Galoá

Book of Abstracts

# DETERMINATION OF GEOMETRIC MEAN DIAMETER OF CORN PARTICLE THROUGH NEAR INFRARED SPECTROSCOPY (NIR)

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**Track**

8. Agriculture and food

The volume of corn used in the Brazilian swine and poultry production systems is 36 million tons per year. For animal feeding purpose corn is processed and as a result of the grinding process, the particle size, expressed as geometric mean diameter (GMD) may vary from 300 to 1100 µm, approximately, influencing the technical and economic performance of swine and poultry. Therefore, the supply of corn with specific GMD can contribute to improve livestock productivity. However, conventional methodology for determining the corn GMD does not show the speed needed to enable monitoring GMD, in real time with the grinding process. This study was carried out to develop and validate a rapid methodology by spectroscopy in the near infrared (NIR), to predict the GMD of ground corn. Fifteen batches of corn grain, were processed through a hammermill using sieves with openings of different holes, in order to produce 69 samples of ground corn. These samples were evaluated for GMD through two methods: 1) Conventional Method: sieving the milled corn sample through a set of sieves (ABNT), overlapping in increasing size of opening holes, namely plate, 0.149, 0.297, 0.595, 1.190, 2.000, and 4.000 mm, and the GMD calculated through mathematical equations, from the percentage of sample retained in each sieve; 2) Methodology with NIR technology, developed from the study of relationships between spectra obtained by reading the samples of ground corn in NIR equipment, and their GMD values measured with conventional methodology. Of the 69 samples of ground corn, 49 were used to establish the calibration equation, and the remaining 20 samples were used for external validation of the equation. The spectra were obtained in 6500 NIRSystems equipment (FOSS NIRSystems, Silver Spring, MD), the equation was generated with the software WinISI III (Infrasoft International LLC, Silver Spring, MD, USA) using the template of Principal Component Analysis (PCA ) for selecting samples, and the statistical model (Modified Partial Least Squares) was used for the calculation of the calibration equation. SNV & Detrend

model was used for pre-processing of data, and the mathematical treatment was performed with 1,4,4,1 model for the first derivative, gap, smooth and smooth2. The equation was generated for spectra obtained by diffuse reflectance in the wavelength range 1100 to 2500 nm. For the 69 samples of corn GMD varied from 320 to 1101 µm (mean = 640 µm). The statistical parameters for the calibration equation: R2 = 0.96, SEC = 41, VR-1 = 0.85, and for the validation of this equation: R2 = 0.89, SEP = 71, bias = -1.40, allow us to conclude that the methodology developed in this study with NIR technology can be used to estimate the GMD of milled corn with good precision in real time with the grinding process.