	0.02

became less pronounced as the trial progressed. Heavier pigs consistently grew faster than lighter pigs, and older pigs generally grew faster than younger pigs. Similar results were observed for feed intake. The effects of initial body weight group and age on feed efficiency (Table 5) were inconsistent. Generally, heavier pigs used feed more efficiently than lighter pigs; this effect achieved significance by the second half of the experiment. However, by the final week of the experiment, pigs in the young treatment group tended to have an improved feed efficiency relative to those which were older at weaning.

The coefficient of variability (CV) of body weight was calculated within pens ($n = 8$); therefore it is possible that single aberrant pigs may skew the result (Table 6) and these numbers are not representative of the CV of the weaning group. The CV was less for heavier pigs throughout the experiment. Since this effect was observed at d 0 it is a reflection of the variability observed with the light weight pigs at the experiment initiation. Age had no effect on CV.

Implications

Pigs which are heavier at weaning perform better than lighter pigs, regardless of age or intake of Phase 1 diet, which had only modest effects on performance.

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Table 5. Effect of Initial Weight or Age, or Intake Treatment on Feed Efficiency (G:F)

Weight block		Heavy			Light		
Intake treatment		Low	Medium	High	Low	Medium	High
d 0–8	Young	0.41	0.66	0.36	0.50	0.54	0.62
	Old	0.74	0.68	0.74	0.72	0.80	0.74
d 9–15	Young	0.88	0.77	0.84	0.81	0.82	0.89
	Old	0.83	0.87	0.86	0.82	0.90	0.86
d 16–22	Young	0.84	0.85	0.86	0.86	0.81	0.84
	Old	0.86	0.84	0.81	0.88	0.85	0.86
d 23–28	Young	0.81	0.85	0.76	0.82	0.82	0.83
	Old	0.84	0.85	0.80	0.83	0.83	0.81
d 29–35	Young	0.73	0.74	0.72	0.76	0.78	0.76
	Old	0.69	0.71	0.72	0.75	0.77	0.70
d 36–53	Young	0.63	0.66	0.64	0.75	0.72	0.73
	Old	0.63	0.61	0.62	0.70	0.70	0.68
d 0–53	Young	0.67	0.69	0.66	0.70	0.71	0.70
	Old	0.68	0.68	0.67	0.70	0.71	0.70

Proc Mixed repeated measures test of fixed effects

Effect	P value	Effect	P value
Weight	0.11	Intake	0.24
Age	0.31	Weight x age	0.79

Table 6. Effect of Initial Weight or Age, or Intake Treatment on Variation in Growth^a

Weight block		Heavy			Light		
Intake treatment		Low	Medium	High	Low	Medium	High
d 0	Young	9.5	9.9	11.3	14.5	12.6	14.0
	Old	12.1	10.9	11.2	14.7	13.1	15.2
d 8	Young	11.2	11.2	13.3	15.9	13.1	16.0
	Old	11.6	11.7	13.0	16.4	14.5	14.2
d 15	Young	13.1	11.8	13.6	17.9	15.4	17.9
	Old	12.8	11.9	14.0	16.9	16.5	14.9
d 53	Young	9.4	7.8	9.3	12.7	10.0	12.0
	Old	10.7	8.2	8.1	12.7	10.4	12.5

^a Measured as the coefficient of variation or bodyweight within a pen (n=8)

Proc Mixed repeated measures test of fixed effects

Effect	P value	Effect	P value
Weight	0.0001	Intake	0.35
Age	0.0001	Weight x age	0.12