

Implementation of Flow Cytometry to Assess the DNA Fragmentation Index in Young Boars – a practical experience from The Netherlands

Authors: Carolina L. A. Da Silva^a, Rodrigo M. Godinho^b

^aGlobal Male Reproduction Services, Topigs Norsvin; ^bTopigs Norsvin Research Center B.V., corresponding author

Detecting sub-fertile boars before use in artificial insemination (AI) is highly important for pig breeding and the AI business. Prediction of sub-optimal fertility may be possible using tests that can measure whether the chromatin structure, which is the genomic message the sperm cells deliver to the oocytes during fertilization, is intact enough to warrant the development of the early embryos. DNA of sperm cells with an abnormal chromatin structure is susceptible to denaturation *in situ*. The percentage of cells with abnormal chromatin and the extent of the abnormality can be detected using flow cytometry by the Sperm Chromatin Structure Assay (SCSA), and the estimation of the DNA Fragmentation Index (DFI, %). A total of 1,559 DFI measures were analyzed from 1,331 boars of 10 commercial lines between 2018 and 2023 during quarantine at Varkens KI Nederland. Using a GuayaEasyCyte®, Luminex Corporation flow cytometer, measurements were linked to CASA (Computer-Assisted Sperm Analysis) traits from 115,342 ejaculates throughout the production life of those boars, and further linked to field fertility traits such as farrowing rate and litter size from 287,620 litters from those same boars. DFI was on average 1.33 ± 1.26 . The heritability estimates for the log transformed DFI was 0.14 ± 0.05 . Genetic correlations were moderate and favorable with all CASA traits. In this extensive data set, DFI was not significant in the analyses of field fertility indicating that DFI is not a predictor of fertility. We hypothesize that given the medium heritability and favorable genetic correlations with all semen traits, this population of boars underwent indirect selection for low DFI, given the phenotypical selection for semen quality traits in the production of semen for AI doses.