

Analysis of Meat and Meat Products Using the DA 7250 SD

Introduction

For meat processors and producers of meat products it is critical to be able to monitor and control key nutritional parameters such as moisture, protein and fat.

The Near Infrared Reflectance (NIR) technique is particularly suited for measurement of these types of samples, but past instrument limitations have not permitted users to reap the full benefits of NIR. Sample preparation requirements such as packing special cups and carefully cleaning between samples made analyses laborious, time consuming and error-prone.

DA 7250 SD

The DA 7250 SD is a proven NIR instrument designed for use in the food industry. Using novel diode array technology it performs a multi-component analysis in only 6 seconds with no sample preparation required. During this time a large number of full spectra are collected and averaged.

As the sample is analyzed in an open dish, the problems associated with sample cups are avoided and operator influence on results is minimal. Disposable petri dishes can be used, eliminating the need for cleaning between samples. The stainless steel sanitary design of the instrument makes it hygienic and easy to clean.



Experimental

Approximately 1200 samples of meat and meat products from North America, Europe and China were analyzed in multiple instruments and by wet

chemistry methods. The samples included raw meat samples such as beef and chicken, as well as various types of meat products such as sausages. The samples were homogenized using a food processor and then placed in disposable plastic cups for NIR analysis in the DA 7250.

More than 900 samples were used as the training set, and the remaining 200+ samples were used as an independent validation set. Calibrations were developed by Perten Instruments using The Unscrambler chemometrics software by Camo. The regression method used was Partial Least Squares (PLS). Multiplicative Scattering Correction (MSC) and Savitsky-Golay 1st derivatives were used as a data pre-treatment to enhance some of the calibration models.

Results and discussion

The DA 7250 results are very accurate when compared to the results from the reference methods. Statistics for the respective parameters are presented in the table below and graphs are displayed on page 2.

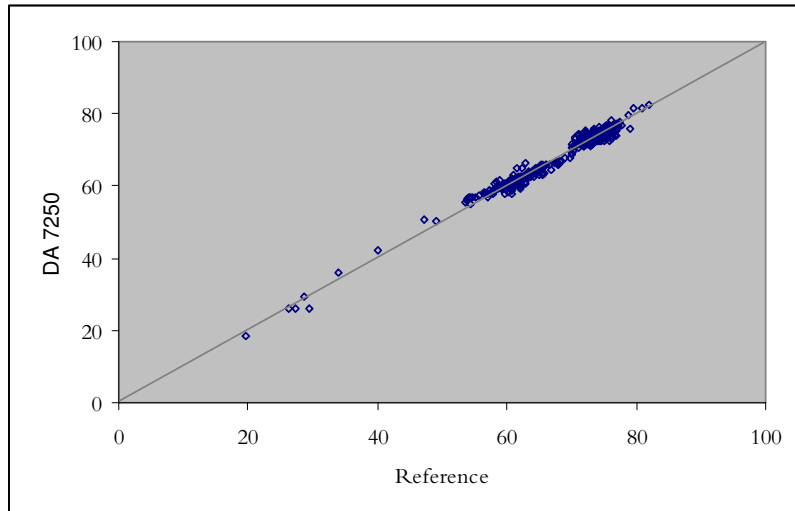
<i>Parameter</i>	<i>Range</i>	<i>Samples</i>	<i>R</i>
Moisture	19.8 – 82.0	900+	0.99
Protein	8.7 – 27.2	900+	0.99
Fat	0.0 – 61.8	900+	0.98

The differences between the DA 7250 and the reference method are of the same magnitude as typical differences between two different reference labs. The DA 7250 is more precise than the reference methods meaning that replicate analyses are much more repeatable and representative.

In summary it is concluded that the DA 7250 can analyze the aforementioned parameters in meat products accurately in 6 seconds. The calibrations can be used on any DA 7250 instrument.

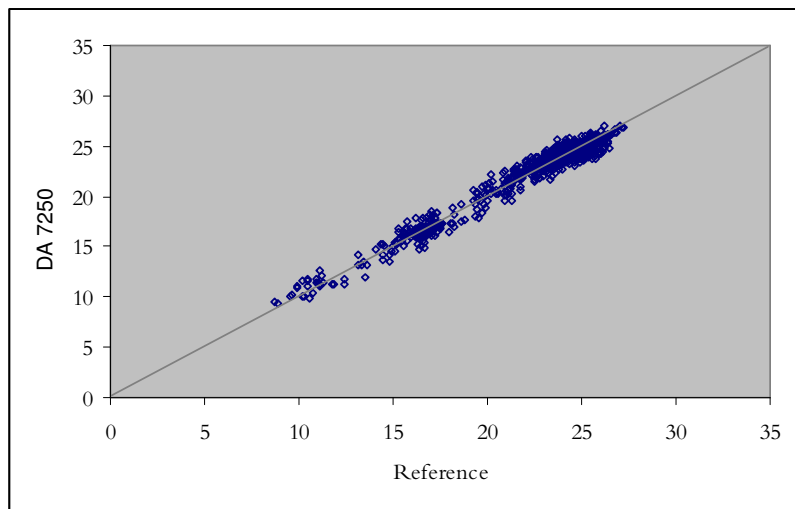
Moisture

While most of the samples fall within 55-80%, the few samples with lower moisture contents are also predicted very accurately. The calibration is well suited for samples with moisture as low as 20%.



Protein

The accuracy for protein is excellent and the DA 7250 can be used to determine protein in various types of meats as well as processed meat products.



Fat

From fat-free poultry meat to high fat meat products, the DA 7200 predicts very close to the wet chemistry method. The fat calibration covers a very wide range, and makes the DA 7250 highly versatile.

