RESEARCH ABSTRACT

ANIMAL SCIENCE

Title: Development of Strategies to Improve Sow Productive Lifetime – **NPB #11-111**

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Scientific Abstract:

A valuable indicator of female lifetime productivity is the age at which gilts achieve their first estrus. We have determined that follicular activity, as determined by tertiary follicle development, in pre-pubertal gilts begins during postnatal days (PND) 85-115. The central hypothesis of this study is that gilts demonstrating tertiary follicle development earlier in life are more likely to achieve puberty earlier compared to counterparts of a similar age and weight that lack tertiary follicle development. The objective of this project was to identify markers and specific time-points during pre-pubertal development that could be utilized as valid indices to predict age of first puberty. To accomplish this, 155 gilts of similar age (± 2 days) were weighed and blood drawn for plasma isolation on PND 75, 85, 95, 105 and 115. Circulating plasma kisspeptin levels were measured. Additionally, vulva width, length and area were recorded as proxies for estrogen activity. At each time point, 10 gilts were sacrificed and ovarian follicular activity was recorded. Estrus detection was conducted daily on PND days 126 to 200 for the remaining 105 gilts. Mean vulva area (VA) on PND 75, 85, 95, 105 and 115 was 596 ± 206, 683 ± 190, 864 ± 212, 1014 ± 228 and 1265 ± 252 mm^2, respectively. Of the gilts demonstrating behavioral estrus, 28 were within PND 140-160, 36 between PND 161-180, 15 between PND 181-200, while 26 did not demonstrate estrus within 200 days of age. All gilts euthanized at PND 75 lacked follicular activity as defined by having a minimum of two antral follicles per ovary, while 60%, 80%, 90% and 100% demonstrated follicular activity on PND 85, 95, 105, and 115, respectively, validating PND 75 to 115 as the approximate window for first follicular activity. Body weight at PND75 and vulva width at PND 115 were both correlated to age at first estrus ($P < 0.05$). Of those gilts whose VA was less than one standard deviation from the mean on PND 95 (i.e. < 652 mm^2), 31% and 50% demonstrated their first behavioral estrus by PND 180 and 200, respectively. However, of those gilts whose VA was within or greater than one standard deviation from the mean (i.e. ≥ 652 mm^2), 66% and 79% exhibited estrus prior to PND 180 and 200, respectively. These data suggest that utilization of VA changes between 95 and 115 days of age could be used as a tool to identify replacement gilts likely to achieve estrus at an early age.