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Effects of Sire Line, Creep Feeding, and Plane of Nursery Nutrition on Growth Performance, Fecal Score, Antibiotic Injection Rate, and Removals and Mortalities of Nursery Pigs

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Summary

A total of 1,692 pigs (sire line × PIC 1050) were used in a 42-d trial to determine the effects of sire line, creep feeding, and plane of nursery nutrition on growth performance, fecal score, antibiotic injection rate, and removals and mortalities of nursery pigs weaned from sows that had a natural porcine respiratory and reproductive syndrome virus (PRRSV) challenge during gestation. At approximately 19 d of age, pigs were weaned, blocked by sire line and creep feed treatment and sex, then balanced for weight, and allotted to one of two dietary treatments in a randomized complete block design with 10 pigs per pen and 14 replicates per treatment. Treatments were arranged in a 3 × 2 × 2 factorial with main effects of sire line, lactation creep feeding (with or without), and plane of nutrition. Sire line treatments were Pietrain- or Duroc-based, with sire line A being from a Pietrain sire line and sire lines B and C being from Duroc sires. Treatment diets were corn-soybean meal-based formulated to either a low or high plane of nutrition with different SID Lys concentrations (1.30% vs. 1.50%) and different inclusion levels of specialty ingredients, including whey powder, enzymatically treated soybean meal, blood plasma, and fish meal. No significant sire line × creep feed × plane of nutrition, sire line × creep feed, or creep feed × plane of nutrition interactions were observed for nursery performance throughout the trial. In phase 1 (d 0 to 10), pigs provided creep feed had decreased ($P \leq 0.016$) ADG and ADFI and poorer F/G compared with pigs not provided creep feed. Pigs fed the high plane of nutrition had improved ($P \leq 0.006$) ADG, d 10 BW, and F/G compared with pigs fed the low plane of nutrition. In phase 2 (d 10 to 21), offspring from sire line A had improved ($P < 0.05$) ADG and F/G compared with offspring from sire line C, with offspring from sire line B being intermediate. Pigs fed a high plane of nutrition had increased ($P = 0.048$) ADG compared with pigs fed a low plane of nutrition. In phase 3 (d 21 to 42), pigs from sire line B had improved ($P < 0.05$) F/G compared with pigs from sire line C, with pigs

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from sire line A being intermediate. Overall (d 0 to 42), pigs from sire lines A and B had improved ($P < 0.05$) F/G compared with pigs from sire line C. Pigs fed a high plane of nutrition improved ($P \leq 0.021$) ADG and F/G compared to pigs fed the low nutrition plane throughout the trial. During phase 3 (d 21 to 42), a significant sire line × plane of nutrition interaction was observed ($P = 0.036$) for fecal score, with pigs from sire line B fed the low plane of nutrition exhibiting a small increase ($P < 0.05$) in fecal score compared with pigs from sire line A, with sire line C being intermediate; however, there were no differences in fecal score among sire lines fed the high plane of nutrition. For fecal scores, in phase 1 (d 0 to 10), phase 2 (d 10 to 21), and overall (d 0 to 42), pigs fed a low nutritional plane had a small improvement ($P \leq 0.002$) in fecal scores compared with pigs fed a high nutritional plane. In summary, offspring from sire lines A and B had improved feed efficiency compared to sire line C, and pigs fed the high plane of nutrition had improved ADG and F/G overall. Interestingly, in the late nursery period, pigs from sire line B fed the low plane of nutrition had a small increase in fecal looseness, with no differences among sire lines fed the high plane of nutrition.

Introduction

Average daily gain (ADG), feed efficiency, and carcass composition are heritable selection traits emphasized in selection indexes for terminal sires to maximize offspring performance. However, there is little published data to provide direct comparisons across genetic lines regarding their transition from lactation to the nursery. One practice that has shown the potential to help in this transition is creep feeding during lactation, but limited information is available on sire line impact. In one study evaluating early- or late-maturing Duroc sire lines and creep feed, a significant interaction was observed for ADG and ADFI in the nursery period, with decreased gain and feed intake in late-maturing pigs without creep feed and no differences in early-maturing pigs.[3]

During the nursery period, it is common for early-phase diets to vary by nutritionist not only in the Standardized Ileal Digestible (SID) Lys content, but also in the inclusion level of various specialty protein and lactose sources. To our knowledge, no studies have evaluated the combination of offspring sired by different sire lines, creep feeding, and plane of nursery nutrition. Therefore, the objective of this study was to determine the effects of sire line, creep feeding strategy, and plane of nursery nutrition on growth performance, injection rate, fecal score, and removals and mortalities of nursery pigs weaned from sows that had a natural porcine respiratory and reproductive syndrome virus (PRRSV) challenge during gestation.

Procedures

The Kansas State University Institutional Animal Care and Use Committee approved the protocol used for this experiment. The study was conducted at the United Animal Health Donald E. Orr farm (Sheridan, IN). In mid-October 2025, the research farm experienced a health challenge with a wild-type PRRSV strain (1-7-4 L1A.5) two months before sows entered the farrowing facility.

[3] Wensley, M. R., J. C. Woodworth, M. D. Tokach, R. D. Goodband, J. M. DeRouchey, and J. T. Gebhardt. 2023. Effect of early vs. late maturing sire line and creep feeding on the stress response, intestinal permeability, and growth performance of nursery and finishing pigs. J. Anim. Sci. 101:skad169. doi:10.1093/jas/skad169.

Breeding and Gestation

Treatments were arranged in a 3 × 2 × 2 factorial with main effects of sire line, lactation creep feeding (with or without), and plane of nutrition. A total of 177 mixed-parity sows (Line 1050, PIC, Hendersonville, TN) were used across one breed-to-farrow group from August 2025 to January 2026. At breeding, parity 1+ sows were blocked by previous lactation treatment, BW, and parity, and were assigned to be bred to one of three commercially available sire lines. Gilts were placed into a gilt development breed room, blocked by breed weight, and assigned to be bred to one of the same sources of sire line semen used for the sows. Sire line treatments were Pietrain- or Duroc-based, with sire line A being from a Pietrain sire line and sire lines B and C being from Duroc sires. In gestation, all females were housed in individual stalls and fed a common gestation diet in meal form. On approximately d 108 of gestation, all females were moved into the farrowing facility, where they were fed a common lactation diet in meal form.

Pre-weaning

A total of 177 litters (sire line × PIC 1050) were used for the remainder of the experiment. Piglets were cross-fostered within 24 h of birth within sire line treatment to equalize litter size. Seven days before weaning, litters were assigned to one of two creep feeding treatments (with or without creep feed) in a randomized complete block design based on sire line treatment. For litters assigned to the creep feed treatment, the high plane of nutrition phase 1 nursery diet was fed. The creep feed diet was in meal form and fed using a commercial creep feeder.

Post-weaning

At weaning, a total of 1,692 pigs (sire line × PIC 1050; initially 14.1 ± 0.23 lb) were used in a 42-d study to determine the effects on growth performance, injection rate, fecal score, and livability of offspring from three sire lines offered creep feed for 0 or 7 d before weaning, and subsequently fed nursery diets with one of two planes of nutrition. At approximately 19 d of age, pigs were weaned, blocked by sire line and creep feed treatment and sex, then balanced for weight, and allotted to one of two dietary treatments in a randomized complete block design, with 10 pigs per pen and 14 replicates per treatment. Pigs were placed in one of two nursery facilities.

Treatment diets were corn-soybean meal-based with two nutritional planes, low and high (Table 1). In phase 1, the low plane of nutrition was formulated to 1.30% SID Lys with 15.0% whey powder, 3.75% enzymatically treated soybean meal, 3.0% blood plasma, and 2.5% fish meal, whereas the high plane of nutrition was formulated to 1.50% SID Lys with 25.0% whey powder, 6.25% enzymatically treated soybean meal, 4.5% blood plasma, and 5.0% fish meal. In phase 2, the low plane of nutrition was formulated to 1.30% SID Lys with 7.5% whey powder, 3.0% enzymatically treated soybean meal, and 2.0% fish meal, whereas the high plane of nutrition was formulated to 1.50% SID Lys with 12.5% whey powder, 5.0% enzymatically treated soybean meal, and 4.0% fish meal. Within each phase, soybean meal was held constant between high and low planes of nutrition. Pens contained either a 3-hole or 5-hole dry self-feeder and a cup waterer to provide ad libitum access to feed and water. A robotic feed system (DryExact Pro; Big Dutchman North America, Holland, MI) was used to record and deliver daily feed additions to each pen. Phase 1 and 2 experimental diets were manufactured at the United Animal Health Griggsville feed mill (Griggsville, IL) and fed in meal form. A common phase 3 diet was manufactured on-site and fed in meal form.

Pens of pigs were weighed, and feed disappearance was measured on d 0, 10, 21, and 42 to determine ADG, ADFI, and feed efficiency. Daily fecal scores of pens were recorded and averaged within phase by one scorer blinded to treatment using a numerical scale where 1 = no looseness, 2 = moderate looseness, and 3 = severe looseness. For injection rate, all instances of injected antibiotic medications were recorded, divided by total pig days, and multiplied by 1,000 to determine the count of injections needed for 1,000 pig days for each treatment. Pig removals and mortalities were recorded to determine removals, mortalities, and total removals and mortalities.

Statistical analysis

Growth performance data were analyzed as a randomized complete block design as a three-way ANOVA using the lmer function from the lme4 package in R Studio (Version 4.5.0, R Core Team, Vienna, Austria) with pen serving as the experimental unit, treatment as the fixed effect, and replication and room as random effects. Removals, mortalities, and total removals and mortalities were reported descriptively as counts for each treatment. Injection rate data were analyzed using a Poisson distribution with an inverse log function in SAS OnDemand for Academics. Three-way interactions, two-way interactions, and main effects of sire line, creep feed, and plane of nutrition were evaluated. Results were considered significant with $P \leq 0.05$ and were considered marginally significant with $0.05 < P < 0.10$.

Results and Discussion

No significant sire line × creep feed × plane of nutrition, sire line × creep feed, or creep feed × plane of nutrition interactions were observed for nursery performance throughout the trial.

Sire line × plane of nutrition

During phase 3 (d 21 to 42), a significant sire line × plane of nutrition interaction was observed ($P = 0.036$) for fecal score, with pigs from sire line B fed the low plane of nutrition exhibiting a small increase ($P < 0.05$) in fecal score compared with pigs from sire line A, with sire line C being intermediate; however, there were no differences in fecal score among sire lines fed the high plane of nutrition (Table 2). This resulted in a tendency ($P = 0.074$) for treatment differences in overall fecal score (d 0 to 42), although no means separation was observed. A tendency for a sire line × plane of nutrition interaction was observed ($P = 0.067$) for injection rate, although no significant means separation was observed. For removals, there was a numeric sire line × plane of nutrition interaction observed, with pigs from sire lines A and B exhibiting a numeric increase in removals with the high plane of nutrition compared with the low nutritional plane; however, pigs from sire line C had numerically fewer removals with the high plane of nutrition compared with the low nutritional plane.

Sire line

On d 0, a significant main effect of sire line was observed ($P < 0.05$) for BW, with pigs from sire line A having increased BW compared with sire lines B and C as well as sire line C having increased BW compared with sire line B (Table 3). In phase 1 (d 0 to 10), a tendency in ADG was observed ($P = 0.062$), with pigs from sire lines A and C exhibiting greater gain compared with pigs from sire line B, but there was no mean separation, although pigs from sire lines A and C had heavier ($P < 0.05$) d 10 BW than pigs from sire line B. A significant sire line effect for ADFI was observed ($P < 0.05$), with greater feed intake in offspring from sire line C compared with offspring from sire

lines A and B. Offspring from sire line A had improved (P < 0.05) F/G compared with offspring from sire line B, with offspring from sire line C being intermediate. During phase 2 (d 10 to 21), a significant sire line effect was observed (P < 0.05) for ADG and F/G, with pigs from sire line A having improved ADG and F/G compared with pigs from sire line C, with pigs from sire line B being intermediate, which resulted in d 21 BW being greater (P < 0.05) for pigs from sire lines A and C compared with those from sire line B. In phase 3 (d 21 to 42), pigs from sire line B had improved (P < 0.05) F/G compared with pigs from sire line C, with pigs from sire line A being intermediate. Pigs from sire line A were heavier (P < 0.05) on d 42 compared with those from sire line B, with sire line C offspring being intermediate. Overall (d 0 to 42), pigs from sire lines A and B had improved (P < 0.05) F/G compared with pigs from sire line C, with no differences observed for ADG or ADFI. In phase 3 (d 21 to 42), pigs from sire line A exhibited a small improvement (P < 0.05) in fecal consistency compared with pigs from sire line C, with pigs from sire line B being intermediate. A tendency for a main effect of sire line was observed (P = 0.085) for injection rate, with pigs from sire line A exhibiting decreased injection rate compared with pigs from sire lines B and C, but there was no mean separation. For removals and mortalities, pigs from sire line C had numerically more removals and total removals and mortalities compared with sire lines A and B.

Creep feed

On d 0, pigs provided creep feed had heavier (P = 0.001) d 0 BW compared with pigs not provided creep feed (Table 4). In phase 1 (d 0 to 10), pigs provided creep feed prior to weaning had decreased (P ≤ 0.016) ADG and ADFI and poorer F/G compared with pigs not fed creep feed. In phase 2 (d 10 to 21), there were no observed differences in growth performance. In phase 3 (d 21 to 42), pigs fed creep feed before weaning tended to have improved (P ≤ 0.082) ADG and F/G compared with pigs not provided creep feed. Overall (d 0 to 42), creep feed offered before weaning had no effect on growth performance throughout the nursery period; however, pigs provided creep feed before weaning had increased (P = 0.033) injection rate compared with pigs not provided creep feed.

Plane of nursery nutrition

During phase 1 (d 0 to 10), pigs fed a high plane of nutrition had improved (P ≤ 0.006) ADG, d 10 BW, and F/G compared with pigs fed a low plane of nutrition (Table 5). A tendency was observed (P = 0.094) for ADFI, with pigs provided a low plane of nutrition tending to have decreased feed intake compared with pigs provided a high plane of nutrition. In phase 2 (d 10 to 21), pigs fed a high plane of nutrition had increased (P ≤ 0.048) ADG and d 21 BW compared with pigs fed a low plane of nutrition. For ADFI, a tendency for a plane of nutrition main effect was observed (P = 0.098) with pigs fed a high plane of nutrition tending to have increased feed intake compared with pigs fed a low plane of nutrition. In phase 3 (d 21 to 42), there were no differences in growth performance, although d 42 BW was greater (P = 0.010) for pigs fed the high plane of nutrition. Overall (d 0 to 42), pigs fed a high plane of nutrition had improved (P ≤ 0.021) ADG and F/G compared with pigs fed a low plane of nutrition. In phase 1 (d 0 to 10), phase 2 (d 10 to 21), and overall (d 0 to 42), pigs fed a low nutritional plane had a small improvement (P ≤ 0.002) in fecal scores compared to pigs fed a high nutritional plane.

In summary, offspring from sire lines A and B had improved feed efficiency compared with sire line C, and pigs fed the high plane of nutrition had improved ADG and F/G

throughout the experiment. Interestingly, in the late nursery period, pigs from sire line B fed the low plane of nutrition had a small increase in fecal looseness, with no differences among sire lines fed the high plane of nutrition.

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Table 1. Ingredient composition of experimental diets (as-fed basis)[1]

Ingredients, %	Phase 1		Phase 2		Phase 3
Plane of nutrition:	Low	High	Low	High	Common
Corn	53.18	38.30	54.74	46.32	60.10
Soybean meal, 47.7% CP	16.50	16.50	27.50	27.50	30.46
Corn DDGS	---	---	---	---	5.00
Whey powder	15.00	25.00	7.50	12.50	---
Enzymatically treated soybean meal[2]	3.75	6.25	3.00	5.00	---
Blood plasma	3.00	4.50	---	---	---
Fish meal	2.50	5.00	2.00	4.00	---
Soybean oil	2.00	2.00	1.00	1.00	---
Monocalcium phosphate, 21.0% P	1.02	0.25	1.07	0.61	0.98
Sodium chloride	0.59	0.30	0.67	0.56	0.77
Calcium carbonate	0.52	0.29	0.65	0.47	0.93
Benzoic acid[3]	0.50	0.50	0.50	0.50	0.25
Zinc oxide	0.40	0.40	0.26	0.26	---
L-Lys-HCl	0.33	0.18	0.36	0.41	0.51
DL-Met	0.20	0.19	0.21	0.26	0.26
L-Thr	0.14	0.08	0.18	0.21	0.23
L-Val	0.07	---	0.09	0.12	0.17
L-Trp	0.03	0.01	0.03	0.04	0.05
Phytase[4]	0.02	0.02	0.02	0.02	0.02
Vitamin and trace mineral premix	0.23	0.23	0.23	0.23	0.26
Total	100	100	100	100	100
Calculated analysis					
Standardized ileal digestible (SID) amino acids, %					
Lys	1.30	1.50	1.30	1.50	1.30
Ile:Lys	54	59	59	58	54
Leu:Lys	111	117	112	107	112
Met:Lys	36	34	37	39	39
Met and Cys:Lys	58	58	58	58	58
Thr:Lys	64	64	64	64	64
Trp:Lys	20	20	20	20	20
Val:Lys	70	71	70	70	70

His:Lys	34	36	35	34	34
Total Lys, %	1.43	1.65	1.44	1.66	1.45
NE, kcal/lb	1,065	1,063	1,033	1,036	1,048
Lactose, %	10.9	18.2	5.5	9.1	---
Total Ca, %	0.69	0.67	0.71	0.70	0.69
Available P, %	0.57	0.57	0.50	0.50	0.43

[1] Phase 1 diets were fed from d 0 to 10, phase 2 diets were fed from d 10 to 21, and phase 3 diets were fed from d 21 to 42 of the study.

[2] HP 300 (Hamlet Protein, Horsens, Denmark).

[3] VevoVitall (DSM Nutritional Products, Parsippany, NJ).

[4] Natuphos E 2500 (BASF, Mt. Olive, NJ), provided an estimated release of 0.14% available P with 1,500 FTU/kg.

Table 2. Interactive effects of commercial sire line and plane of nursery nutrition on nursery pig performance, fecal score, injection rate, and removals and mortalities[1]

Sire line:	A		B		C			*P* =
Plane of nutrition[2]:								Sire line ×
Item	Low	High	Low	High	Low	High	SEM	plane
BW, lb								
d 0	14.4	14.4	13.5	13.5	14.2	14.3	0.23	0.879
d 10	16.0	16.1	14.8	15.2	15.8	16.2	0.37	0.165
d 21	24.2	24.5	22.5	23.1	23.3	24.2	0.85	0.504
d 42	48.1	48.8	46.3	47.5	47.2	48.3	1.50	0.869
Phase 1 (d 0 to 10)								
ADG, lb	0.16	0.17	0.13	0.17	0.15	0.19	0.017	0.280
ADFI, lb	0.29	0.29	0.28	0.30	0.31	0.31	0.023	0.630
F/G	1.86	1.87	2.01	2.83	1.78	2.49	0.233	0.133
Phase 2 (d 10 to 21)								
ADG, lb	0.74	0.76	0.69	0.72	0.68	0.72	0.047	0.761
ADFI, lb	0.97	0.99	0.92	0.96	0.94	0.97	0.089	0.919
F/G	1.32	1.32	1.33	1.34	1.34	1.40	0.042	0.252
Phase 3 (d 21 to 42)								
ADG, lb	1.15	1.16	1.15	1.17	1.13	1.15	0.054	0.911
ADFI, lb	1.87	1.89	1.84	1.86	1.85	1.87	0.128	0.999
F/G	1.62	1.63	1.60	1.59	1.63	1.64	0.054	0.702
Overall (d 0 to 42)								
ADG, lb	0.80	0.81	0.78	0.81	0.77	0.80	0.039	0.752
ADFI, lb	1.25	1.26	1.22	1.24	1.23	1.25	0.087	0.983
F/G	1.56	1.55	1.56	1.54	1.60	1.57	0.043	0.338
Fecal scores[3]								
d 0 to 10	1.45	1.51	1.46	1.52	1.48	1.54	0.055	0.989
d 10 to 21	2.34	2.53	2.43	2.49	2.40	2.49	0.073	0.199
d 21 to 42	1.44[b]	1.47[ab]	1.52[a]	1.47[ab]	1.51[ab]	1.49[ab]	0.084	0.036
d 0 to 42	1.68	1.76	1.74	1.75	1.73	1.76	0.071	0.074

Injection rate[4]	0.68	1.01	0.97	1.61	2.12	1.16	0.470	0.067
Removals, n	2	3	1	4	10	5	---	---
Mortalities, n	5	8	4	4	4	8	---	---
Total removals and mortalities, n	7	11	5	8	14	13	---	---

[1] A total of 1,692 mixed-sex pigs (initially 14.1 ± 0.23 lb) were used with 10 pigs per pen and 28 replicates per treatment. Treatments were organized in a 3 × 2 × 2 factorial design based on sows bred to one of three different sire lines, then offspring were provided or not provided creep feed 7 days prior to weaning, and lastly, after weaning fed either a low or high plane of nutrition through nursery phases 1 and 2, with a common phase 3 diet fed to all pigs. Sire line treatments were Pietrain- or Duroc-based, with sire line A being from a Pietrain sire line and sire lines B and C being from a Duroc sire.

[2] Treatment diets were corn-soybean meal-based with two nutritional planes, low and high. In phase 1, the low plane of nutrition was formulated to 1.30% SID Lys with low inclusion of whey powder, enzymatically treated soybean meal, blood plasma, and fish meal. The high plane of nutrition was formulated to 1.50% SID Lys with higher inclusion of specialty ingredients.

[3] Pen fecal scores were measured daily and averaged within each phase. Fecal scores consisted of 1 = no looseness, 2 = moderate looseness, and 3 = severe looseness.

[4] Number of individual injections per 1,000 pig days.

Table 3. Main effect of commercial sire line on nursery pig performance, fecal score, injection rate, and removals and mortalities[1]

Item	Sire line			SEM	*P* =
	A	B	C		
BW, lb					
d 0	14.4[a]	13.5[c]	14.2[b]	0.23	< 0.001
d 10	16.1[a]	15.0[b]	16.0[a]	0.36	< 0.001
d 21	24.4[a]	22.8[b]	23.8[a]	0.82	< 0.001
d 42	48.4[a]	46.9[b]	47.7[ab]	1.46	0.008
Phase 1 (d 0 to 10)					
ADG, lb	0.17	0.15	0.17	0.016	0.062
DFI, lb	0.29[b]	0.29[b]	0.31[a]	0.022	0.004
F/G	1.86[b]	2.42[a]	2.14[ab]	0.173	0.045
Phase 2 (d 10 to 21)					
ADG, lb	0.75[a]	0.70[ab]	0.70[b]	0.045	0.024
ADFI, lb	0.98	0.94	0.96	0.088	0.111
F/G	1.32[b]	1.34[ab]	1.37[a]	0.040	0.025
Phase 3 (d 21 to 42)					
ADG, lb	1.15	1.16	1.14	0.053	0.312
ADFI, lb	1.88	1.85	1.86	0.127	0.536
F/G	1.63[ab]	1.60[b]	1.64[a]	0.053	0.013
Overall (d 0 to 42)					
ADG, lb	0.81	0.79	0.78	0.038	0.145
ADFI, lb	1.25	1.23	1.24	0.087	0.322
F/G	1.55[b]	1.55[b]	1.58[a]	0.042	0.001
Fecal scores[2]					
d 0 to 10	1.48	1.49	1.51	0.052	0.364
d 10 to 21	2.44	2.46	2.44	0.068	0.825
d 21 to 42	1.46[b]	1.49[ab]	1.50[a]	0.083	0.025
d 0 to 42	1.72	1.74	1.75	0.070	0.115
Injection rate[3]	0.83	1.25	1.57	0.300	0.085
Removals, n	5	5	15	---	---
Mortalities, n	13	8	12	---	---
Total removals and mortalities, n	18	13	27	---	---

[1] A total of 1,692 mixed-sex pigs (initially 14.1 ± 0.23 lb) were used with 10 pigs per pen and 56 replicates per treatment. Treatments were organized in a 3 × 2 × 2 factorial design based on sows bred to one of three different sire lines, then offspring were provided or not provided creep feed 7 d before weaning, and lastly, after weaning fed either a low or high plane of nutrition through nursery phases 1 and 2, with a common phase 3 diet fed to all pigs. Sire line treatments were Pietrain- or Duroc-based, with sire line A being from a Pietrain sire line and sire lines B and C being from a Duroc sire.

[2] Pen fecal scores were measured daily and averaged within each phase. Fecal scores consisted of 1 = no looseness, 2 = moderate looseness, and 3 = severe looseness.

[3] Number of individual injections per 1,000 pig days.

Table 4. Main effect of creep feeding on nursery pig performance, fecal score, injection rate, and removals and mortalities[1]

	Creep feed[2]			
Item	No	Yes	SEM	*P* =
BW, lb				
d 0	14.0	14.1	0.22	0.001
d 10	15.7	15.6	0.36	0.196
d 21	23.7	23.5	0.81	0.425
d 42	47.6	47.8	1.45	0.508
Phase 1 (d 0 to 10)				
ADG, lb	0.17	0.15	0.015	0.007
ADFI, lb	0.31	0.28	0.022	< 0.001
F/G	1.92	2.36	0.148	0.016
Phase 2 (d 10 to 21)				
ADG, lb	0.72	0.71	0.044	0.414
ADFI, lb	0.96	0.96	0.087	0.747
F/G	1.34	1.35	0.040	0.501
Phase 3 (d 21 to 42)				
ADG, lb	1.14	1.16	0.052	0.082
ADFI, lb	1.86	1.87	0.126	0.633
F/G	1.63	1.61	0.052	0.069
Overall (d 0 to 42)				
ADG, lb	0.79	0.80	0.038	0.892
ADFI, lb	1.24	1.23	0.086	0.755
F/G	1.57	1.56	0.042	0.424
Fecal scores[3]				
d 0 to 10	1.50	1.49	0.051	0.669
d 10 to 21	2.44	2.45	0.067	0.695
d 21 to 42	1.48	1.49	0.083	0.620
d 0 to 42	1.73	1.74	0.070	0.783

Injection rate[4]	0.91	1.51	0.250	0.033
Removals, n	11	14	---	---
Mortalities, n	17	16	---	---
Total removals and mortalities, n	28	30	---	---

[1] A total of 1,692 mixed-sex pigs (initially 14.1 ± 0.23 lb) were used with 10 pigs per pen and 84 replicates per treatment. Treatments were organized in a 3 × 2 × 2 factorial design based on sows bred to one of three different sire lines, then offspring were provided or not provided creep feed 7 days prior to weaning, and lastly, after weaning fed either a low or high plane of nutrition through nursery phases 1 and 2, with a common phase 3 diet fed to all pigs. Sire line treatments were Pietrain- or Duroc-based, with sire line A being from a Pietrain sire line and sire lines B and C being from a Duroc sire.

[2] Piglets had access to creep feed 7 days prior to weaning.

[3] Pen fecal scores were measured daily and averaged within each phase. Fecal scores consisted of 1 = no looseness, 2 = moderate looseness, and 3 = severe looseness.

[4] Number of individual injections per 1,000 pig days.

Table 5. Main effect of plane of nursery nutrition on nursery pig performance, fecal score, injection rate, and removals and mortalities[1]

	Plane of nutrition[2]			
Item	Low	High	SEM	*P* =
BW, lb				
d 0	14.0	14.1	0.22	0.726
d 10	15.5	15.8	0.36	< 0.001
d 21	23.3	24.0	0.81	0.005
d 42	47.2	48.2	1.45	0.010
Phase 1 (d 0 to 10)				
ADG, lb	0.15	0.18	0.015	0.001
ADFI, lb	0.29	0.30	0.022	0.094
F/G	2.40	1.89	0.148	0.006
Phase 2 (d 10 to 21)				
ADG, lb	0.70	0.73	0.044	0.048
ADFI, lb	0.94	0.97	0.087	0.098
F/G	1.35	1.33	0.040	0.239
Phase 3 (d 21 to 42)				
ADG, lb	1.14	1.16	0.052	0.154
ADFI, lb	1.85	1.87	0.126	0.306
F/G	1.62	1.62	0.052	0.624
Overall (d 0 to 42)				
ADG, lb	0.78	0.81	0.038	0.021
ADFI, lb	1.23	1.25	0.086	0.181
F/G	1.57	1.55	0.042	0.008
Fecal scores[3]				
d 0 to 10	1.46	1.53	0.051	0.002
d 10 to 21	2.39	2.50	0.067	< 0.001
d 21 to 42	1.48	1.49	0.083	0.342
d 0 to 42	1.72	1.76	0.070	0.002
Injection rate[4]	1.12	1.23	0.216	0.674
Removals, n	13	12	---	---
Mortalities, n	13	20	---	---
Total removals and mortalities, n	26	32	---	---

[1] A total of 1,692 mixed-sex pigs (initially 14.1 ± 0.23 lb) were used with 10 pigs per pen and 84 replicates per treatment. Treatments were organized in a 3 × 2 × 2 factorial design based on sows bred to one of three different sire lines, then offspring were provided or not provided creep feed 7 d before weaning, and lastly, after weaning fed either a low or high plane of nutrition through nursery phases 1 and 2, with a common phase 3 diet fed to all pigs. Sire line treatments were Pietrain- or Duroc-based, with sire line A being from a Pietrain sire line and sire lines B and C being from a Duroc sire.

[2] Treatment diets were corn-soybean meal-based with two nutritional planes, low and high. In phase 1, the low plane of nutrition was formulated to 1.30% SID Lys with low inclusion of whey powder, enzymatically treated soybean meal, blood plasma, and fish meal. The high plane of nutrition was formulated to 1.50% SID Lys with higher inclusion of specialty ingredients.

[3] Pen fecal scores were measured daily and averaged within each phase. Fecal scores consisted of 1 = no looseness, 2 = moderate looseness, and 3 = severe looseness.

[4] Number of individual injections per 1,000 pig days.