EFFECTS OF VARYING CREEP FEEDING DURATION ON PROPORTION OF PIGS CONSUMING CREEP FEED AND PRE-WEANING PERFORMANCE

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Summary

A total of 54 sows (PIC Line 1050) and their litters were used in this study to determine the effects of varying durations of creep feeding on the rate of pigs consuming creep feed (eaters) and pre-weaning performance. Two groups of sows were blocked according to parity and date of farrowing and allotted to three experimental treatments using a randomized complete block design. Creep feeding was initiated at d 7, 14, and 18 from birth for a duration of 13, 6, and 2 d of creep feeding. A creep diet (1,585 kcal ME/lb, 1.56% TID Lys) with 1.0% chromium oxide was offered *ad libitum* until weaning (d 20) using a rotary creep feeder with hopper. A single lactation diet (1,586 kcal ME/lb, 0.97% TID Lys) was used where sows were allowed free access to feed throughout lactation. Piglets were weighed individually at d 0 (birth), 7, 14, 18, and 20 to calculate total and daily gains. Daily creep feed intake per litter was recorded and calculated. Fecal samples from all piglets were taken twice per sampling day using sterile swabs at d 14, 18, and 20 for Treatment 1; at d 18 and 20 for Treatment 2; and d 20 for Treatment 3. Piglets were categorized as 'eaters' when fecal sample was colored green at least once on any of the sampling days. Overall, there were no differences in weaning weights ($P<0.61$), total gain ($P<0.38$), and daily gain ($P<0.38$) among pigs and litters fed creep for different durations. Total creep feed intake of litters fed creep for 13 and 6 d were greater ($P<0.0001$) than those litters provided creep feed for 2 d. There were no differences ($P<0.69$) in overall creep intake between litters fed for 13 and 6 d. Litters provided with creep feed for 13 d produced 10% more (80 vs. 70%; $P<0.03$) eaters than litters fed creep for both 6 and 2 d. There were no differences ($P<0.98$) in the percentage of eaters between litters fed creep for 6 and 2 d. In conclusion, longer durations of creep feeding did not affect pre-weaning gain and weaning weights but did increase the proportion of eaters in whole litters; however, a relatively high percentage of pigs (70%) were classified as eaters by providing creep feed for only 2 d prior to weaning.

(Key words: feed management, creep feeding, feeding duration.)

Introduction

The plethora of evidence on the benefits of creep feeding has been limiting and equivocal, especially for weaning ages less than four weeks. However, recent studies where piglets were categorized into eaters and non-eaters of

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creep feed have provided some new insights on the value of creep feeding. Research at Kansas State University has shown that creep feeding for 18 d improved piglet survivability but did not improve pre-weaning gains or weaning weights at d 20. When whole litters where divided based on creep feed consumption category, piglets designated as eaters had better post-weaning gains and d 28 weights compared to non-eaters and non-creep fed pigs. In this study, about 60% of the creep-fed pigs were categorized as eaters while 75% of creep feed intake was consumed in the last week prior to weaning. It is not known if providing creep feed at varying durations will create more eaters or affect pre-weaning performance. Therefore, the objective of this experiment was to determine the effects of varying durations of creep feeding on the rate of creating eaters and pre-weaning performance.

Procedures

A total of 54 sows (PIC Line 1050) and their litters were used in this study conducted at the Kansas State University Swine Research and Teaching Center farrowing facilities. Sows used in this experiment were from two batches of sows farrowed in April and May, 2007, with 27 experimental sows included from each batch. Sows were blocked according to parity and date of farrowing and allotted to three experimental treatments using a randomized complete block design. Cross-fostering was performed within 48 h post-farrowing to standardize litter weights and litter size (>12 pigs). The sow or litter was the experimental unit with 18 replicates per treatment group.

There were three experimental treatments in this study according to the duration of creep feeding. Creep feeding was initiated at d 7, 14, and 18 from birth for Treatments 1, 2, and 3, respectively. These corresponded to durations of 13, 6, and 2 d of creep feeding. A creep diet (1,585 kcal ME/lb, 1.56% TID Lys; Table 1) with 1.0% chromium oxide was offered *ad libitum* until weaning using a rotary creep feeder (Rotecna® Mini Hopper Pan, Rotecna SA, Spain). The feeder is equipped with a 6-liter capacity hopper, which is adjustable to five different settings of feeder gaps to allow *ad libitum* feeding. The creep diet was in pellet form (2-mm pellets). A single lactation diet (1,586 kcal ME/lb, 0.97% TID Lys) was used in the experiment. Sows were allowed free access to feed throughout lactation. Water was made available at all times for both sows and their litters using nipple drinkers and bowls, respectively.

Piglets were weighed individually at d 0 (birth), 7, 14, 18, and 20 (weaning). Creep feeders were weighed daily. Daily creep feed consumption per litter was computed as the difference in feeder weights between consecutive days. Fecal samples from all piglets were taken using sterile swabs at d 14, 18, and 20 for Treatment 1; at d 18 and 20 for Treatment 2; and d 20 for Treatment 3. The color of each fecal sample was visually determined. Fecal sampling was performed twice per sampling day. Piglets that tested negative on the first fecal sampling were re-sampled after 9 to 12 h. Piglets were categorized as 'eaters' when fecal color was green at least once on any of the sampling days.

Sows were weighed after farrowing and at weaning. Weekly feed intake of the sows was recorded to calculate total and average daily feed intake. In this study, two sows from Treatment 3 were removed from the test due to death of the sow. General health of the piglets was checked daily and use of medication was monitored. Temperature in the farrowing facility was maintained at a minimum of 20°C, and supplementary heat was provided to the piglets using heat lamps when needed.

Periodic and cumulative average daily gain and creep feed intake were calculated for each treatment group. Pre-weaning mortality was also calculated. Data were analyzed as a randomized complete block design using

PROC MIXED of SAS. The effect of varying creep feeding durations on percentage of eaters was analyzed using the Chi-square test in SAS.

Results and Discussion

The effect of varying creep feeding durations on sow performance is shown in Table 2. Sows had an average parity of 2.1 ± 0.2 and lactation length of 19.9 ± 0.3 d. Varying the duration of creep feeding had no effect on total (P<0.76) or daily feed intake (P<0.53) of sows during lactation. Likewise, there were no differences in post-farrowing weight (P<0.98), weaning weight (P<0.74), and lactation weight loss (P<0.67) among the treatments. Litter size at weaning (P<0.98) and mortality from d 2 to weaning (P<0.93) was also similar across the treatments.

Overall, differences in litter weaning weights (P<0.80), total gain (P<0.50), and daily gain (P<0.52) among litters fed creep for different durations were not significant (Table 3). For individual pigs, differences in weaning weight (P<0.61), total gain (P<0.38), and average daily gain (P<0.38) among creep-fed litters for different durations were also not significant (Table 4). These results suggest that the availability of creep feed for longer durations did not improve weaning weights and weight gains of both pigs and litters. This may be due to the relatively small creep feed intake during the first week of creep feeding; intake may have been insufficient to generate any differences in growth performance.

From d 8 to 14, litters offered creep feed for 13 d had a total intake of 0.36 lb (Figure 1). From d 15 to 20, litters fed creep for 6 d had a higher (P<0.02) total creep intake than litters fed creep for 13 d. Likewise, litters provided with creep feed for 6 and 2 d also tended (P<0.09) to have higher total creep intake than litters fed creep for 13 d. Overall, the total creep feed intake of litters fed for 13 and 6 d were greater (P<0.0001) than those litters provided creep feed for only 2 d (Figure 1). There were no differences (P<0.69) in total creep intake between those fed for 13 and 6 d. These results suggest that initiating creep feeding at a later age does not detrimentally affect creep intake; instead, older piglets readily accept creep feed and consume the same or more feed than piglets started on creep feed at an earlier age. Thus, litter creep intake seems to be more related to the maturity of piglets rather than the period of induction of creep feeding.

The duration of creep feeding influenced (P<0.03) the proportion of eaters in creep-fed litters (Figure 2). Litters provided with creep feed for 13 d produced 10% more (P<0.03) eaters than litters fed creep for both 6 and 2 d. There were no differences (P<0.98) in the percentage of eaters between litters fed creep for 6 and 2 d. The higher rate of eaters suggests that the longer availability of creep feed to litters helps stimulate more piglets to consume creep feed and improves the average creep consumption of piglets categorized as eaters. However, a 10% difference in eaters also indicates that the additional 7 to 11 d of creep feeding generated only 1 more eater per litter (for a litter of at least 10 piglets). Therefore, the benefit of longer durations of creep feeding should be weighed based on the economic value of creating more eaters in whole litters.

In conclusion, longer durations of creep feeding do not affect pre-weaning gain and weaning weights but can increase the proportion of eaters in whole litters. The adoption of longer creep feeding durations should be evaluated based on practicality and the economic benefits of improved piglet performance attributed to eaters post-weaning.

Table 1. Diet Composition (as-fed basis)

Ingredient, %	Creep[a]	Lactation[b]
Corn	6.15	60.00
Soybean meal (46.5% CP)	2.32	31.20
Spray dried whey	25.00	-
Fine ground oat groats	30.00	-
Extruded soy protein concentrate	10.00	
Spray-dried animal plasma	6.00	-
Select menhaden fish meal	6.00	-
Lactose	5.00	
Choice white grease	5.00	5.00
Monocalcium P (21% P)	0.35	1.45
Chromium oxide	1.00	-
Antibiotic	1.00	
Limestone	0.45	1.20
Zinc oxide	0.38	-
Salt	0.30	0.50
L-Lysine HCl	0.15	-
DL-methionine	0.15	-
Trace mineral premix	0.15	0.15
Vitamin premix	0.25	0.25
Sow add pack	-	0.25
Acidifier	0.20	-
Flavor	0.10	-
Vitamin E, 20,000 IU	0.05	-
Total	100.00	100.00
Calculated analysis		
Crude protein, %	23.9	19.6
TID Lysine, %	1.56	0.97
ME, kcal/lb	1,585	1,589
Calcium, %	0.79	0.87
Available P, %	0.56	0.38
TID Lysine:ME ratio, g/Mcal	4.47	2.77

[a]Diet fed in pellet form.
[b]Diet fed in meal form throughout lactation.

Table 2. Effects of Varying Creep Feeding Durations on Sow Performance[ab]

Item	Creep Feeding Duration, d			SED	Probability, *P*<
	13	6	2		
No. of sows	18	18	16	-	-
Lactation length, d	19.7	19.9	20.0	0.2	0.33
Average parity	2.1	2.1	2.2	0.2	0.95
Lactation feed intake, lb					
Total (d 0 to 20)	225	223	231	14.5	0.76
ADFI	11.4	11.2	11.5	0.7	0.53
Sow weight, lb					
Post-farrowing	480	482	482	14.5	0.98
Weaning	445	450	456	14.5	0.74
Change	-34.7	-32.1	-27.7	7.9	0.67
No. of pigs/litter					
Post-fostering	12.2	12.3	12.2	0.1	0.51
D 20 (weaning)	11.2	11.3	11.2	0.3	0.98
Mortality (d 2 to 20), %	7.7	7.9	8.6	2.3	0.93

[a]Two groups of sows (total =52, PIC Line 1050) were blocked according to day of farrowing and parity and allotted to three treatments (13, 6, and 2 d creep feeding durations).
[b]Creep feed with 1.0% chromium oxide was offered *ad libitum* from d 7, 14, and 18 to weaning (20 d).

Table 3. Effects of Varying Creep Feeding Durations on Litter Performance[ab]

Item	Creep Feeding Duration, d			SED	Probability, *P*<
	13	6	2		
No. of litters	18	18	16	-	-
No. of pigs	219	221	197	-	-
Litter weight, lb					
Post-fostering	34.0	34.2	33.9	1.0	0.97
D 7	60.4	60.8	60.6	2.7	0.99
D 14	102.0	100.1	99.8	5.1	0.89
D 18	129.0	127.1	125.7	6.1	0.86
At weaning	141.2	138.1	137.0	6.6	0.80
Litter BW gain, lb					
D 8 to 14	41.7	39.4	38.9	2.8	0.55
D 15 to 18	27.0	27.0	25.9	1.6	0.75
D 19 to 20	12.2	11.0	11.2	1.0	0.41
D 15 to 20	39.2	38.0	37.2	2.2	0.65
D 8 to 20	80.9	77.3	76.0	4.4	0.50
Litter ADG, lb					
D 8 to 14	5.96	5.62	5.55	0.40	0.55
D 15 to 18	6.75	6.76	6.45	0.41	0.75
D 19 to 20	6.56	6.33	6.20	0.37	0.62
D 15 to 20	6.14	5.51	5.65	0.50	0.41
D 8 to 20	6.22	5.96	5.85	0.34	0.52

[a]Two groups of sows (total =52, PIC Line 1050) were blocked according to day of farrowing and parity and allotted to three treatments (13, 6, and 2 d creep feeding durations).
[b]Creep feed with 1.0% chromium oxide was offered ad libitum from d 7, 14, and 18 to weaning (d 20).

Table 4. Effects of Varying Creep Feeding Durations on Pig Performance[ab]

Item	Creep Feeding Duration, d			SED	Probability, *P*<
	13	6	2		
No. of litters	18	18	16	-	-
No. of pigs	219	221	197	-	-
Pig weight, lb					
Post-fostering	3.05	3.04	3.04	0.07	0.97
D 7	5.40	5.40	5.40	0.17	0.99
D 14	9.13	8.89	8.94	0.36	0.78
D 18	11.55	11.29	11.24	0.44	0.75
At weaning	12.66	12.26	12.26	0.47	0.61
Pig BW gain, lb					
D 8 to 14	3.73	3.49	3.54	0.22	0.49
D 15 to 18	2.42	2.39	2.3	0.14	0.68
D 19 to 20	1.11	0.97	1.02	0.08	0.19
D 15 to 20	3.53	3.37	3.32	0.18	0.46
D 8 to 20	7.26	6.86	6.86	0.34	0.38
Pig ADG, lb					
D 8 to 14	0.533	0.499	0.506	0.031	0.49
D 15 to 18	0.605	0.598	0.574	0.036	0.68
D 19 to 20	0.556	0.487	0.511	0.039	0.19
D 15 to 20	0.589	0.561	0.553	0.030	0.46
D 8 to 20	0.559	0.527	0.528	0.026	0.38

[a]Two groups of sows (total =52, PIC Line 1050) were blocked according to day of farrowing and parity and allotted to three treatments (13, 6, and 2 d creep feeding durations).
[b]Creep feed with 1.0% chromium oxide was offered ad libitum from d 7, 14, and 18 to weaning (d 20).

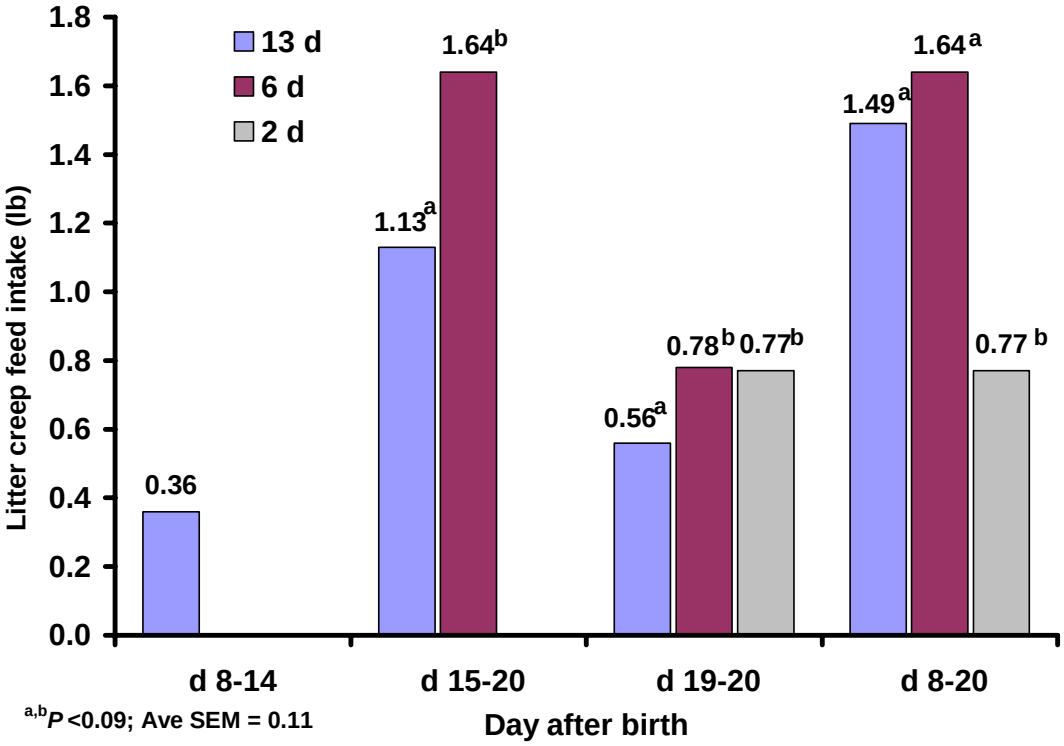

Figure 1. Effect of Varying Creep Feeding Durations on Total Litter Creep Feed Intake.

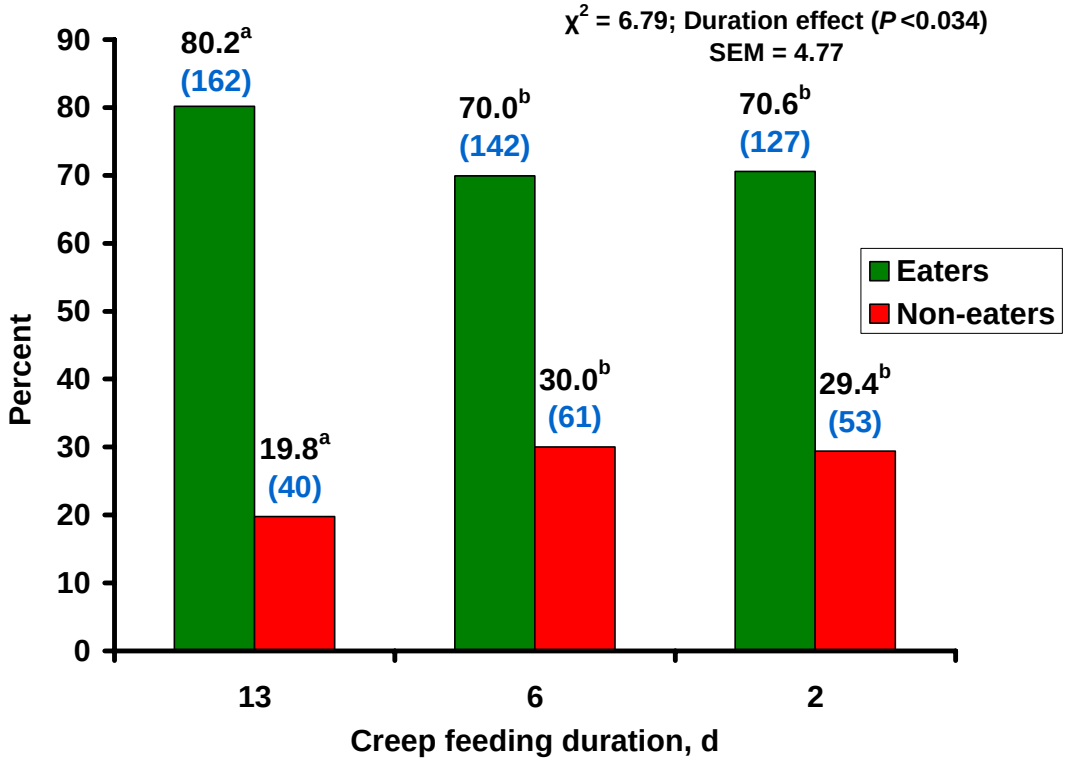

Figure 2. Effect of Varying Creep Feeding Durations on Percentage of Eaters (number of pigs in parentheses).