THE EFFECT OF THE REPEATABILITY FILE IN THE NIRS FATTY ACIDS ANALYSIS OF ANIMAL FATS

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Previous works have shown the viability of NIRS technology for the prediction of fatty acids in Iberian pig fat, but although the resulting equations showed high precision, in the predictions of new samples important fluctuations were detected, greater with the time passed from calibration development to NIRS analysis. This fact makes the use of NIRS calibrations in routine analysis difficult. Moreover, this problem only appears in products like fat, that show spectrums with very defined absorption peaks at some wavelengths. This circumstance causes a high sensibility to small changes of the instrument, which are not perceived with the normal checks. To avoid these inconveniences, the software WinISI 1.04 has a mathematic algorithm that consist of create a "Repeatability File". This file is used during calibration development to minimize the variation sources that can affect the NIRS predictions.

The objective of the current work is the evaluation of the use of a repeatability file in quantitative NIRS analysis of Iberian pig fat. A total of 188 samples of Iberian pig fat, produced by COVAP, were used. NIR data were recorded using a FOSS NIRSystems 6500 I spectrophotometer equipped with a spinning module. Samples were analysed by folded transmission, using two sample cells of 0.1mm pathlength and gold surface.

High accuracy calibration equations were obtained, without and with repeatability file, to determine the content of six fatty acids: miristic ($SECV_{without}$=0.07% $r^2_{without}$=0.76 and $SECV_{with}$=0.08% r^2_{with}=0.65), palmitic ($SECV_{without}$=0.28 $r^2_{without}$=0.97 and $SECV_{with}$=0.24% r^2_{with}=0.98), palmitoleic ($SECV_{without}$=0.08 $r^2_{without}$=0.94 and $SECV_{with}$=0.09% r^2_{with}=0.92), stearic ($SECV_{without}$=0.27 $r^2_{without}$=0.97 and $SECV_{with}$=0.29% r^2_{with}=0.96), oleic ($SECV_{without}$=0.20 $r^2_{without}$=0.99 and $SECV_{with}$=0.20% r^2_{with}=0.99) and linoleic ($SECV_{without}$=0.16 $r^2_{without}$=0.98 and $SECV_{with}$=0.16% r^2_{with}=0.98). The use of a repeatability file like a tool to reduce the variation sources that can disturbed the prediction accuracy was very effective. Although in calibration results the differences are negligible, the effect caused by the repeatability file is appreciated mainly when are predicted new samples that are not in the calibration set and whose spectrum were recorded a long time after the equation development. In this case, bias values corresponding to fatty acids predictions were lower when the repeatability file was used: miristic ($bias_{without}$=-0.05 and $bias_{with}$=-0.04), palmitic ($bias_{without}$=-0.42 and $bias_{with}$=-0.11), palmitoleic ($bias_{without}$=-0.03 and $bias_{with}$=0.03), stearic ($bias_{without}$=0.47 and $bias_{with}$=0.28), oleic ($bias_{without}$=0.14 and $bias_{with}$=-0.04) and linoleic ($bias_{without}$=0.25 and $bias_{with}$=-0.20).