The overall response of piglets to phase one diets during the first two weeks in the nursery is not affected by creep feeding or weaning weight.


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Average litter size on swine farms in Canada has increased from approximately 12.3 to 13.7 piglets in the past 5 years. Further improvement is expected and is an important determinant of the competitiveness of the industry in Western Canada. However, research conducted at PSCI showed that as litter size increased from 8.4 to 15.4 pigs born alive, average birth weight decreased by approximately 250 grams, or almost 40 grams per additional pig. The number of pigs less than 850 grams increased from 0.2 per litter in the small (5 to 12 piglets) litters to almost 1 per litter in the largest (16 or more born alive) litters. It is apparent that as litter size continues to increase it is crucial that these small pigs survive and go to market or the benefits of larger litters will not be not realized.

The period immediately post-weaning is characterized by problems such as low feed consumption, poor growth rate, and increased incidence of diarrhea in the piglets. Reducing the interval between weaning and resumption of feed consumption can mitigate these issues, thus the piglet must be encouraged to begin consuming solid feed upon entering the nursery. Traditionally the feed offered immediately post-weaning is very high quality, containing animal by-products providing the piglet with "extra-nutritional" benefits including appetite stimulation. This feed however, is very expensive and producers are questioning if it is necessary for all piglets.

This experiment was designed to determine if the requirement for a complex dense feed immediately post-weaning is dependent on the weaning weight of the pig. We hypothesized that the light-weight pigs at weaning would show a greater response to the higher quality feed. We also studied the whether the provision of creep feed was beneficial. This creep feed data and the data pertaining specifically to weaning weight were described in the Fall 2011 issue of Centred on Swine.

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Fifteen nursery fills were studied. Each nursery (32 pens, 4-5 pigs per pen) was filled with the piglets from one weeks' farrowing. We used only 12 pens, 6 for the lightest, and 6 for the heaviest pigs from the weaning group. Within each body-weight grouping, these 6 pens were then assigned to one of 3 treatments (Table 1). Thus within each nursery we had 2 pens per treatment, per body-weight grouping. Pens were mixed gender, and contained at least 2 pigs of one gender. Farrowing groups 1 to 8, received creep

Table 1. Treatment regimes

Treatment	Feeding regime
A	Complex diet day 0 to 1, Simple diet day 2 to 14
B	Complex diet day 0 to 4, Simple diet day 5 to 14
C	Simple diet day 0 to 14

Table 2. Ingredient composition of experimental diets

Ingredient, %	Complex	Simple
Wheat	24.20	29.86
Corn	20.00	
Soybean meal	16.90	25.00
Peas	10.00	10.00
Canola meal	------	7.80
Corn DDGS	------	20.00
Fish meal	5.00	------
Spray dried whey	14.29	------
Spray dried plasma	2.50	------
Spray dried blood meal	2.50	------
Canola oil	1.75	2.80
Limestone	0.70	0.85
Dicalcium Phosphate	0.15	1.15
Salt	0.25	0.40
Vitamins	0.60	0.60
Minerals	0.60	0.60
DL methionine	0.130	0.090
L-Threonine	0.190	0.245
Lysine HCl	0.020	0.385
Copper sulphate	0.04	0.04
Choline chloride	0.08	0.08
LS20	0.10	0.10
Cost per tonne, August 2012	$ 906.00	$ 498.00

feed (a non-medicated phase 1 starter) for one week prior to weaning. Groups 9 to 15, received no creep feed. As described in our earlier report (Fall 2011) creep feeding in this experiment did not improve average litter weaning weights.

Diets (Table 2) were formulated to meet or exceed amino acid, energy, vitamin and mineral requirements for pigs of this age and body weight (NRC 1998). The "complex" diet used corn instead of corn DDGS and contained whey, plasma, blood meal and fish meal while the "simple" diet met requirements using wheat, soybean meal, canola meal and corn DDGS. The simple diet would thus be much "cheaper" to manufacture. While both diets met all the nutrient requirements for piglets of this age and weight ingredients in the complex diet should supply additional benefits such as improved palatability and aiding the immune system. We hypothesized that the complex diet would be especially beneficial for lightweight piglets and those who had not received creep in the farrowing room. As shown in Table 2, based on August 2012 ingredient prices, the complex diet cost $906 per tonne or $400 more than the simple diet.

The three treatments were A: the complex diet only on day 1, B: the complex diet on the first 4 days, followed by the simple diet, and piglets on treatment C only received the simple diet.

Surprisingly dietary regime had no effect on piglet performance during the first 14 days in the nursery (Table 3, BW d 14, ADG, ADFI and FCE day 0 to 14 all $P > 0.05$). The provision of the complex feed improved feed intake and prevented some body weight loss during the first 24 hours post-weaning, however this benefit was not maintained.

There was an interaction between diet and body weight category on growth rate immediately post-weaning (Figure 1). Piglets which were heavier at weaning, lost weight during the first day post-weaning regardless of diet complexity. In contrast, piglets which were lighter, and receiving a complex diet maintained their BW (BW group by diet, day 0 to 1; $P = 0.01$). Our hypothesis, that light-weight pigs would respond more to a higher quality diet was proven correct for the first 24 hours post-weaning. However, overall this response appears to be of little importance as there were no interactions of birth weight and feeding regime after this time (data not shown).

In this experiment feeding a simple diet, formulated to meet all nutrient requirements, did not reduce growth of piglets when compared to a complex diet fed for 1 or 4 days post-weaning.

(The overall response of piglets ... cont'd on page 5)

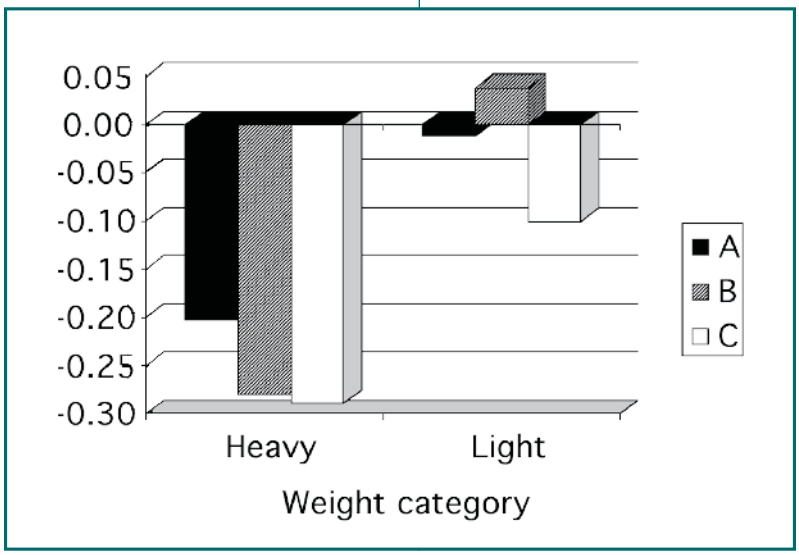

Figure 1. The interaction between body weight and feeding regime on the growth of piglets day 0 to 1 post-weaning. Treatment A and B piglets were receiving the complex diet and treatment C piglets the simple diet during this period.

a greatly expanded database of ingredient information," points out Dr. Patience. "It attempts to make ingredient nutrient content more robust and places a greater emphasis on net energy and effective NE. Also, it tells you how many sources of data there are for each ingredient, so you can see how much validity to put on the data." In addition, he notes, it has an expanded emphasis on modelling to define nutrient requirements. A greatly expanded explanation of the scientific and philosophical basis of the recommendations presented in the book, helps you determine whether the approach is right for your farm.

- The widespread availability of synthetic amino acids: lysine, methionine, threonine and tryptophan. "The use of synthetic amino acids reduces the quantity of soybean meal and other protein sources in the diet," explains Dr. Patience. "It has been estimated that the widespread adoption of synthetic amino acids has reduced the quantity of land required to feed the US pig herd by 14 - 15%."
- Marker-assisted technology and hyper-prolific lines. "This has led to advances in productivity that could only have occurred if nutritional management was up to the task," believes Dr. Patience. "Nutrition has kept up with genetics, and we have been able to feed a sow that is producing 30 PSY and also feed for the pig's better growth potential."
- Adoption of increasingly sophisticated record keeping systems, which have driven the decision making process. "This has had a profound influence on the industry. Producers ask a lot more questions when they have better data," says Dr. Patience. "They ask: If I'm below average or below target, what is going on nutritionally?"
- The increasingly rapid change in emphasis from maximizing productivity to maximizing financial returns. A good example is a big focus on barn throughput while meeting weight targets.

"How did we ever operate without using these developments?" asked DR. Patience. "Producers have adopted most of these, although the NE system is not being used as much as it should. Least cost formulation is only one step along the way, we need to know the pig's response so we can optimise its nutrient intake based on performance."

(The overall response of piglets ... cont'd from page 3)

Table 3. The effect of feeding regime on performance of weanling pigs. Average of 60 pens per treatment, 4 pigs per pen.

		Dietary Treatment				
Parameter		A	B	C	SEM	P value
Body wt, kg	Day 0	8.43	8.43	8.42	0.07	0.92
	Day 1	8.33	8.32	8.22	0.08	0.07
	Day 4	8.47	8.89	8.44	0.08	<0.0001
	Day 7	8.79	9.19	8.79	0.10	<0.0001
	Day 14	10.95	11.25	11.11	0.17	0.14
ADG, kg/day	Day 0-1	-0.11	-0.12	-0.20	0.02	0.002
	Day 2-4	0.03	0.14	0.06	0.01	<0.0001
	Day 5-7	0.14	0.12	0.14	0.01	0.21
	Day 5-14	0.27	0.25	0.28	0.01	0.04
	Day 0-14	0.17	0.20	0.19	0.01	0.14
ADFI, kg/day	Day 0-1	0.12	0.12	0.08	0.01	0.002
	Day 2-4	0.10	0.17	0.12	0.01	0.0001
	Day 5-7	0.20	0.25	0.20	0.01	0.001
	Day 0-14	0.24	0.27	0.25	0.01	0.002
	Day 5-14	0.31	0.33	0.31	0.01	0.16
FCE, as G/F	Day 0-14	0.71	0.70	0.73	0.04	0.31
	Day 5-14	0.86	0.75	0.89	0.02	0.0001

Switching from a complex to a simple diet after one day reduced feed intake to a greater extent than switching after 4 days post-weaning.

Feeding the complex diet for the initial 4 days in the nursery would costs about $0.50 more per pig than feeding the simpler, cheaper diet throughout. Our results indicate that these savings would accrue regardless of piglet birth weight.

It is important to note that these studies were designed specifically to investigate the response to the diets and these pigs were raised under ideal, non-stressful conditions. We are presently conducting experiments to determine if these results will be maintained when pigs are raised under more commercial conditions. In a similar experiment, however, Levesque and co-workers (2012) at the University of Guelph showed that although pigs fed a simple diet post weaning did have decreased growth and feed intake relative to their cohorts receiving a complex diet they compensated for this reduction during the grow-finish stage and thus there was no overall effect on performance but overall a decrease in lifetime diet cost.

The Bottom Line:

Producers may be able to save money by feeding simpler stage 1 diets. However, our study and that conducted at the University of Guelph indicates that further research is required to determine if these simple, cheaper diets affect the ability of the young pig to respond to disease and/or environmental stressors.

Acknowledgments

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