The pre-ovulatory luteinising hormone surge is affected by the sex ratio of a gilt's birth litter

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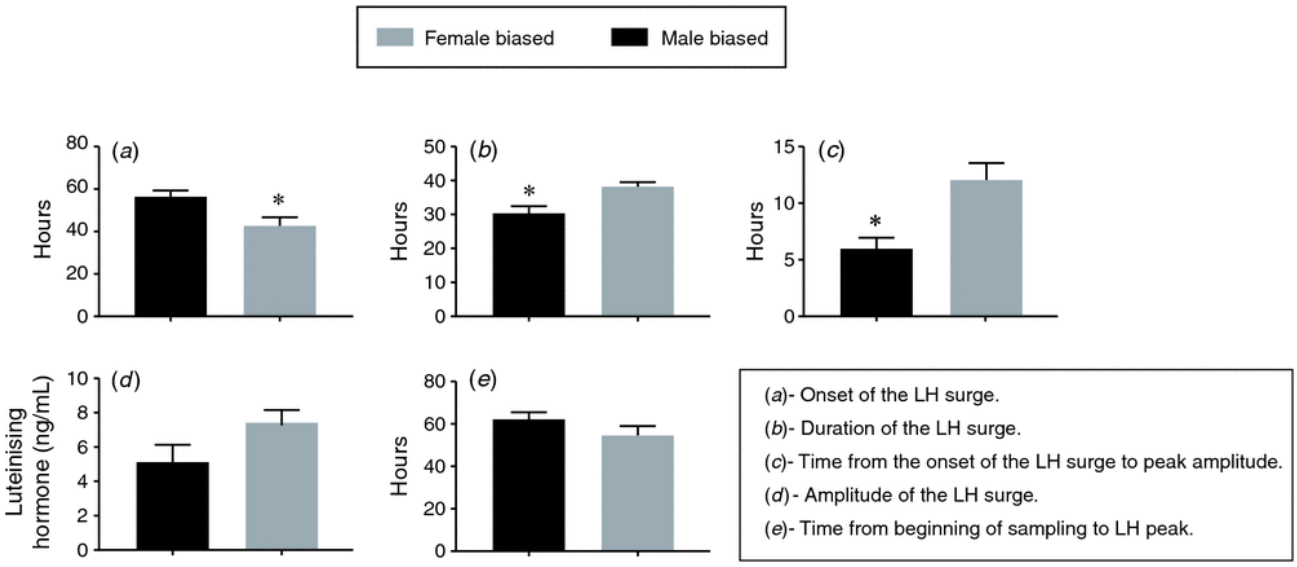
Animal Production Science 57(12) 2474-2474 https://doi.org/10.1071/ANv57n12Ab016
Published: 20 November 2017

Female reproduction can be affected by exposure to excessive concentrations of androgens in utero, resulting in masculinisation (Veiga-Lopez et al. 2009). Gilts may be exposed to excessive concentrations of androgens in utero from developing male littermates, as occurs in rodents (vom Saal and Bronson 1978). Gilts from male-biased litters may be masculinised and present with decreased reproductive potential due to differences in the functioning of their hypothalamo-pituitary-gonadal axis (HPG) (Veiga-Lopez et al. 2009). We hypothesised that the preovulatory surge of luteinising hormone (LH) of gilts from male-biased litters would be delayed in onset and would have an attenuated amplitude compared to gilts from female-biased litters.

Large White x Landrace gilts were selected from male-biased (>60% males, n = 10) or female-biased (>60% females, n = 9) litters. From 19 weeks of age gilts were rehoused into groups of four and began boar exposure in a detection mating area for 1 h daily for detection of puberty. To synchronise second oestrus, gilts received 5 mL/d of an orally active progestogen, altrenogest, commencing 12 days after the detection of puberty. Once all gilts had expressed puberty the altrenogest was withdrawn. Four days after withdrawal of altrenogest blood samples were collected via indwelling jugular vein catheters every 4 h until the end of subsequent oestrus. Plasma was stored at –20°C until required for LH assay using a double antibody radioimmunoassay. The assay sensitivity was 0.4 ng/mL and the intra and inter assay coefficients of variation were, 11.9% and 20.3%, respectively. A surge was defined as described by Barb et al. (1982). Data were analysed using a one-way ANOVA (SPSS v22.0, IBM, Armonk, NY, USA).

The onset of the LH surge was significantly delayed (56 ± 3.3 v. 43 ± 3.8 h, P < 0.05) for gilts from male-biased litters compared to gilts from female-biased litters (Fig. 1). The duration of the LH and the time from the onset of the LH surge to peak amplitude was significantly less (30 ± 2.2 v. 38 ± 1.2 h, and 6 ± 0.9 v. 12 ± 1.4, respectively, P < 0.05) for gilts from male-biased litters than for gilts from female-biased litters. There was no difference between groups in the amplitude of the LH peak or the time from beginning sampling to reach the LH peak.

Fig. 1. Characteristics of the pre-ovulatory luteinising hormone surge for gilts from male biased and female biased litters (* = $P < 0.05$).



These data partially support our hypothesis in that the LH surge was delayed in gilts from male-biased litters but there was no difference in amplitude of the LH surge. Nonetheless, we present evidence that gilts from male-biased litters display a delayed LH surge, an attenuated duration of the LH surge and a reduced time from the onset of LH surge to the peak. Combined, these data suggest that the response of the HPG axis during oestrus is different between gilts from male-biased litters and gilts from female-biased litters. These differences may affect reproductive performance and therefore, with further research, the sex ratio could be used as a selection tool to improve the breeding herd.

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Supported by Australian Pork Limited and Pork SA