Effect of piglet birth weight on serum triglyceride levels at weaning and at slaughter

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Introduction In pigs, birth weight is associated with health status in later life. The heavier the piglet is at birth the more likely it is to survive. During critical growth periods *in utero*, an adverse foetal environment can lead to permanent changes in the metabolism of the offspring (foetal programming). Light birth weight piglets tend to have higher levels of free fatty acids in their blood at weaning (Lösel *et al.* 2009) and have higher levels of carcass fat at slaughter than heavy birth weight piglets (Rehfeldt and Kuhn 2006). The aim of this study was to determine the influence of back fat levels in gilts and nutrition during gestation on serum triglyceride (TG) levels in offspring at weaning and slaughter. The hypothesis was that lighter pigs at birth would have higher levels of serum triglycerides due to unfavourable foetal programming *in utero*.

Materials and methods Fourteen gilts (Landrace x Large White) were used in this study with either; low back fat depth (P2:~12 mm) or high back fat depth (P2:~17 mm) at service. At d 25 of gestation gilts were randomly allocated to a gestation diet (6.19 g/kg lysine, 13.0 MJ DE/kg) at the following levels: 1.8 kg, 2.5 kg or 3.5 kg until d 90 of gestation. Offspring from gilts were selected at weaning based on their birth weight. Two of the lightest (<1.2 kg at birth) and two of the heaviest piglets (>1.7 kg at birth) were selected from each litter. One light and one heavy piglet were sacrificed at weaning and blood samples were collected. The remaining light and heavy piglets from each litter were individually fed and followed through to slaughter at c. 130 days post weaning (c.100 kg) when blood samples were collected. Blood was allowed to clot at room temperature for a few hours before serum was separated by centrifugation at 2500 x g for 20 min at 15°C. Serum was analysed for TG levels using an enzymatic-colorimetric determination kit (Sentinel Diagnostics). Data was analysed using the mixed models procedure of SAS with effects for growth stage (weaning or slaughter), birth weight (light or heavy), feeding level (1.8 kg, 2.5 kg and 3.5 kg), sow back fat level (high or low) and their interactions. Sow was included as a random effect.

Results Mean serum TG levels of light and heavy birth weight pigs were similar at both weaning and slaughter (P>0.05). Light birth weight piglets had higher serum TG levels than their heavy littermates when measured both at weaning and at slaughter (P<0.01; Figure 1). There was no birth weight × growth stage interaction for serum TG level. Serum TG level was influenced by gilt (dam) (P<0.05).

Conclusions These preliminary results indicate that light birth weight littermates have higher serum TG levels than heavy littermates at weaning and this difference persists to 100 kg. This life long effect of birth weight on serum TG levels may be part of a foetal programming effect. Future work will look at the underlying mechanisms for the effects observed.

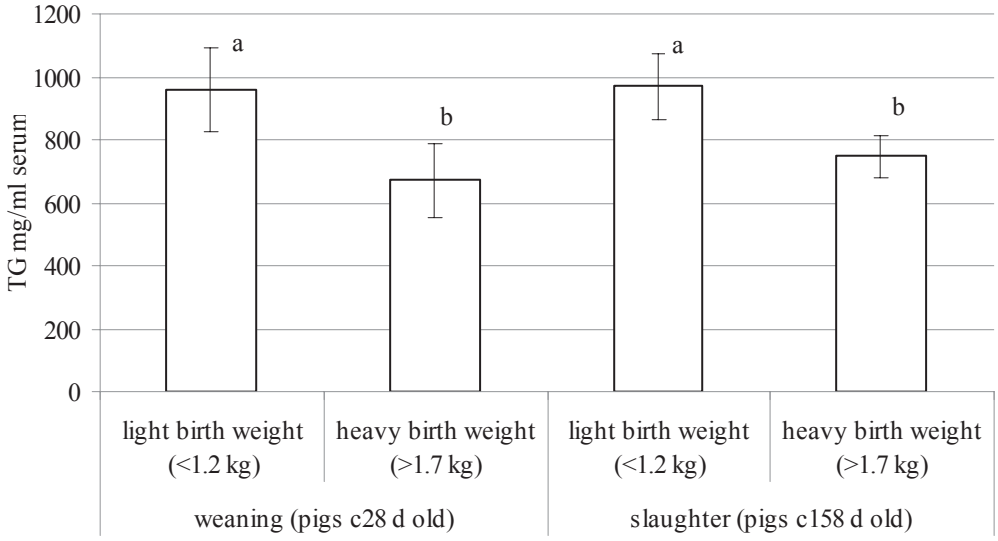

Figure 2 Effect of birth weight and growth stage on offspring serum TG levels. [a, b] Columns within the graph that do not share a common letter are significantly different (P<0.05).

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References

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