

# Organic pig breeding programs with limited trait registration should adopt genomic selection

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## Abstract

Organic pig producers rely on genetic materials from conventional breeding programs. However, a separate organic breeding program with intensive trait registration has been recommended. In this study we consider the same traits in conventional and organic breeding goals: growth rate from birth to 30kg, growth rate from 30-100kg, lean meat percentage, back and leg strength, feed efficiency, live piglets at 5days, slaughter loss and sow longevity. These traits differ in relative economic importance in the two breeding goals and the genetic correlation between the two breeding goals is 0.83. In addition, the organic farmers are also interested piglet mortality and number of functional teats. The current organic pig breeding herds are characterized by limited pedigree and performance trait registration. This makes it difficult to realize high response to selection. We envision that genomic selection (GS) could improve response to selection when phenotypic information is limited. GS will provide additional information source that can increase prediction accuracies and accurately estimate relationship between selection candidates. We used stochastic simulation to test this hypothesis. We compared economic and genetic gain per year and rate of inbreeding per generation realised in the traditional breeding scheme (TS) with limited phenotypes with GS scheme with intensive (GSI) and limited (GSL) genotyping intensities. The change in economic response per year realised were €1.59, €1.88 and €1.78 for TS, GSI and GSL, respectively. The GSI and GSL outperformed TS in genetic gain for individual traits. The GSI resulted to lower rate of inbreeding per generation 0.037 compared to 0.051 for TS and GSL. Our findings show that adoption of GS in organic pig breeding program with limited trait registration is beneficial.