Sow weight development: a pragmatic approach to crossbred and selection populations

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Feed used for maintenance in sows is around 1% of their live weight, and a 10 kg higher sow body weight from 1st lifetime insemination onwards requires 36.5 kg extra feed for maintenance annually, which increases the feed cost for a 1000 sow operation unit by approximately $15,000 CAD per year. Genetic selection, through emphasis on feed efficiency, changes body development year after year. Phenotypic sow development should allow for adequate litter weight, litter size and longevity for an optimum lifetime production. In this study we want to get a grip on sow mature weight and its variation.

Sow weights (n=14,554 of 5,292 sows) around farrowing and litter weights were collected on two crossbred and one purebred farm with industry accepted feeding protocols, that is, limited feeding at the different stages of production. Sow weights were corrected for stage of gestation and realized litter weights to represent empty body weight at the day of farrowing. Weight at the age of first insemination was added. When estimating genetic parameters, the statistical model for sow weight included, in addition to *Line* and *HerdYearSeason,* a rate parameter as a covariate (b_1*AGE $^{-1}$) within *Farm*. A bivariate analysis applying a repeatability model for the weight of purebred and crossbred animals yielded similar heritabilities (h^2 = 0.58 ± 0.05 and h^2 = 0.55 ± 0.05, for purebred and crossbred, respectively), and highly relevant genetic variances (335 ± 40 and 166 ± 13 kg^2) with a clearly positive, but not significant genetic correlation of 0.49 ± 0.46. The (random) effect of a permanent environment was not significant for either characteristic.

A second analysis in which genetic parameters were estimated simultaneously for the plateau and the rate parameter showed that genetic selection based on the repeatability model for weight only, affected both the plateau and the rate parameter. Only crossbreds were included in this analysis because the minimum required weight observations per sow were not met for purebred animals.

Selection for mature weight might affect other key traits. The phenotypic correlations between the EBVs for the weight of crossbred sows and litter weight, litter size and longevity were -0.15, -0.02 and +0.02, respectively. Genetically heavier or smaller animals do not have better production with heavier ones possibly having slightly lower performance. However, if animals are treated as equally and uniformly as possible, it is reasonable to assume that genetically heavier animals use more feed for growth, instead of for reproduction, given equal feeding rations. Heritability estimates point to a clear genetic drive to weight development. This study shows the relevance of weight observations at nucleus level and the necessity to estimate genetic correlations with production traits.

Keywords: Sow mature weight; Quantitative genetics; Pigs