Application Note
July 2017

Model Tailoring with the F750
The preferred method for transferring models between instruments

The ability to transfer a model from one instrument to another is a critical requirement for many F-750 users. Simply loading a pre-built model from a F-750 onto a second F-750 may lead to a bias in prediction. This bias is caused by the subtle differences in the manufacturing of the F-750 and of the spectrometer. This bias can be overcome by combining just a few scans of fruit from the new F-750 with the original F-750 model. When this process is applied to one of our starter models, it is referred to as "**Model Tailoring**" and as demonstrated herein, results in a near perfect model transfer. complete process is outlined in the F-750 Tailoring Models document found on the Felix website.

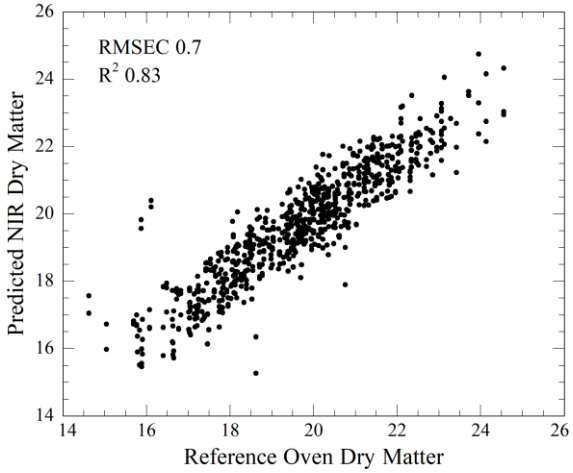
Materials and Methods:

Figure 1. Fruit presentation for measuring whole cherries with the F-750.

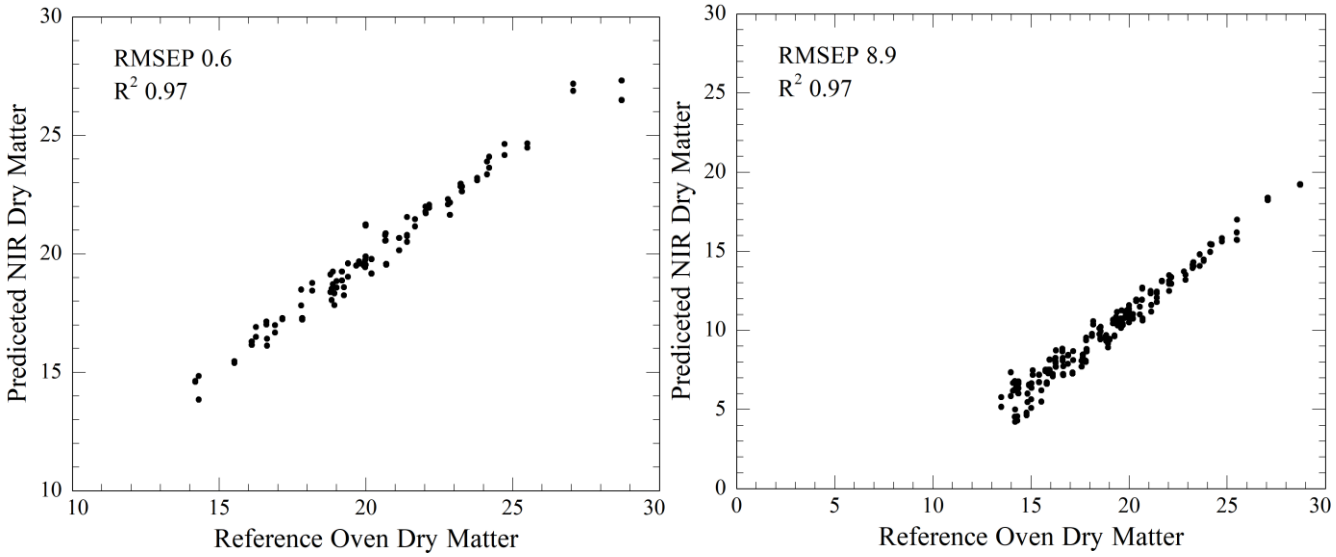
In March 2017, Agriculture and Agri-food Foods Canada shared a Cherry Starter Model with Felix Instruments. In July of 2017, two lots of cherries from Hood River, Oregon were used to test the F-750 Model Tailoring procedure. The first lot of 50 Lapin cherries was used as the initial tailoring set. The second lot of 88 Leo cherries were used to validate that the tailoring process was successful. As shown in figure 1, whole cherries were scanned twice on a single side. The side of the cherry that was scanned was then cut away for Dry Matter analysis in a conventional dehydrator oven following the standard operating procedure found on the Felix website.

Results and Discussion:

By combining the starter cherry model with 50 dry matter values and spectra from a second F-750, the model was tailored to properly separate differences in the spectral response of the instruments and the fruit. A strong correlation existed between spectral data and collected reference values, with a model prediction R^2 of 0.92 for Dry matter. Figure 2 Left displays this correlation and demonstrates the consistency of measurements after model tailoring. Figure 2 right displays that without model tailoring there is a bias in the predicted values of the F-750 after model transfer.



The Root Mean Square Error of Prediction (RMSEP) for the independent validation of lot 2 was of +/- 0.6 Dry Matter with model tailoring and +/- 8.9 Dry Matter without model tailoring. This illustrates the accuracy of the model tailoring method. The RMSEP is equivalent to the expected Standard Deviation (SD) of errors.



Conclusions:

Model files can be transferred between F-750 Produce Quality Meters by following the F-750 Model Tailoring process found on the Felix website. This is a fast and reliable method for accurately deploying a single calibration to multiple F-750s. In the case of tailoring the Cherry Stater model supplied of AAFC for local cherries from Hood River Oregon, it was found that the new calibration with model tailoring predicted the Dry Matter of Cherries with an R^2 of 0.97 and an expected error of +/- 0.6 DM.

For more information about commodities tested with the F-750, visit www.felixinstruments.com.

Model Provided by Agriculture and Agri-Food Canada Published in:
Development of a predictive model for 'Lapins' sweet cherry dry matter content using a visible/near infrared spectrometer and its potential application to other cultivars. Dr. Peter Toivonen, Mr. Adrian Batista, Ms. Brenda Lannard
Canadian Journal of Plant Science, 0, 0, https://doi.org/10.1139/CJPS-2017-0013