RESEARCH ABSTRACT

ANIMAL SCIENCE

Title: Association of compositional traits and structural soundness with the ability of commercial line of sows to complete parities two and **three – NPB#06-031**
(A continuation of the original project titled: Association of compositional, structural soundness, and health with the ability of a commercial line of young sows to successfully complete parity one **(NPB#05-081)**

Investigator: Dr. Kenneth J. Stalder

Institution: Iowa State University

Date submitted: 23 - June - 2009

Scientific Abstract

The objective of this study was to estimate the phenotypic and genetic associations of gilt compositional and structural soundness traits with reproductive and longevity traits (longevity defined as the ability to complete the second and the third parity). The ultimate goal of this project is to analyze data gathered from commercial females until culling at the end of their productive life (or at least across five parities), in order to determine factors measured or evaluated early in a sow's life that are associated with superior sow productive lifetime.

The study involved in total 2064 commercial females from two genetic lines, but the number of available pedigree animals for the purposes of genetic analyses was 1447. Evaluated compositional traits included body weight, loin muscle area, last rib backfat and 10th rib backfat. Soundness traits consisted of six body structure traits (body length, depth and width, rib shape, top line and hip structure), five leg structure traits per leg pair (front legs: legs turned, buck knees, pastern posture, foot size and uneven toes; rear legs: legs turned, weak/upright legs, pastern posture, foot size and uneven toes) and overall leg action. Studied reproductive traits included cumulative total number born, number born alive and number weaned across three parities. Lifetime, herd days and removal parity were considered as longevity traits.

The summary statistics were conducted using SAS software. The least square means were calculated using PROC GLM and models used for variance component estimation were developed with PROC MIXED. PROC LIFETEST was used for phenotypic survival analyses. AI-REML and the DMU-package were used to estimate variance components using bivariate or multivariate animal models.

The total proportion culled or died before reaching fourth parity was 56%. Reproductive failure and leg problems were the most frequent culling reasons across the first three parities (16.0% and 7.4%, respectively). The median survival times were 529 herd days, 721 days of age or a mean removal parity of 2.5. The heritabilities of longevity traits were relatively low. At the time of removal females had farrowed on average 28.2 piglets of which 26.4 were born alive and they had weaned 21.3 piglets. Cumulative reproductive traits were low to moderately heritable.

Body weight was significantly associated with all longevity traits, but not with cumulative reproductive traits. Backfat measurements were significantly associated with removal parity and cumulative reproductive traits and loin muscle area was associated with herd days. Longevity and/or reproductive performance improved with lower gilt weight, greater backfat and greater loin muscle area. The heritability estimates for body composition traits were high. Slower growth rate, greater backfat and larger loin muscle area were also genetically associated with improved reproductive performance and longevity.

Body length, rib shape, buck knees, front foot size, weak / upright rear legs and overall leg action had significant phenotypic associations across reproductive and longevity traits. Slightly shorter body than average and more shaped ribs appeared favorable. For leg structure traits, the most extreme inferior scores seemed detrimental regarding longevity and reproduction. The heritabilities were low to moderate for body structure and relatively low for leg traits. A favorable genetic trend was observed in the associations of body structure with reproductive and longevity traits. Body length and rib shape had significant genetic associations with reproduction and longevity; females with shorter body and more shaped ribs farrowed and weaned more piglets and remained longer in the herd. Furthermore, greater body width was significantly associated with improved longevity. Upright rear legs had significant favorable correlations with reproductive performance and longevity.