

An investigation of the relationship between pig weight and subsequent variation in weight

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Introduction Strategies to reduce the variable growth rate and hence variable weight of pigs at slaughter are continuously being investigated (e.g. O'Connell *et al.*, 2005). However, key to designing strategies to reduce variability is the need to understand where variability arises. The objective of this study was to identify which pigs, based on their wean and 10 week weight, within a normal population of pigs, contribute most to end weight variability.

Materials and methods All pigs (Landrace x Large White) were born and reared on the research herd at AFBI Hillsborough between 1997 and 2009. All pigs were weaned at the same age (28 days +/- 2 days). Two datasets were built from data attained from 22 experiments where pigs were penned in groups of 10 or 20. One dataset contained the weaning and 10 week weight of 12,000 pigs, and the second the 10 and 20 week weight of 4,950 pigs. Regression analysis were performed to investigate the relationships between wean and 10 week weight and between 10 week and 20 week weight. The datasets were subdivided into weight categories. At weaning these categories represented 6kg (102 pigs), 7kg (493 pigs), 8kg (1152 pigs), 9kg (1614 pigs), 10kg (1482 pigs), 11kg (810 pigs), 12kg (324 pigs) or 13kg (102 pigs) with a tolerance of +/-0.2kg. At 10 weeks of age, the categories represented 20kg (84 pigs), 25kg (678 pigs), 30kg (1224 pigs) and 35kg (408 pigs) with a tolerance of +/-1kg. Within each weight category of each dataset pigs were randomly assigned to one of six groups which represented a 'replicate'. The average, standard deviation (SD) and coefficient of variation (CV) of 10 and 20 week weight of each replicate respective of dataset was then determined. Analysis of variance (Genstat Version 10) was used to test the effect of start weight on end weight variation.

Results A significant ($P < 0.001$) but weak ($R^2 = 0.383$) linear relationship ($y = 2.11x + 10.9$) was found between wean and 10 week weight. Likewise the relationship between 10 and 20 week weight was also significant ($P < 0.001$) but weak ($R^2 = 0.274$) and linear ($y = 1.53x + 40.7$). The 10 week weight of pigs increased as their wean weight increased (Table 1). The CV for 10 week weight was highest for pigs with a weaning weight of 6kg and tended to decrease as pigs got heavier (Table 1). However, the SD of 10 week weight was highest for pigs with a weaning weight of 12kg and 13kg. As 10 week weight increased, so did 20 week weight ($P < 0.001$). However, 10 week weight had no significant effect on the CV of 20 week weight, although the standard deviation of 20 week weight from pigs weighing 35kg at 10 weeks of age was significantly higher (11.2) ($P < 0.01$, LSD 1.16) than that of pigs in the other weight categories (Figure 1).

Table 3 Effect of wean weight on the average, SD and CV of ten week weight

	6.0kg	7.0kg	8.0kg	9.0kg	10.0kg	11.0kg	12.0kg	13.0kg	LSD	P
Average (kg)	24.4 ^a	26.18 ^b	27.9 ^c	29.67 ^d	31.18 ^e	33.08 ^f	34.95 ^g	37.88 ^h	0.151	<.001
SD	3.70 ^a	3.82 ^a	3.79 ^a	3.52 ^a	3.74 ^a	3.93 ^{ab}	4.64 ^c	4.18 ^b	0.30	<.001
CV	0.152 ^a	0.146 ^{ab}	0.136 ^b	0.119 ^c	0.120 ^c	0.120 ^c	0.133 ^b	0.110 ^c	0.010	<.001

^{a, b, c} numbers with the same superscript are not significantly different ($P > 0.05$)

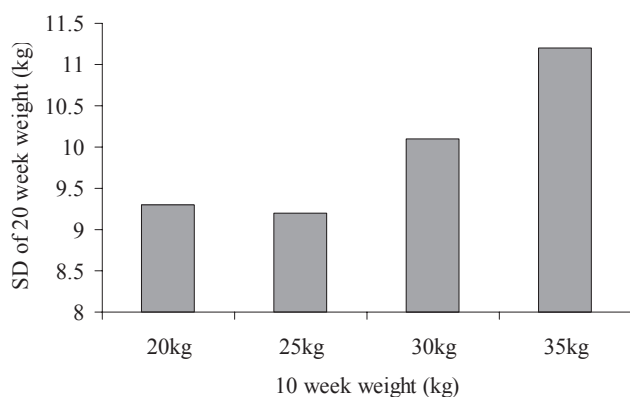


Figure 1 The effect of 10 week weight on the standard deviation of 20 week weight

Conclusion Although the relationships between wean and 10 week weight and between 10 and 20 week weight were significant, the R^2 of the best fit line was very low indicating a large degree of variability. The study also suggests that the 10 week weight of pigs with low weaning weights (6-8kg) is more variable than of those with higher weaning weights. A similar trend is not present when relating 10 and 20 week weight although pigs with a high 10 week weight (35kg) were found to have a larger spread of weights, as indicated by a higher SD at 20 weeks compared with pigs weighing 20, 25 or 30 kg at 10 weeks of age. This study would suggest that there is a greater potential to manipulate the 10 week weight of light weight pigs at weaning than that of heavy weight pigs since their variable weight at 10 weeks was higher than that of heavy weight pigs.

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Reference

O'Connell, N.E., Beattie, V.E. and Watt, D. 2005. *Livestock Production Science* 97, 107 – 115