THE EFFECTS OF MEAL TRANSITION DIETS ON NURSERY PIG GROWTH PERFORMANCE IN A COMMERCIAL ENVIRONMENT

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Summary

A total of 2,016 pigs (initially 12.6 lb and 18 ± 2 d of age) were used in a 28-d growth assay to evaluate the current feed-budget allocations for SEW, Transition, and Phase 2 diets fed in meal form in a commercial environment. Pigs were allotted to one of six treatments, with a variety of feed budgets: 1) pelleted diets with 1 lb/pig of SEW diet (6.7% plasma) and 3 lb/pig of Transition diet (2.5% plasma); 2) pelleted diets with 0.5 lb/pig of SEW diet (6.7% plasma) and 1 lb/pig of Transition diet (2.5% plasma); 3) meal diet with 2 lb/pig Transition diet (2.5% plasma); 4) meal diet with 4 lb/pig of Transition diet (2.5% plasma); 5) meal diet with 2 lb Transition diet (4% plasma); and 6) meal diet with 4 lb Transition diet (4% plasma). After the allotted amount of feed was distributed to the pens as described in the budget, all treatments were fed 12 lb/pig of a Phase 2 meal diet, and then a Phase 3 meal diet for the duration of the trial. From day 0 to 10 and for the overall period, the pigs fed the pelleted SEW and Transition diets grew faster, and had better feed efficiency, lower removal rates (culls), and greater margin over feed cost than did the pigs fed the meal-based Transition diets. For pigs fed the pelleted SEW and Transition diets, pigs fed 1 and 3 lb, respectively, had better ADG and F/G for the period d 0 to 10 after weaning, better F/G for the period d 0 to 28, lower feed cost per lb of gain, and greater margin over feed than pigs fed 0.5 and 1 lb, respectively, of SEW and Transition diets. The current recommendations of providing weanling pigs 1 lb/pig SEW diet and 3 lb/pig Transition diet optimized growth and profitability in this production system.

(Key Words: Nursery Pig, Pellets, Feed Budget, Spray-dried Animal Plasma.)

Introduction

Average weaning age has increased by an average of three days in the last few years, indicating the need to re-evaluate the current feed budget used for nursery pigs. The current feed budget used for 11- to 12-lb pigs allocates 1 lb of SEW diet and 3 lb of Transition diet per pig. This may need to be modified because weaning ages and weight have increased. Recent studies also suggest that nursery pigs started on pelleted diets have greater gain and feed intake than do pigs started on meal diets. With the increase in weaning age, starting pigs straight onto the meal diets may be an option, allowing producers to manufacture diets for weanling pigs on-farm. Therefore, the objective of our study was to evaluate several feed-budget options and their effects on the growth performance of nursery pigs reared in a commercial environment.

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Procedures

A total of 2,016 pigs (initially 12.6 lb and 18 ± 2 d of age) were used in a 28-d growth assay. Pigs were randomly sorted into one of 72 pens (36 pens of barrows and 36 pens of gilts), with 28 pigs per pen. All pigs were then weighed, and pens were allotted to treatment so all pigs within block were the same average weight. One pen of barrows and one pen of gilts consumed feed from one single fenceline feeder; therefore, the experimental unit is the combined data from the two pens. Pigs were housed in a commercial nursery in southern Minnesota. Pigs were allotted to one of six treatments with a variety of feed budgets (Tables 1 and 2): a pelleted diet with 1 lb/pig of SEW diet and 3 lb/pig of Transition diet; a pelleted diet with 0.5 lb/pig of SEW diet and 1 lb/pig of Transition diet; or a Transition meal diet with either 2.5% or 4% plasma, fed at either 2 or 4 lb/pig. After the allotted amount of feed was distributed to the pens as described in the budget, all treatments were fed 12 lb/pig of a Phase 2 meal diet, and then a Phase 3 meal diet for the duration of the trial.

Data was analyzed by using PROC MIXED in SAS, as a randomized complete-block design with pens (one barrow and one gilt) consuming feed from a single feeder as the experimental unit. Least squares means were used to determine differences between treatments, and contrast statements were used to determine differences in plasma rate, pellet versus meal, and differences between the feed budgets for the meal diets.

Results and Discussion

Pigs fed the pelleted SEW and Transition diets had improved ($P<0.05$) ADG, ADFI, and F/G compared with that of the pigs fed the meal diets from d 0 to 10 (Table 4). There was no difference ($P>0.08$) in ADG, ADFI, or F/G for the feeding period from d 10 to 21 between the pigs previously fed meal or pelleted diets. For the overall feeding period (d 0 to 28), pigs fed the pelleted SEW and Transition diets had increased ($P<0.05$) ADG, improved F/G, reduced removal rates, and increased margin over feed cost, compared with pigs fed the meal-based diets. Therefore, the response demonstrated from d 0 to 10 was carried through the overall treatment period, indicating the importance of starting pigs on feed to maximize overall growth performance. The increased feed intake of pigs fed pelleted diets probably coincides with more pigs getting started on feed earlier; this might explain the fewer pigs removed (pigs who lost weight) from the study when fed pelleted diets from d 0 to 10. Starting pigs on feed quickly will also affect long-term growth performance; the more quickly pigs are started on feed, the greater the long-term growth performance through the nursery phase, as well as through the finishing phase. These data are similar to previous data that suggest that weanling pigs started on pelleted diets have increased gain and feed intake, compared with those started on meal diets.

Pigs fed the pelleted diets with 1 and 3 lb/pig, respectively, of SEW and Transition feed had increased ($P<0.001$) ADG and F/G for the d 0 to 10 period after weaning. In addition, for the overall feeding period, pigs fed 1 and 3 lb/pig, respectively, of SEW and Transiton feed had numerically ($P<0.09$) greater ADG and improved ($P<0.001$) F/G, and were 0.7 lb heavier on d 28 than were pigs fed 0.5 and 1 lb/pig, respectively, of SEW and Transition feed. Pigs fed pelleted 1 and 3 lb/pig, respectively, consumed SEW and Transition diets for a longer duration ($P<0.001$, 11 d compared with 6 d) than did pigs fed 0.5 and 1 lb/pig; therefore, pigs consumed more spray-dried animal plasma and lactose. This indicates, even with 18-d-old pigs, the importance of starting pigs on feed and including large

amounts of both lactose and spray-dried animal plasma in these diets.

Similar to the differences demonstrated between the pelleted diets, pigs fed 4 lb/pig of Transition diet as meal had greater ADG and improved F/G, compared with that of pigs fed the meal diets with 2 lb/pig. The budget that provided 2 lb/pig of Transition diet seems to have resulted in pigs being switched too quickly to the Phase 2 diets.

From d 10 to 21, there was no difference in growth performance when pigs consumed a similar Phase 2 diet. Thus, the differences in growth performance found from d 0 to 10 were maintained through the duration of the trial. Pigs fed the pelleted diets with 1 lb/pig of SEW feed and 3 lb/pig of Transition feed had greater ADG and ADFI, lower F/G and feed cost per lb of gain, and a greater margin over feed than did pigs fed 0.5 and 1 lb/pig, respectively, (Table 5). Therefore, starting pigs on pelleted diets with a budget of 1 and 3 lb/pig for the SEW and Transition diets, respectively, provided the greatest growth performance for pigs reared in a commercial environment.

Table 1. Feed Budget, lb/pig[a]

Diet Form:	Pellet 1	Pellet 2	Meal			
Plasma, %:			2.5%		4.0%	
SEW	1	0.5	---	---	---	---
Transition	3	1	2	4	2	4
Phase 2	12	12	12	12	12	12

[a]Diets were provided via a fence-line feeder providing feed for two pens of 28 pigs each.

Table 2. Composition of Experimental Diets (As-fed Basis)[a]

	Pellet		Meal	
Item	SEW	Transition	2.5% Plasma	4% Plasma
Corn	33.21	35.32	36.70	38.16
Soybean meal (46.5% CP)	12.11	23.02	24.90	22.00
Choice white grease	6.00	5.00	3.70	3.70
Monocalcium P (21% P)	0.45	0.90	0.68	0.68
Limestone	0.60	0.70	0.45	0.45
Salt	0.20	0.30	0.30	0.30
Vitamin and trace mineral premix	0.30	0.30	0.30	0.30
Antibiotic[b]	1.00	1.00	---	---
Zinc oxide	0.40	0.40	0.39	0.39
Kem-Gest™	---	---	0.20	0.20
L-threonine	---	0.09	0.18	0.16
Lysine HCl	0.15	0.15	0.28	0.25
DL-methionine	0.15	0.14	0.18	0.16
Spray-dried animal plasma	6.70	2.50	---	---
Appetien	---	---	2.50	4.00
Select menhaden fish meal	5.80	6.00	5.50	5.50
DeProt whey	6.25	22.50	---	---
Dairylac® 80	---	---	22.50	22.50
Spray dried whey	25.00	---	---	---
Spray-dried blood cells	1.65	1.65	1.25	1.25
Choline Cl 60%	0.04	0.04	---	---
Total	100.00	100.00	100.00	100.00
Calculated analysis				
Total lysine, %	1.69	1.55	1.65	1.65
ME, kcal/lb	1,600	1,572	1,574	1,578
Protein, %	22.2	22.1	22.4	22.3
Ca, %	0.89	0.96	0.8	0.79
P, %	0.79	0.82	0.77	0.78
Available P, %	0.62	0.59	0.54	0.56
Lysine:calorie ratio, g/Mcal	4.78	4.47	4.75	4.74

[a]Diets were fed according to a predetermined feed budget (Table 1), and all pigs were fed 12 lb/pig of the Phase 2 diet after the allotted budget had been fed. All pigs were then fed a Phase 3 diet for the reminder of the trial.
[b]Provided 200 g/ton Neomycin sulfate and 200 g/ton oxytetracycline.

Table 3. Composition of Phase 2 and 3 Diets (As-fed Basis)[a]

Item	Phase 2	Phase 3
Corn	49.82	57.85
Soybean meal (46.5% CP)	30.32	35.22
Choice white grease	3.00	3.00
Dicalcium P (18.5% P)	1.10	1.35
Limestone	0.55	0.70
Salt	0.30	0.35
Vitamin and trace mineral premix	0.30	0.30
Antibiotic[b]	0.70	0.70
Zinc oxide	0.25	---
L-threonine	0.14	0.13
Lysine HCl	0.30	0.30
DL-methionine	0.14	0.10
Select menhaden fish meal	2.25	---
Spray-dried blood cells	0.83	---
Spray dried whey	10.00	---
Total	100.00	100.00
Calculated analysis		
Total lysine, %	1.55	1.45
ME, kcal/lb	1,536	1,546
Ca, %	0.75	0.69
P, %	0.70	0.65
Available P, %	0.41	0.33
Lysine:calorie ratio, g/Mcal	4.58	4.26

[a]All pigs were fed 12 lb/pig of the Phase 2 meal diet after the allotted budget had been fed. All pigs were then fed a Phase 3 meal diet for the reminder of the trial.
[b]Provided 140 g/ton Neomycin sulfate and 140 g/ton oxytetracycline.

Table 4. Effects of Meal Transition Diets on Growth Performance of Nursery Pigs Reared in a Commercial Environment[a]

Diet Form:	Pellet 1	Pellet 2	Meal									
Plasma, %:	6.7/2.5%	6.7/2.5%	2.5%		4%			Probability, P <				
SEW, lb/pig	1	0.5	--	--	--	--						
Transition, lb/pig	3	1	2	4	2	4	SE	Treatment	Pellet 1 vs. Pellet 2	Meal vs. Pellet	2.5% vs. 4% Plasma	Meal Budget
Day of diet switch[b]												
Trans to Phase 2	11.2	6.2	7.0	11.2	8.0	11.0	0.1	0.0001	0.0001	0.0001	0.001	0.0001
Phase 2 to 3	22.3	20.0	20.5	22.7	21.2	22.5	0.3	0.0001	0.0001	0.04	0.39	0.0001
d 0 to 5												
Initial wt, lb	12.6	12.6	12.6	12.6	12.6	12.6	0.0	0.63	0.23	0.60	0.25	0.63
ADG, lb	0.17	0.16	0.09	0.07	0.08	0.08	0.02	0.0001	0.57	0.0001	0.89	0.61
ADFI, lb	0.23	0.26	0.19	0.18	0.18	0.20	0.01	0.0001	0.09	0.0001	0.58	0.65
F/G	1.49	1.70	2.26	3.56	3.14	3.26	0.72	0.21	0.84	0.02	0.68	0.32
d 5 to 10												
ADG, lb	0.49	0.35	0.34	0.42	0.32	0.37	0.02	0.0001	0.0001	0.001	0.04	0.001
ADFI, lb	0.43	0.39	0.45	0.44	0.43	0.44	0.01	0.02	0.04	0.006	0.20	0.90
F/G	0.88	1.14	1.36	1.07	1.35	1.20	0.05	0.0001	0.001	0.0001	0.19	0.0001
d 0 to 10												
ADG, lb	0.33	0.25	0.21	0.24	0.20	0.22	0.01	0.0001	0.0001	0.0001	0.11	0.02
ADFI, lb	0.33	0.33	0.32	0.31	0.30	0.32	0.01	0.11	0.63	0.04	0.51	0.67
F/G	1.01	1.29	1.53	1.28	1.54	1.44	0.05	0.0001	0.001	0.0001	0.08	0.001
D 10 to 21												
ADG, lb	0.69	0.73	0.73	0.72	0.68	0.73	0.03	0.52	0.22	0.91	0.45	0.42
ADFI, lb	1.00	1.04	1.06	1.02	1.01	1.02	0.02	0.20	0.08	0.52	0.17	0.32
F/G	1.45	1.43	1.46	1.44	1.51	1.40	0.04	0.54	0.77	0.66	0.95	0.10
d 0 to 28												
Final wt, lb	31.5	30.8	30.2	30.6	30.2	30.7	0.2	0.007	0.05	0.001	0.99	0.07
ADG, lb	0.66	0.64	0.61	0.62	0.61	0.62	0.01	0.003	0.09	0.0002	0.98	0.19
ADFI, lb	0.89	0.89	0.88	0.88	0.87	0.89	0.01	0.65	0.97	0.41	0.71	0.54
F/G	1.34	1.39	1.45	1.41	1.43	1.43	0.01	.0001	0.01	0.0001	0.72	0.13

[a]Each value is the mean of six feeders (two pens per feeder and 28 pigs per pen). All pigs were fed the 12 lb/pig of the Phase 2 diet after the indicated amount of SEW and Transition diets had been fed.

[b]Average day after weaning that pigs had consumed their Transition feed budget and were switched to the Phase 2 diet.

Table 5. Effects on Removals, Feed Cost, and Margin Over Feed [a]

Diet Form:	Pellet 1	Pellet 2	Meal									
Plasma, %:	6.7/2.5%	6.7/2.5%	2.5%		4%			Probability, P <				
SEW, lb/pig	1	0.5	--	--	--	--						
Transition, lb/pig	3	1	2	4	2	4	SE	Treatment	Pellet 1 vs. Pellet 2	Mealvs] Pellet	2.5% vs. 4% Plasma	Meal Budget
d 0 to 28												
Removal, %	3.0%	2.1%	4.8%	5.1%	3.9%	4.5%	1.1%	0.27	0.46	0.02	0.51	0.69
Feed, $/lb gain[b]	$0.153	$0.168	$0.157	$0.164	$0.158	$0.171	$0.002	<.0001	<0.0001	0.24	0.02	<0.0001
Margin over feed[c]	$5.53	$5.06	$5.02	$4.99	$4.99	$4.87	$0.10	0.003	0.003	0.001	0.52	0.48

[a]Each value is the mean of 6 feeders (2 pens per feeder and 28 pigs per pen). All pigs were fed the 12 lb/pig of the Phase 2 after the indicated amount of SEW and Transition diets had been fed.
[b]Diet costs used were $596.50, $442.70, $360.61, $401.95, $241.12, and $161.64/ton for SEW, Pelleted Transition, 2.5% Plasma Transition, 4% Plasma Transition, Phase 2, and Phase 3, respectively.
[c]Margin over feed was calculated as d 0 to 21 gain × $.45/lb minus feed cost for d 0 to 21.