

Number Born Alive Accuracy Changes Based on the Number of Crossbred Records Included for Large White and Landrace Breeding Value Estimation from a Large Seedstock Supplier

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Summary and Implications

Data from a large pig breeding company which included number born alive records from company nucleus farms, company multiplier farms, customer-owned daughter nucleus farms, and customer-owned closed herd commercial farms were used to estimate breeding values and prediction accuracies of selection for purebred Landrace and Large White females. Prediction accuracies when breeding values were estimated using purebred information only and purebred and crossbred information were compared for three customer-owned commercial herds with pedigree information on more than 70% of their Landrace/Large White crossbred females. Change in accuracy and Pearson correlations with and without crossbred daughter records were calculated for active purebred sows. Estimates were given according to the number of additional daughter records obtained when crossbred records were included in breeding value estimation. Change in accuracy increased from 0.001 to 0.23 when 0 and >20 daughter records were included, respectively. Pearson correlations between accuracy estimates decreased from 1.00 to 0.71 when 0 and >20 daughter records were included, respectively. Results suggest that the inclusion of crossbred daughter records increases selection accuracy in purebred sows and that this could impact selection and mating decisions to improve genetic progress at the commercial level.

Introduction

Swine breeding companies utilize purebred performance records to estimate breeding values by traditional quantitative methods. Some breeding companies have access to crossbred progeny performance records from customer-owned herds and can include these in breeding value estimations. Because the breeding goal for maternal seedstock suppliers is improvement in the first generation (F_1) Landrace/Large White female, these crossbred progeny records can be used to enhance breeding value estimation in purebreds. Increased selection accuracy, which results in improved genetic progress, can be obtained by increasing the number of records for an individual or its relatives. The

objective of this study was to estimate the change in prediction accuracy for purebred Large White and Landrace animals when using field data from crossbred progeny for numbers born alive.

Materials and Methods

Data were obtained from a large pig breeding company and consisted of 603,606 sow records on number of piglets born alive, of which 319,253 were purebred sow records. This included records from company nucleus farms, company multiplier farms, customer-owned daughter-nucleus farms, and customer-owned closed herd commercial farms. Breeding values and prediction accuracies for number born alive were estimated for all animals using best linear unbiased prediction. The number of purebred Landrace and Large White sows in the dataset was 78,619, of which 17,147 were company owned and 49,899 were customer owned. The percent of purebred sows with pedigree information was 99% in company nucleus herds, 87% in customer-owned daughter-nucleus herds, 87% in customer-owned closed herds, and 45% in company multiplier herds. The number of crossbred sows in the dataset was 72,704, of which 34% had pedigree information. Pedigree information is necessary to be able to use crossbred sow records in purebred sow breeding value estimation. Therefore, three customer-owned herds with pedigree information from more than 70% of their F_1 crossbred sows were used for accuracy comparisons. Change in accuracy and Pearson correlations between accuracy estimates with and without crossbred daughter records were calculated for active purebred sows.

Results and Discussion

For sows with 0 daughter records, the increase in accuracy was 0.001 ± 0.001 (Figure 1); and the correlation between accuracy estimates was 1.00. The increase was likely due to added pedigree information. For sows with 1–9 crossbred daughter records, the increase in accuracy was 0.09 ± 0.04 when F_1 daughter records were included; and the correlation between accuracy estimates was 0.59. The increase in accuracy for sows with 10–19 crossbred daughter records was 0.16 ± 0.04 , and the correlation between accuracy estimates was 0.40. For sows with >20 crossbred daughter records, the increase in accuracy was 0.23 ± 0.03 with a correlation between accuracy estimates of 0.71. These results suggest that including crossbred daughter records increases the selection accuracy in purebred sows with daughter litter records in commercial systems which are raising their own purebred females. The

magnitude of this increase in accuracy implies that the potential exists to impact selection and mating decisions, resulting in increased genetic progress in F₁ crossbred females.

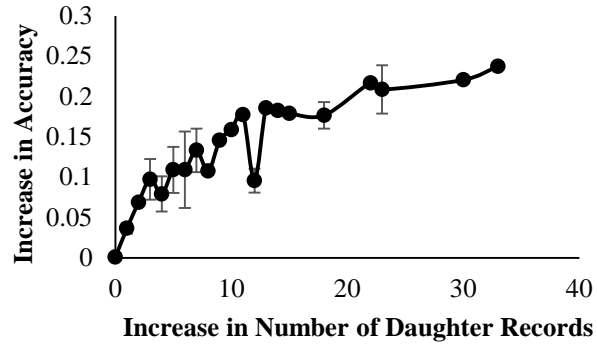


Figure 1. Average increase in accuracy (means \pm SD) by the increase in the number of daughter records when crossbred records are included in the estimation of breeding values on purebred sows in customer-owned commercial herds with pedigree information on more than 70% of Landrace/Large White crossbred females