

SEX AND AGE AT WEANING AFFECT SMALL INTESTINAL HISTOLOGY AND ENZYMATIC CAPACITY

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While pigs are commonly weaned at 23-27 days of age, sow milk production peaks at 10-14 days of lactation after which it limits growth. By weaning earlier and providing pigs with a suitable diet, it may be possible to increase growth of the young pig. However, it is possible that the digestive function of early-weaned pigs may be immature and incapable of digesting many feedstuffs. The present study was designed to examine some of the factors that might influence small intestinal function in the weaned pig.

Forty-eight pigs were used in a 2 x 2 x 2 x 3 factorial experiment with the respective factors being; age at weaning (14 or 28 d), weight at weaning (heavy or light), sex (boar or gilt) and day post weaning (1, 7 or 14 d). Sixteen pigs were weaned and fasted for 24 h before being euthanased. The remaining pigs were weaned into individual pens and given a diet containing 15.5 MJ DE/kg and 0.95 g available lysine/MJ DE *ad libitum*. Sixteen pigs were euthanased on day 7 and the remaining 16 on day 14 post weaning after a 24 h fast. Samples of the small intestine were taken at 25, 50 and 75% and 10, 25, 50, 75 and 90% of the length from the duodenum to the ileum for histology and enzymology, respectively.

Table 1. Effect of sex (S) and age (A) and weight (W) at weaning and day after weaning (D) on small intestinal (SI) weight, histology and enzymatic activity.

SI	Sex		Age		Weight		Day				sed ²	Significance
	Boar	Gilt	28d	14d	H	L	1	7	14	sed ¹		
Weight (g)	277	277	337	218	316	239	21	188	256	388	26	A ^{***} , D ^{***} , W ^{**}
Villous height (µm)	369	406	392	382	386	389	14	480	329	356	17	S*, D ^{***}
Crypt depth (µm)	177	174	177	174	175	176	4.8	143	182	201	5.9	D ^{***}
Maltase ³	0.85	1.09	1.28	0.66	1.04	0.90	0.09	0.44	0.97	1.50	0.09	S**A ^{***} , D ^{***}
GLAase ^{3,4}	1.59	1.62	2.19	1.03	1.69	1.53	0.18	0.71	1.75	2.36	0.18	A ^{***} , D ^{***}

¹sed for main effects of sex, age and weight. ²sed for main effect of time.

³µM glucose/min per g mucosa. ⁴Glucoamylase.

Mean villous height was greater in gilts than boars but was not different between pigs weaned at 14 and 28 d or heavy and light pigs. Villous height was greatest immediately after weaning, then decreased and remained low whereas crypt depth increased with time after weaning. Mean maltase activity was greater in gilts than in boars and in pigs weaned at 28 d compared to 14 d and furthermore tended to be greater in the heavier pigs ($P=0.081$). Mean glucoamylase activity was greater in pigs weaned at 28 d rather than 14 d. It appears that the carbohydrate digestive capacity is lower in early-weaned pigs, particularly if they are small for age. On the other hand, absorptive capacity as indicated by villous height may be similar between age and weight groups. Gilts may be better prepared to handle the transition at weaning as indicated by their greater villous height and maltase activity. Split sex weaning practices may allow for separate diets matched to digestive function to be used for newly weaned boars and gilts.

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