Session 3: Breeding for Resilience to Climate Change: Adaptation strategies.

S03.O-05

PREDICTION OF HEAT STRESS STATUS BY INFRARED SPECTROSCOPY IN DAIRY SHEEP

Manuel Ramon[1], Clara Diaz[2], María Jesús Carabaño[3].

[1]CERSYRA-IRIAF, Valdepeñas, Spain; [2]INIA-CSIC, Madrid, Spain; [3]CSIC-INIA, Madrid, Spain.

Advances in high-throughput phenotyping using Fourier-transform infrared spectroscopy (FTIR) offer the opportunity to efficiently measure new traits on a large scale that can be exploited in breeding programs as indicator traits. As new traits, the definition of phenotypes to improve the adaptation of animals to heat stress events is gaining interest within the context of Climate Change. Thus, in this work we evaluate the suitability of using FTIR to predict whether an animal has been exposed to a heat stress event. Milk samples from 305 ewes from the same flock were collected in two seasons: comfort (spring) and summer (hot season). Fourier-transform infrared spectra were collected on the same day as milk sampling and consisted of the transmittance values measured at 1,060 wavenumbers ranging from 5,011 to 925 (cm^{-1}). A quality control analysis using principal components analysis in the FTYR spectra was carried out in order to remove outliers. After QC, a PLS-DA analysis was conducted to evaluate if we were able to discriminate between both conditions, comfort and heat stress. The results showed a high discrimination capacity between ewes under comfort and ewes under heat stress. The variability observed within the group of samples analyzed under comfort was significantly lower than that observed for the group of samples analyzed under heat stress. This would indicate that while exposure to heat stress events produces physiological changes in the animal that are reflected in the composition of the milk, these changes are not the same in all animals. A detailed study of the regions of the spectra in which large variability among individuals was observed could provide insight into the metabolic pathways involved in the heat stress response. Also, the results open the possibility of considering the use of infrared spectroscopy as a breeding tool. For this, a more detailed study of the individual variability of spectra under heat stress would be necessary.