Can Flaxseed Replace Antibiotics in Nursery Diets?

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Results from work at Prairie Swine Centre have shown that when piglets are raised in a high health situation, the use of in feed antibiotics post-weaning had no benefit, regardless of weaning age. Additionally, weaning piglets at 3 weeks of age may be more beneficial to the producer if they are able to produce piglets with the same nursery exit weights relative to pigs weaned at 4 weeks.

Introduction

Weaning is a stressful time in a piglets' life. During this time, they are exposed to 3 major stressors (nutritional, environmental, and social). Combined, these can activate the immune response in the piglet, which in turn can have negative impacts on animal performance post weaning (low or no feed intake, reduced or negative growth rates).

In order to help combat the stress/immune response at the time of weaning, piglets are often fed a diet containing a low level of antibiotics (Ab). This helps the piglets cope with any potential secondary infections which may be contracted while their immune system is vulnerable. In April 2015, Health Canada announced that the use of in-feed antibiotics will be phased out over the next 3 years. Finding alternate strategies to help piglets cope at the time of weaning is important, and nutritional modulation for this purpose is a growing area of interest.

Flaxseed is a rich source of omega-3 (n-3) fatty acids (FA), which are known to have many different health benefits, including anti-inflammatory properties. Omega-3's can be easily transferred to piglets via the milk when sows are fed diets containing a good quality source (Eastwood, 2014). Additionally, changing the FA profile of sow diets by adding n-3's can impact the inflammatory responses of their offspring (Eastwood et al., 2012). Perhaps by improving the health of piglets prior to weaning, through nutritional modulation of the sow, we can remove Ab's in the nursery diets.

Materials and Methods

A total of 103 sows were used for this trial, 52 weaned at 4 weeks of age and 51 at 3 weeks of age. Within each weaning group, sows were fed one of two diets (control or n-3) throughout lactation. At the time of weaning, 10 piglets from each litter were selected, moved to the nursery and housed in 2 groups of 5 piglets each (2 nursery pens per litter). One half of the litter (1 pen) was fed a starter diet containing Ab's (LS20, 0.1%), and the other half received the same diet without Ab's. After one week, all piglets were switched to a common phase 2 diet for the remainder of the study. Prior to weaning, nurseries skipped a single wash cycle, to ensure that each weaning cohort was immunologically challenged. Regardless of weaning age, all piglets completed the trial at 56 days of age.

Piglet performance was determined in both the farrowing and nursery rooms. Sow milk was collected during mid-lactation to determine the FA profile of milk being consumed by piglets. Piglet health was monitored by collecting blood for complete blood cell count (CBC) and chemistry blood panels 2 days post weaning. A total of 1,181 piglets completed the lactation portion of the trial. Of those, 1,021 piglets were used for the nursery portion.

Results and Discussion

There were no dietary effects (± n-3 FA's) on sow feed intake, numbers of piglets born, piglet growth or on the number of piglets weaned per litter ($P > 0.10$). As expected, sows fed a diet with added n-3 FA's had significantly more n-3's in their milk relative to control sows (5:1 vs. 8:1 n-6:n-3 ratio).

In the nursery, there was no impact of sow diet on ADG, ADFI, G:F or final body weight for piglets weaned at 3 or 4 weeks of age ($P > 0.10$). For piglets weaned at 3 weeks of age, ADFI was 20 g/d higher during the 4th week in the nursery for piglets who received no Ab's in their phase 1 diet ($P=0.03$); however, ADG and G:F were not affected ($P > 0.10$). Feed intake was not affected during any of the other weeks on trial for these piglets. For piglets weaned at 4 weeks of age, ADG tended to be greater in piglets fed diets with Ab's for week 1 of the trial ($P = 0.05$), which also lead to improved G:F ratios during that week ($P = 0.04$). Growth and G:F were unaffected by the

> Pigs raised in a clean, high health facility do not require antibiotics into Phase 1 diets post-weaning.

Table 1: Reproductive performance of sows fed diets with or without n-3 FA's and weaned at 3 or 4 weeks of age

	Sow Lactation Diets		Statistics	
	Control (- n-3)	Omega (+ n-3)	SEM	P Value
3 Week Wean[1]				
Parity	2.50	2.20	0.394	0.560
Lactation length, d	19.35	19.36	0.368	0.979
ADFI, kg/d	6.01	5.81	0.262	0.589
Born alive, n	14.81	14.72	0.662	0.925
Born total, n	15.62	15.92	0.666	0.746
Weaned, n	11.15	11.24	0.310	0.844
Total litter gain, kg	54.17	52.89	2.255	0.685
Piglet ADG, kg/d	0.25	0.24	0.007	0.468
4 Week Wean[1]				
Parity	2.11	2.12	0.279	0.982
Lactation length, d	26.22	26.56	0.393	0.538
ADFI, kg/d	7.55	7.66	0.249	0.747
Born alive, n	14.70	14.64	0.576	0.937
Born total, n	15.96	16.12	0.670	0.867
Weaned, n	11.56	11.88	0.267	0.386
Total litter gain, kg	77.21	77.94	2.151	0.795
Piglet ADG, kg/d	0.26	0.25	0.006	0.402

[1]*Litters were standardized to ~12 pigs each within the first 24 hr post-farrowing*

inclusion of Ab's from weeks 2 to 4 in the nursery. Feed intake tended to be higher in Ab fed piglets during week 3 (P = 0.08), and was significantly higher in week 4 (P = 0.03) relative to piglets who received no Ab's in the first week post-weaning (930 g/d vs. 900 g/d); however this did not impact G:F. We observed no dietary effects (sow diet or nursery diet) on the final body weight of piglets at nursery exit; however, regardless of dietary treatment, piglets weaned at 3 weeks of age were ~1.5 kg heavier than those weaned at 4 weeks (P < 0.05).

No effects were found in sow or phase 1 diet on any of the blood measures taken when piglets were weaned at 3 weeks of age. When piglets were weaned at 4 weeks of age, piglets weaned from sows fed diets containing n-3 FA's had lower white blood cell counts relative to those weaned from sows fed the control diet (P < 0.05). White cell counts were unaffected by phase 1 diet, and neither sow nor phase 1 diet affected any of the other blood parameters measured.

Regardless of diet, piglets weaned at 3 weeks of age had lower creatine kinase (CK), aspartate aminotransferase (AST) and white blood cell (WBC) counts relative to those weaned at 4 weeks. CK and AST are enzymes involved in muscle catabolism.

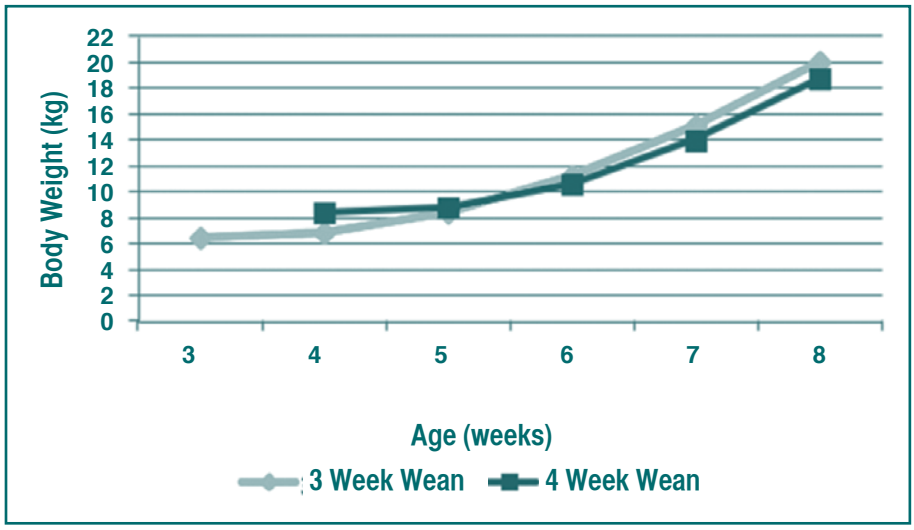

Figure 1: Average body weight of piglets weaned at 3 or 4 weeks of age during the nursery phase of the experiment

Conclusion

Results from this trial clearly showed that in a high health situation, the use of in feed Ab's post-weaning had no benefit, regardless of weaning age. This experiment has also shown that, at nursery exit (8 weeks old), piglets weaned at 3 weeks of age had heavier body weights than those weaned at 4 weeks of age, which in part may be due to the fact that piglets weaned at 3 weeks had lower WBC, CK and AST counts relative to those weaned at 4 weeks.