

Increasing the age of gilts at first boar contact improves the timing and synchrony of the pubertal response but does not affect potential litter size

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Abstract

One hundred and ninety-two Large White/Landrace crossbred gilts were used in this study. The study was conducted in two blocks, with 16 gilts allocated to each of six treatments in each block. The treatments compared the effects on puberty attainment of commencing boar exposure at 161, 182 or 203 days of age, and the effect of first mating gilts at either the pubertal or second oestrus on ovulation rate and early embryo survival. Boar contact took place in a detection-mating area (DMA), and consisted of 20 min/day of full contact with a vasectomized boar greater than ten months of age. Gilts were artificially inseminated at the allocated oestrus, with the reproductive tracts collected at 22.8 ± 0.4 days after first mating (mean $\pm$ S.E.M.), and the numbers of corpora lutea and viable embryos recorded. The age at which gilts attained puberty increased with the age at which boar exposure commenced. Mean gilt ages at puberty were 179.5 ± 1.6 , 191.7 ± 1.2 and 210.3 ± 0.9 days, respectively, when boar contact commenced at 161, 182 and 203 days of age, $P < 0.01$. Mean days-to-puberty was significantly shorter when boar contact began at 182 and 203 days of age compared to 161 days of age (10.4 ± 1.2 and 8.3 ± 0.9 days versus 18.9 ± 1.5 days, respectively, $P < 0.01$). Similarly, commencing boar exposure at 182 or 203 days of age as opposed to 161 days of age significantly increased the proportion of gilts attaining puberty within 10 days of start of boar exposure (0.67 and 0.70 versus 0.24, $P < 0.01$). Mean days-to-puberty and the synchrony of puberty attainment were similar when boar contact commenced at 182 and 203 days of age. There was no significant effect of mating oestrus or age of gilts at mating on ovulation rate, embryo number or embryo survival. In conclusion, the current

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data indicate that the timing and synchrony of puberty attainment is significantly improved when first boar exposure of gilts is delayed until 182 days of age. Further, it is evident that within the age range investigated, delaying first mating until the second oestrus does not significantly increase either ovulation rate or embryo number at day 20 post-mating.

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1. Introduction

Gilt age at mating is an important determinant of breeding herd efficiency, and is largely dependant on age at puberty (Koketsu et al., 1999). Female pigs may attain puberty anywhere between 102 and 350 days of age. Reducing this variation by controlling the onset of puberty is extremely beneficial to the productivity of a breeding herd (Hughes, 1982). Early age at puberty is associated with younger mating ages and a shorter non-productive period prior to breeding herd entry (Brooks and Smith, 1980; Aherne and Kirkwood, 1985). Failure to attain puberty or exhibit regular oestrous cycles is a common problem associated with replacement gilts (Whittemore, 1996). Lucia et al. (2000) reported that nearly 20% of premature culling of females from the breeding herd occurs at parity 0, with 65% of these culls attributed to reproductive disorders or failure. Considering the high cost associated with rearing replacement gilts, it is appropriate to investigate whether current gilt management strategies need to be revised to suit current genotypes.

Repeated studies have shown that daily physical contact with a mature boar (the ‘boar effect’) is an effective method of stimulating precocious puberty attainment in replacement gilts (Hughes and Cole, 1976; Kirkwood and Hughes, 1979). The boar effect is mediated through the synergistic actions of visual, tactile, olfactory and auditory stimuli (Patterson et al., 2002a). Age at start of boar contact is the most favourable predictor of gilt response (Hughes and Varley, 1980; Eastham et al., 1986). Further, it has previously been reported that optimal timing and synchrony of puberty attainment occurs when gilts are 160 days old at commencement of boar contact (Hughes and Cole, 1976; Kirkwood and Hughes, 1979; Eastham et al., 1986). However, the higher rates of lean growth, reduced body fat content, and greater mature weights typical of current genotypes, mean that gilts are now heavier yet leaner when puberty stimulation and mating take place. More importantly, they are also at a lower proportion of their mature weight and therefore physiologically less mature. Consequently, a number of recent reviews have suggested that selection for improved production traits may also be a selection against early puberty attainment (Whittemore, 1996; Edwards, 1998; Evans and O’Doherty, 2001; Slevin and Wiseman, 2003).

A presumptive strategy of mating gilts at their second or third oestrus has been widely adopted by the pork industry (Whittemore, 1996). This strategy has been associated with higher ovulation rates (Archibong et al., 1987), decreased embryo mortality (Menino et al., 1989; Archibong et al., 1992), and a tendency toward larger first litter sizes (Young and King, 1981) compared to mating at the first observed oestrus. In contrast, first litter size (Young et al., 1990a) and sow productivity over multiple parities were unaffected by oestrus number (Young et al., 1990b) or age (Brooks and Smith, 1980) at first mating, with Aumaitre et al. (2000) reporting a decrease in annual breeding herd productivity when gilts were mated at their second or third oestrus. In addition to the contradictory results described, these studies did not separate the confounding

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