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Efficacy of Once (1x) Versus Twice (2x) Daily Physical or Fence-line Contact with Boars for Stimulating Earlier Puberty in Gilts

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Summary and Implications

The effectiveness of twice daily (2x) versus once daily (1x) boar exposure (BE) and the possible interaction of frequency of BE and type of BE (physical, PBE, versus fence-line, FBE) for stimulating earlier puberty in gilts was evaluated. Gilts (n=120) from the R-LS line of the gene pool herd at the University of Nebraska-Lincoln were, within litter, assigned randomly to two frequencies of BE (1x versus 2x per day) and two types of BE (PBE versus FBE) plus one additional treatment where gilts were maintained in continuous fence-line contact with boars (CFBE). Treatments were initiated when gilts in each replicate reached 160 days of age. Duration of BE for 1x and 2x BE was 10 minutes per exposure. Two sets of three White Line boars (10 months of age at start) were used to stimulate the gilts. Gilts were maintained in groups of eight per pen and were taken to the boar room for stimulation. Physical boar exposure induced a more rapid and more synchronous first estrous response than FBE. The average interval to first estrus after initial BE was shorter (20.2 versus 29.7 days, $P < .01$) and age at puberty occurred 8.8 days earlier ($P < .02$) in PBE than FBE gilts. Interval to first estrus tended to be shorter in gilts

receiving 2x versus 1x contact with boars (21.5 versus 28.4 days, $P < .08$). Puberty also tended to occur earlier in gilts receiving 2x versus 1x BE (182.8 versus 191.1 days, $P < .06$). Interval to estrus and age at puberty in gilts subjected to CFBE did not differ from the other FBE treatments but were increased compared to gilts receiving PBE. Physical BE is required to achieve maximal pubertal response to boar exposure. Added frequency of BE (2x versus 1x per day) tended to decrease pubertal age overall, but it appears the greatest effect of increasing the frequency of boar exposure occurs when gilts are being stimulated with FBE.

Introduction

Evaluation of the influence of frequency of contact with boars on the efficacy of boar exposure (BE) for stimulating earlier puberty in gilts has demonstrated BE frequencies of less than once daily decreased the effect. In Nebraska studies, providing boar contact on alternate days produced comparable pubertal responses to once daily BE when applied to gilts starting at 130 days of age, but was less effective than once daily BE when imposed at 160 days of age. Australian researchers have reported the effect of boars on puberty attainment was reduced when applied at less-than-once-daily frequencies. More recently, Australian researchers reported two or three contacts per day, induced earlier puberty than once daily contact. In gilts responding be-

fore termination of their experiment (70% pubertal/group), puberty was achieved 5.7 days and 12.8 days earlier in gilts provided twice per day and three times per day physical contact with boars compared to gilts receiving once daily BE (196 day average). The objectives of the present experiment were to: (1) evaluate the effectiveness of twice-daily versus once-daily boar exposure for stimulating earlier puberty in gilts, and (2) determine whether the pubertal response to frequency of BE differs with type of BE provided (fence-line, FBE, versus physical boar exposure, PBE).

Materials and Methods

One-hundred twenty gilts from the R-LS line of the gene pool herd at UNL were assigned randomly within litter to a replicated (3 pens per treatment of 8 gilts per pen) factorial experiment involving two frequencies of BE (once, 1x, versus twice, 2x, daily) and two types of BE (FBE versus PBE). An additional group was maintained in continuous fence-line contact with boars (CFBE). Treatments were initiated when gilts in each replicate reached 160 days of age. Gilts were bled for progesterone determinations 7-10 days before and at the start of treatment to determine ovarian status. Gilts with elevated progesterone were deleted from the study. Duration of BE for once daily and twice daily BE was 10 minutes per exposure.

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Boar exposure and heat detection (10 minutes duration) were accomplished by moving gilts from their home room (rooms housing gilts on once and twice daily BE treatments) into contact with boars housed in the CFBE room. Gilts assigned to the CFBE room were relocated to another room before each session of once daily or twice daily BE. Two sets of three White Line (WL) boars (10 mo) were maintained in fence-line contact with pens of CFBE gilts. FBE gilts were placed in a pen adjacent to a pen of boars and received contact with boars for 10 minutes through a 16 foot pen divider equipped with vertical open bars (4 inch spacings). Boars from each set were distributed individually to pens on alternate days before PBE gilts were brought to the CFBE room. Each pen of PBE gilts was placed in a pen with a single boar for 10 minutes. Gilts were observed closely for symptoms of estrus during the first 5 minutes and estrous gilts were removed from the pen as soon as observed to prevent unwanted matings and keep boars actively working other gilts in the pen. Each set of boars was rotated daily between the two boar pens to insure that all gilts received exposure to different boars on alternate days. CFBE gilts were returned to their home pens and heat checked once daily for a 10 minute period. This typically occurred after a 90 minute to 2 hour period away from boars.

Results and Discussion

Physical boar exposure, especially twice daily exposure, induced a more rapid and synchronous first estrous response than FBE. Fifty-four percent of PBE_{2x} gilts expressed pubertal estrus during the first 10 days of BE. This compared to 27.3 percent, 21.7 percent, 17.4 percent and 13.6 percent for the PBE_{1x}, FBE_{2x}, CFBE and FBE_{1x} groups, respectively (Figure 1). PBE_{1x} gilts showed the greatest first estrous response during the second 10-day period (45.4%) and had achieved a comparable estrous response to PBE_{2x} gilts by 20 days after initiation of BE.

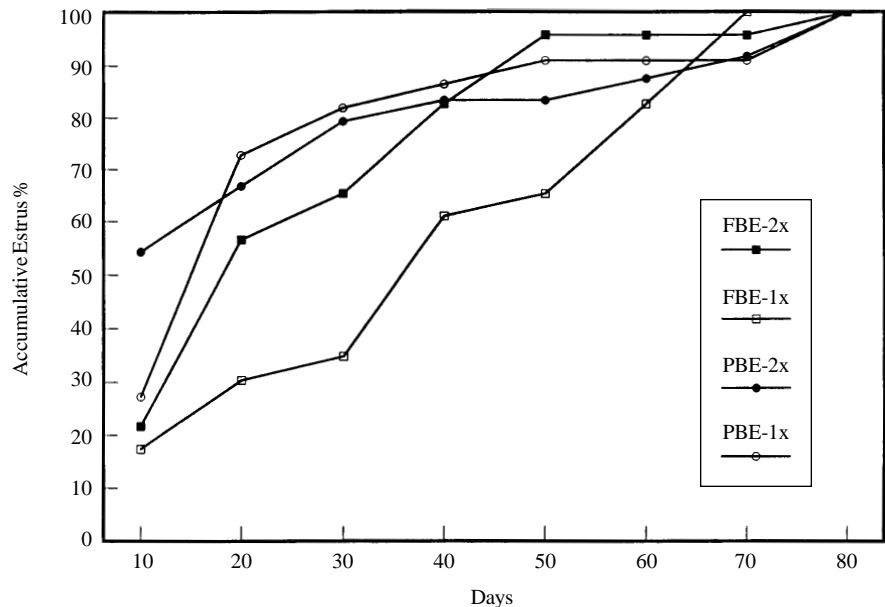


Figure 1. Accumulative estrous response (%) by 10-day intervals from initial boar exposure at 160 days. FBE - 2x = fence-line boar exposure twice per day; FBE - 1x = fence-line boar exposure once per day; PBE - 2x = physical boar exposure twice per day; PBE - 1x = physical boar exposure once per day.

PBE gilts maintained a substantial advantage in first estrous percentage over FBE gilts during the first 30 days of BE. After 30 days of BE, FBE_{2x} gilts achieved a cycling rate comparable to PBE gilts and maintained an advan-

tage over FBE_{1x} gilts through 50 days of BE (Figure 1). After initial BE, the average interval to first estrus was shorter for PBE gilts than FBE gilts (20.2 versus 29.7 days, $P < .02$) and tended to be shorter for gilts exposed to boars twice daily versus once daily (21.5 versus 28.4 days, $P < .08$, Table 1). FBE_{2x} gilts expressed first estrus faster on average than FBE_{1x} gilts (23.4 versus 36.0 days, $P < .01$). CFBE gilts responded similarly to FBE_{1x} gilts (average interval, 31.9 days).

Both type and frequency of BE affected mean age at puberty (Table 2). PBE gilts reached puberty 8.8 days earlier ($P < .02$) than FBE gilts and gilts provided twice daily BE expressed first estrus 8.3 days earlier ($P < .06$) than gilts provided once daily BE. Average pubertal age in CFBE gilts (192.8 days) was comparable to that produced with once daily FBE (197.9 days). Although no statistically significant interactions between type and frequency of BE were detected for any of the responses measured, they suggest that further evaluation of interaction effects is warranted. While the pubertal response to FBE_{2x} was neither as rapid nor synchronous as responses to PBE, the treatment achieved

Table 1. Interval to estrus (average \pm SE, days) after initiation of boar exposure (BE)

| Type of BE ^a | Frequency of BE | | |
|-------------------------|-----------------|-------------------|-------------------|
| | 1x/d | 2x/d | Combined |
| FBE | 36.0 \pm 3.9 | 23.4 \pm 3.9 | 29.7 |
| PBE | 20.9 \pm 4.0 | 19.6 \pm 3.8 | 20.2 ^b |
| Combined | 28.4 | 21.5 ^c | |

^aFBE and PBE = Fence-line and physical boar exposure, respectively.

^bFBE versus PBE, $P < .02$.

^c1x versus 2x per d, $P < .08$.

Table 2. Age at puberty (average \pm SE, days) as affected by type and frequency of boar exposure (BE)

| Type of BE ^a | Frequency of BE | | |
|-------------------------|-----------------|--------------------|--------------------|
| | 1x/d | 2x/d | Combined |
| FBE | 197.9 \pm 4.0 | 184.9 \pm 4.0 | 191.4 |
| PBE | 184.3 \pm 4.0 | 180.8 \pm 3.9 | 182.6 ^b |
| Combined | 191.1 | 182.8 ^c | |

^aFBE and PBE = Fence-line and physical boar exposure, respectively.

^bFBE versus PBE, $P < .02$.

^c1x versus 2x per d, $P < .06$.



a similar interval to first estrus and similar age at puberty as expressed by PBE gilts. In contrast, under the conditions of this experiment, FBE_{1x} and CFBE were clearly less effective in inducing a rapid and synchronous first estrous response in gilts.

Physical BE, as previously demonstrated in Nebraska studies and elsewhere, was clearly more efficacious than FBE for stimulating earlier puberty in gilts. Frequency of BE had a less consistent effect but twice daily BE tended to be more effective than once daily BE. Although the interactions between type and frequency of BE were not significant, the data suggests frequency of BE may be less of a concern with PBE than with FBE. The poor pubertal response achieved with CFBE was surprising and may suggest the mechanism triggering pubertal estrus in response to BE is more sensitive to shorter and more frequent boar stimuli when applied on the fence-line. This seems to be the situation regarding estrus expression by mature cycling gilts, which show a higher and more rapid estrous response when housed away from boars and provided a new or novel boar stimulus to detect estrus. Future research will be conducted to confirm and expand these findings and determine whether age or stage of gilt maturation influences the response to type and frequency of boar exposure and their possible interaction.

Conclusion

Physical BE is required to achieve the maximal pubertal response to boar exposure. It is suggested, but not proven, that increasing the frequency of BE from once to twice per day offers little advantage when using PBE but may be important when using FBE. Questions remain regarding the relative ineffectiveness of CFBE in this experiment. It is important to confirm and expand these findings in the future.

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