379 ASAS-EAAP Talk: Precision Phenotyping using Infrared Spectroscopy to Improve the Quality of Animal Products. Alessio Cecchinato[1], sara Pegolo[1], Giovanni Bittante[1], [1]*DAFNAE - Department of Agronomy, Food Natural resources, Animals and Environment University of Padova*

There is an ever-growing interest in research oriented towards the improvement of quality of animal products. In this context, one major operational bottleneck is the possibility to collect quality indicators over the meat and dairy chains and for selective breeding purposes. The use of near-infrared (NIR) and the Fourier-transformed infrared (FTIR) spectroscopy techniques have been proven to be powerful precision phenotyping tools for high-throughput meat and milk quality assessment. Such technologies allow scoring large number of animals and/or derived-products for novel (predicted) phenotypes and indicator traits to set-up potential new payment systems and boost the genetic improvement. One important step in the use of NIR and FTIR tools is the definition of the "gold standard" as the infrared-based predictions could act only as indicators traits. Indeed, the definition of a robust calibration set, the assessment of repeatability and reproducibility of the reference (i.e., gold standard) as well as the detection of random and systematic errors are crucial steps. Once the reference phenotype has been defined, different statistical methodologies could be applied to infrared spectra data. For instance, the partial least squares regression (PLS) is a multivariate regression method commonly used to build up prediction models using NIR and FTIR spectra data. However, the implementation of advanced statistical approaches, such as Bayesian approaches and machine learning methods, might allow us to achieve more robust and accurate predictions. In this talk, we will describe and discuss some of the challenges and potentials of NIR and FTIR tools for large-scale precision phenotyping. Some examples include the use of NIR and Visible-NIR (Vis-NIR) for assessing meat quality parameters (also using portable instruments able to collect spectra directly from the muscle surface at the slaughterhouse) and the use of FTIR for predicting several traits related to fine milk composition and technological traits in dairy cattle.

Keywords: Precision livestock farming; near-infrared spectroscopy; Fourier-transformed infrared spectroscopy

378 Making-Do When Big Data Isn't Big Enough: Limitations and pathways of possible development in the prediction of Thoroughbred racing performance as a breeding outcome. Roger E. Lyons[1], [1]*President, Roger Lyons Consulting, Inc.*

A performance genetics model adapted to real-world data of Thoroughbred racing and breeding will be presented. The continuity of ancestry and performance is documented in the annals of pedigree, not as functional counterparts, but as corresponding signs of market value. Pedigree invites chronic misprision of highly diverse genetic resources competing for scarce opportunity in the racing economy, resulting in samples that are often small and of dubious composition. Data is specialized for competing "pedigree analysis" that packages the system of signification to meet market demand for meaning. Given statistical deficits, this data is a necessary inferential asset of the model. The model's premise is that predictability is optimized if racing performance is defined as the function of an indivisible relation between parents. Statistical data consists of 6-generation ancestries of mares that produced offspring by a subject stallion. Comparison of proportions is used to identify effects resulting from his relation to individual ancestors of the subject mare. Expected performance by the sire's offspring is defined as the proportion of mares that produced a superior runner by him. Each ancestor of a subject mare also has descendants among the mares that produced offspring by the stallion. For each of those groups, the proportion of mares that produced a superior runner is compared with the stallion's expected performance using a t-test of statistical significance at the .10 level. Probable effect is further tested by case study involving such variables as racing class, generational distance, sex-linkage, inbreeding, and an ancestor's pattern of effect across the stallion population. Stallions with the highest prevalence of positive effects are preferred for the subject mare. This model, under the trade name LyonScore®, has been used since 2012 by Werk Thoroughbred Constultants, Inc. as a component of its client services.