

# SELECTION FOR PLACENTAL EFFICIENCY IN SWINE

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## ABSTRACT

With the overall goal of increasing profitability by increasing litter size, two lines of pigs were divergently selected for four generations on an index of reproductive traits (n = 193 litters). The selection index (**SI**) included total born (**TB**), birth weight (**BW**) and placental weight (**PW**) and was designed to increase (**H** line) or decrease (**L** line) BW:PW (placental efficiency; **PE**). (Co)variance components were estimated for direct and maternal additive effects by using an animal model with MTDFREML procedures. Breeding values were estimated (**EBV**) for individual BW (n = 2,111), PW (n = 2,006), PE (n = 1,677), and SI (n = 1,677). Direct heritability estimates were 0.03, 0.25, 0.18, 0.11 and 0.08 for BW, PW, PE, SI, and TB, respectively. Genetic divergence was 20.7 g, 0.24, 0.11, and 0.07 pigs per generation for PW, PE, SI, and TB, respectively ( $P < 0.01$ ), but not significant for BW. Thus, PW and PE are susceptible to change by genetic selection; however, the genetic trend for TB unexpectedly was positive in the L line

The phase two objective was to evaluate correlated responses in conceptus development and placental function in these lines. Sows were remated within line to produce 50 generation-four litters for evaluation at d 30, 50, 70, 90, and 110 of gestation.

Fetal weight did not differ between lines from d 30 to 90, but was lower in H than L at d 110 ( $P = 0.02$ ). Crown-rump length did not differ between lines from d 30 to 70, but was longer in H than L at d 90 ( $P = 0.09$ ) and shorter at d 110 ( $P = 0.04$ ). PW did not differ between lines from d 30 to 90, but was lower in H than L at d 110 ( $P < 0.01$ ). PE did not differ between lines at any gestational age. These results suggest that in western breeds, a reduction in placental weight through selection is not accompanied by physiological changes to improve placental function and may result in decreased prenatal survival.

The farrowing data were used in phase three to determine factors influencing survival at farrowing (**FS**) and weaning (**WS**). These traits were considered traits of the piglet and scored 1 for piglets alive at those time points or 0 if dead. Estimates of direct heritability were 0.16 and 0.18 and of maternal heritability were 0.14 and 0.10 for FS and WS, respectively. Logistic regressions indicated BW, PW, their interaction, and TB can be used as predictors FS and WS. In the presence of BW, PE does not improve the prediction of survival. These results suggest possible selection for increased FS and WS. A piglet's BW, PW, its litter average BW, and the individual's deviation from that average can be used to produce piglets with high survival probability.