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Evaluation of the effects of age at first farrowing, weaning age, and days open on reproductive performance

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Abstract

Accurate genetic evaluation must account for as much environmental-management variation as possible. Past studies have indicated that first parity litter size can increase as age at farrowing is increased. Other studies indicate that if first parity gilts are allowed to skip one estrous cycle, second parity litter size can be increased. Additional data also has indicated that weaning pigs less than 17 days of age can affect litter size of the following litter. Based on these results, farrowing records were analyzed to evaluate the effects at age of first farrowing, weaning age, and days from weaning to successful breeding on sow farrowing performance.

Materials and Methods

Farrowing records were obtained from four large independent seedstock suppliers. Data were edited to include records with farrowing intervals between 119 and 175 days, age at first farrowing between 275 and 400 days, weaning age from 5 to 34 days, and days from weaning to successful breeding from 0 to 60 days. After editing, 21,300 records remained.

Farrowing performance records for number born alive, number weaned adjusted for number after transfer (a measure of preweaning survival), and 21-day litter weight were evaluated. The records were first analyzed for known sources of variation including farm, service sire breed-dam breed combination, parity within farm and dam breed, and contemporary group defined as a month of time on a farm. The remaining within-contemporary group variation was fit to linear and quadratic effects of age at first parity for parity one records, and weaning age and days from weaning to breeding of the subsequent litter for multiparous records.

Equations were developed to adjust for the effects of age at first farrowing, weaning age, and days from weaning to breeding. The equations were developed to adjust data to the overall mean of each variable: 350 days of age at first farrowing, 20 day weaning age and nine days from weaning to successful breeding.

Results

The resulting prediction equations are presented in Table 1. Number weaned adjusted for number after transfer was not affected by any dependent variable evaluated. Age at first farrowing had a significant linear and quadratic response on both number born alive and 21-day litter weight. Weaning age and days from weaning to successful breeding were significant only for number born alive for parity two and parity three females. The regression coefficients were larger for parity two than parity three. Weaning age and days from weaning to successful breeding were not significant for sows of parity four or greater. Although statistically significant, the dependent variables only account for 1.5 to 2.0% of the remaining variation for number born alive and 21-day litter weight.

The adjustment equations are presented in Table 2. The adjustment for age at first farrowing is .49 pigs and 6.40 lbs. of 21-day litter weight with 280 day age at first farrowing, versus zero adjustment at 350 day age of first farrowing.

For parity two, the adjustment for an early weaned litter (14 days) and rapid three day weaning to rebreeding interval is .237. The adjustment for a later weaned litter (28 days) and longer interval from weaning to breeding (25 days; i.e., second estrus breeding) is -.47. Thus, the number born alive performance will be increased for sows with shorter farrowing intervals (greater litters/sow/year) and decreased for sows with longer farrowing intervals. With the adjustments, selection for number born alive should be phenotypically independent of weaning age and farrowing intervals. Overall, the adjustments are smaller for parity three than for parity two.

Further research with detailed breeding and farrowing records is needed to refine the analysis. As with all field records, the possibility of confounding, management preferences and unintentional correlated responses exist. For example, first parity gilts weaning heavy litters (150 lbs. with 12 pigs or more) may require additional days from weaning to successful breeding either via delayed cycling days from weaning to first estrus or lower first estrus conception rates. Another possibility is that the herdsman observing the low condition of the parity 1 gilt has decided to skip breeding for one estrous cycle. Also with field records, culling is always being done based on performance level achieved (voluntary culling) and ability to rebreed rapidly (nonvoluntary culling). Additional research should be completed which evaluates the heritability of traits related to ability to cycle and conceive such as age at first farrowing and days from weaning to successful breeding.

Table 1. Regression equations.

Parity 1 (N = 9019)

Number born alive = 2.272 + (.0335 * age at farrowing) - .00004198 * (age at farrowing)^2)

21-day litter weight = 19.49 + (.3827 * age at farrowing) - (.0004624 (age at farrowing)^2)

Parity 2 (N = 5916)

Number born alive = 8.472 + (.021065 * weaning age) + (.018686 * days from weaning to successful breeding)

Parity 3 (N = 4939)

Number born alive = 9.513 + (.00533 * weaning age) + (.01180 * days from weaning to successful breeding)

Table 2. Adjustment formulas.

Parity 1

Adjustment for number born alive = 6.582 - (.0335 * age at farrowing) + .00004198 * $(\text{age at farrowing})^2$)

Adjustment for 21 day weight = 77.31 - (.3827 * age at farrowing) + (.0004624 * $(\text{age at farrowing})^2$)

Parity 2

Adjust for NBA = .589 - (.0211 * weaning age) - (.01869 * days from weaning to successful breeding)

Parity 3

Adjust for NBA = .2142 - (.00533 * weaning age) - (.0118 * days from weaning to successful breeding)