

Relationship Between Purebred and Crossbred Performance for Number Born Alive and Number Born Dead

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Summary and Implications

The purpose of this study was to estimate the relationship between purebred and crossbred sow reproductive performance. The relationship between purebred and crossbred performance is the foundation of all successful breeding programs. The heritability estimates for all traits ranged from 0.11 to 0.22. The estimated genetic correlations (standard error) for NBA and NBD between the first parity at the nucleus level and parities 2 and greater at the commercial level were 0.98 (± 0.20) and 0.40 (± 0.22), respectively. The results of this study indicate that a relationship between purebred and crossbred performance exists. Thus, selection on purebred individuals may result in improvement in crossbred performance.

Introduction

The breeding objective for a swine nucleus selection program is to improve crossbred commercial performance. Most genetic improvement programs are based on an assumed relationship between purebred performance in a nucleus herd and their relatives' crossbred performance in a commercial herd. Since nucleus animals have fewer parities to shorten the generation interval and longevity is important at the commercial level, it is important to analyze the relationship between purebred parity 1 performance and crossbred parity 2 and greater performance. The objective of this study was to examine the relationship between purebred and crossbred reproductive performance using number born alive and number born dead as the reproductive traits of interest.

Materials and Methods

For this analysis, 28,542 records from 11,506 purebred sows and 49,475 records from 12,897 crossbred sows were evaluated. Purebred sows were from a Landrace pure line, and the crossbred sows were F1 offspring from a cross between a Landrace pure line and a Large White pure line.

Pedigree information for at least three generations was known for each individual with performance records. Number born alive and number born dead records from parity 1 one were considered to be different traits than records from parities 2 and greater. The analysis model for the parity 1 traits included age at first farrowing as a linear covariate and contemporary group as a fixed effect. The fixed effects in the analysis model for the parity 2 and greater traits included parity and contemporary group. All models included a random animal effect, and a permanent environment effect was fitted for the repeated records. Variance component estimates and correlations were calculated using ASREML (VSN International, Hemel Hempstead, UK).

Results and Discussion

In addition to the difference in genetic composition of sows (i.e. purebred versus crossbred) in nucleus and commercial herds, there are differences in management practices between the two types of herds. Nucleus sows sometimes have fewer parities due to the desire to shorten the generation interval in order to increase the rate of genetic improvement. However, sow longevity is an economically important trait at the commercial level. Sows must remain in the herd for a sufficient number of parities to recover their initial gilt replacement and development costs. This does not allow for direct selection on longevity in the nucleus herd. If 1st parity reproductive performance is related to the reproductive performance at later parities, this would suggest that selection on nucleus animals after only 1 or 2 parities can have a positive impact on crossbred performance in later parities.

The heritability estimates for all traits ranged from 0.11 to 0.22. The estimated genetic correlation (\pm SE) for NBA and NBD between the first parity at the nucleus level and parities 2 and greater at the commercial level were 0.98 (± 0.20) and 0.40 (± 0.22), respectively. These results indicate a desirable relationship between purebred performance in a nucleus herd and crossbred performance in a commercial herd. Based on these results, it is possible to make substantial genetic improvement in crossbred performance when selection is only on purebred performance.