THE EFFECT OF CREEP FEEDING ON POSTWEANING PERFORMANCE IN EARLY WEANED PIGS

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Story in Brief

A study involving 144 pigs weaned at approximately 24 days of age was conducted to determine the effect of creep feeding on postweaning performance in early weaned pigs. Pigs from litters offered creep feed for one week prior to weaning and pigs from litters not offered creep feed were blocked by weight into two groups (heavy and light weight) and fed a common prestarter diet for the first two week period (Period 1) and a common starter diet from day 15 to 35 postweaning (Period 2). During week 1 and for Period 1, average daily gain was similar between heavy pigs from both the creep fed and non-creep fed groups but average daily gain of light weight pigs was greater in pigs previously fed creep feed. Average daily gain was similar for all pigs during week 2. During week 1 average daily feed intake was similar for heavy pigs and for light pigs between treatments. During week 1 and for Period 1, smaller pigs previously fed creep feed had improved feed efficiency when compared to those not offered creep, however feed efficiency of heavy weight pigs was similar between the two groups. During Period 2 average daily gain and average daily feed intake of heavy pigs were improved in the creep fed group when compared to non-creep fed group. Feed efficiency during Period 2 was similar between the two treatments. This study suggests that creep feeding influences subsequent performance of early weaned pigs.

(Key Words: Early Weaned Pig, Weaning, Creep Feeding Period.)

Introduction

In order to shorten the breeding cycle and maximize reproductive efficiency of the sow herd, many swine producers have started routinely weaning pigs at 3 to 4 weeks of age. The practice of creep feeding was originally introduced for older pigs whose increasing energy requirement could not be met with decreasing sow milk production after 3 to 4 weeks of

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lactation, and its benefits were well established (Krider et al., 1950; Terrill et al., 1952). In contrast, data regarding the benefits of creep feeding in situations where piglets are weaned at 3 to 4 weeks of age are much less conclusive. Lucas and Lodge (1961) have suggested that even a little creep feed intake may cause digestive enzyme induction and gut flora modifications that may prepare the young pig for the dry diets offered postweaning. The gut immune system may also have a period of hypersensitivity to dietary proteins in pigs not fed sufficient quantities of dietary protein to allow the developement of oral tolerance. This may be of particular significance to the early weaned pig because of the limited intake. English (1981) reported that creep feed intakes of 1.32 lb before weaning results in a mature gut and minimize postweaning diarrhea. Miller et al. (1984) suggested that substantial amount of creep feed before weaning may cause the animal to become tolerant to the dietary antigens, thus when the pigs are weaned the immune response is suppressed with little resulting gut changes. In contrast, insufficient preweaning feed intake, which commonly occurs when the pigs are weaned at three weeks or less, results in the immune system being primed to the dietary antigens. This leads to a gut damaging hypersensitivity response when piglets are weaned and may predispose early weaned pigs to postweaning diarrhea. This study was conducted to evaluate the effectiveness of creep feeding for early weaned pigs

Materials and Methods

One hundred forty four Yorkshire, Hampshire and Yorkshire x Hampshire crossbred pigs (72 pigs in each of two trials) were weaned at approximately 24 days of age (20-28 day). Each trial was composed of thirty six pigs from six litters previously offered a creep feed (Table 1) for 1 week prior to weaning and thirty-six pigs from five litters which were not offered creep feed. The creep diet was formulated to be highly palatable and to contain a high percentage of postweaning protein sources. After weaning, pigs within preweaning treatment were blocked by weight into two groups (heavy and light) and fed a common prestarter and starter diet. The average age at weaning of pigs in the heavy group was 24.4 days and for the light group was 23.7 days. The postweaning prestarter diet contained 10% dried skim milk (Table 2) and was formulated to contain 1.4% lysine and 20% of an edible grade of dried whey. The prestarter diet was fed to both the creep fed and non-creep fed pigs for 2 weeks (Period 1) with weekly gain and efficiency data obtained. All pigs were fed a common 18% crude protein starter diet (Table 2) for an additional 3 week period (Period 2). Pigs had ad libitum access to both feed and water during Periods 1 and 2. Pigs were housed in an environmentally controlled nursery in pens measuring 3.8 by 5.0

Table 1. Diet fed during one week prior to weaning[a].

Ingredient	%
Sunflower seed	25.0
Dried skim milk	20.0
Whey,dehydrate	16.5
Isolated soy protein	10.0
Provesteen[b]	10.0
Fish meal, menhaden	8.0
Rolled steamed oats	5.0
Corn, ground	5.0
Flavor 792[c]	.5

[a] As fed basis.
[b] Provesta Corporation, Bartlesville, OK.
[c] Flavor Hut Corporation, St. Charles, IL.

Table 2. Composition of diets fed during periods 1 and 2.

	Diet[a]	
Ingredient	Period 1	Period 2
Dried skim milk	10.0	-
Whey, dehydrate	20.0	-
Isolated soy protein	3.0	-
Soybean meal, 44%	-	28.5
Steamed rolled oats	26.9	-
Provesteen[b]	8.0	-
Corn, ground	11.52	66.65
Soybean oil	8.0	-
Lysine, HCl	.24	.15
Fish meal, menhaden	3.0	-
Ethoxyquin	.025	-
Pment sugar[c]	5.0	-
Dicalcium phosphate	-	1.95
Calcium carbonate	1.0	.9
FOA 390[d]	1.0	1.0
Flavor 792[e]	.1	-

(Table 2 continued on next page)

Table 2. (Continued).

Novasil[f]	.5	-
Coli-mix[g]	.5	-
Copper sulfate	.1	.075
DL-Methionine	.075	-
Vit-min-mix[h]	.74	.375
Salt	.30	.40
Calculated analysis		
ME, Kcal/lb	1592.7	1453.6
CP, %	20.7	18.3
Ca, %	.9	.88
P, %	.81	.74
Lys, %	1.40	1.11
Trp, %	.24	.24
Thr, %	.87	.72
Met+Cys, %	.64	.61

[a] As fed basis.
[b] Provesta Corporation, Bartlesville, OK.
[c] Pment sugar, Bob's Candy Co., Albany, GA.
[d] Contains 10g Furazolidone, 5g Oxytetracycline, 4.5g Arsanilic acid per lb.
[e] Flavor 792, Flavor Hut Corporation, St. Charles, IL.
[f] Novasil, Engelhard Corporation, Cleveland, OH.
[g] Coli-mix, Central Biologics, Inc., Raleigh, NC.
[h] Supplied 4,160 IU vitamin A, 416 IU vitamin D, 18 IU vitamin E, 20 mg pantothenic acid, 28 mg niacin, 4.0 mg riboflavin, .02 mg vitamin B_{12}, 1.3 mg biotin, 2.7 mg pyridoxine, .9 mg folic acid, 3.9 mg thiamin, 267 mg choline, .1 mg selenium, .03 g manganese, .1 g zinc, .1 g iron, .1 g copper, .1 g magnesium, .43 g potassium and .2 mg iodine, per lb of feed in Period 1 and 3,000 IU vitamin A, 300 IU vitamin D, 12.8 IU vitamin E, 15 mg pantothenic acid, 20.3 mg niacin, 3.0 mg riboflavin, .01 mg vitamin B_{12}, 193 mg choline, .07 mg selenium, .02 g manganese, .07 g zinc, .07 g iron, .07 g copper, .17 mg iodine, per lb of feed in Period 2.

feet on a raised, woven wire floor. A temperature of 84 to 86°F was maintained during the first week of the experiment and was decreased 2°F per week for the remainder of the trial. Incidence of scours was observed twice daily during the first two weeks and once a day for the last three weeks of the study. Individual pig weight and pen feed intake were measured weekly to determine average daily gain, average daily feed intake and feed efficiency. Pen was used as the experimental unit to evaluate performance criteria.

Results and Discussion

The amount of total feed intake in the pre-weaning period was .62 lb/pig for the week prior to weaning (Table 3). Creep feed did not significantly affect weaning weight. Performance differences between the older, heavier pigs and younger, smaller pigs were observed resulting in a block x treatment interaction ($P<.05$). Therefore, data will be presented on a within block basis.

During the first week postweaning, average daily gain was similar between heavy weight, older (24.4 days of age) pigs from both the creep fed and non-creep fed groups but average daily gain of younger (23.7 days), light weight pigs from litters previously fed creep diet was higher ($P<.05$) than that of light weight pigs from litters not offered a creep diet (Table 4). During the second week, feeding creep feed prior to weaning did not affect average daily gain in either the heavy or light pigs. Light weight pigs from litters fed the creep grew faster ($P<.05$) than those from litters not offered

Table 3. Creep-feed intake in the pre-weaning period.

Item	Treatment	
	Creep	No creep
No of litters	11	10
No of pigs	82	76
Avg birth wt, lb	2.90	2.93
Avg weaning wt, lb	13.75	13.64
Total feed intake		
Days 17-24, lb/pig	.62	0
Avg daily feed intake		
Days 17-24, lb/pig	.09	0

Table 4. The effect of creep feeding on average daily gain, average daily feed intake and feed efficiency of early weaned pigs[a].

	Treatment				
	Creep		No creep		
Item	Heavy	Light	Heavy	Light	SE
Weaning age, d	24.4	23.7	24.3	23.6	
	Average daily gain, lb				
Week 1[g]	.46[d]	.48[d]	.48[d]	.33[e]	.04
Week 2	.81	.79	.84	.68	.07
Period 1[g]	.64[d]	.64[d]	.66[d]	.51[e]	.04
Period 2[g]	1.39[b]	1.28[c]	1.25[c]	1.23[c]	.02
	Average daily feed intake, lb				
Week 1	.55	.57	.57	.51	.02
Week 2	1.03[d]	.88[ef]	.99[de]	.81[f]	.04
Period 1	.79[d]	.73[de]	.79[d]	.66[e]	.02
Period 2	2.46[b]	2.20[c]	2.24[c]	2.17[c]	.04
	Feed efficiency (G:F)				
Week 1[g]	.83[d]	.88[d]	.86[d]	.67[e]	.05
Week 2	.79[d]	.88[e]	.83[de]	.85[de]	.03
Period 1[g]	.81[de]	.88[d]	.84[de]	.76[e]	.03
Period 2	.57	.58	.56	.57	.01

[a] Least squares means.
[b,c] Means in the same row with different superscripts differ ($P < .01$).
[d,e,f] Means in the same row with different superscripts differ ($P < .05$).
[g] Block x treatment interaction ($P < .05$).

creep feed postweaning during Period 2 but average daily gain between heavy pigs was similar. One of the advantages of creep feeding is to provide additional feed for suckling pigs in situations where milk intake may be insufficient for normal growth and development; especially light weight pigs. The higher ($P<.05$) average daily gain observed in light weight pigs from litters previously creep fed as compared to light weight pigs from litters not offered creep during week 1 and for Period 1 suggests that creep feeding may be more important in gut developement in lighter, younger pigs.

Average daily feed intake during the first week on trial was similar among the treatments. During the second week and for the entire 14 day prestarter period (Period 1), no significant differences were observed between heavy weight pigs from litters fed creep feed and those not receiving the creep feed but lighter pigs from litters offered the creep diet tended to have higher average daily feed intake than lighter pigs from litters not offered creep diet although no significant differences were observed. During the first week, feed efficiency (gain/feed) was similar between heavy weight pigs from the creep fed and non-creep fed groups, but light weight pigs from litters fed the creep diet had improved ($P<.05$) feed efficiency when compared to those from litters not previously fed the creep diet. During the second week, feed efficiency was not affected by creep feeding in either heavy pigs or light weight pigs. During the entire 14 day period, heavier pigs fed creep feed and those not offered creep feed had similar feed efficiency but light weight pigs from litters previously fed the creep diet had improved efficiency ($P<.05$) when compared to those from litters not fed the creep diet. During Period 2, average daily gain and average daily feed intake continued to be affected by preweaning treatment in the heavy weight pigs. Heavy weight pigs previously fed creep feed had higher ($P<.05$) average daily gain and average daily feed intake when compared to heavy pigs from litters not offered the creep diet. Conversely, light weight pigs from the preweaning treatments had similar average daily gain and average daily feed intake. No significant difference in feed efficiency between the two groups was observed during period 2 for either heavy or light weight pigs.

Initial weight of heavy pigs (Table 5) averaged 17.64 and 17.56 lb while initial weight of light pigs averaged 12.06 and 12.10 lb for pigs from litters previously fed the creep diet or not offered the creep diet, respectively. After week 1, due to inferior gains by light weight pigs from litters not offered the creep diet, creep feeding affected pig weight ($P<.05$) and by the end of week 2, light weight pigs from litters not offered the creep diet weighed 7.3% less than light weight pigs previously fed the creep diet prior to weaning. Differences in pig weight continued throughout the 3 week carryover period when pigs were fed a common starter diet. Light weight pigs from litters not offered the creep diet weighed 5.5% less at the

Table 5. The effect of creep feeding on pig weight (lb)[a].

	Treatment				
	Creep		No creep		
Item	Heavy	Light	Heavy	Light	SE
No of pigs	36	36	36	36	
Initial wt	17.64	12.06	17.56	12.10	
Week 1[g]	20.83[d]	15.51[e]	20.97[d]	14.45[f]	.31
Week 2[g]	26.49[d]	21.01[e]	26.86[d]	19.25[f]	.62
Week 3	35.18[d]	29.02[e]	34.63[d]	26.88[e]	.77
Week 4	45.72[d]	37.80[e]	43.65[d]	35.31[e]	.95
Week 5	55.77[d]	47.72[e]	53.33[d]	45.23[e]	1.08

[a] Least squares means.
[d,e,f] Means in the same row with different superscripts differ ($P < .05$).
[g] Block x treatment interaction ($P < .05$).

completion of the trial when compared to those from litters previously fed creep diet although these differences were not significant. There was no significant difference in incidence of scours (16 vs 18 pigs) in pigs between litters previously fed the creep diet and those not offered the creep diet during Period 1 (Table 6).

Table 6. The effect of creep feeding on incidence of scours in early weaned pigs.

	Treatment			
	Creep		No creep	
Item	Heavy	Light	Heavy	Light
No of pigs	36	36	36	36
Week 1	7	2	2	6
Week 2	2	5	3	7
Period 1	9	7	5	13
Period 2	0	0	1	0

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