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Analysis of Meat and Meat Products using the DA 7250 NIR Analyzer

Introduction

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

With Near Infrared (NIR) technology multi-constituent results are available in seconds rather than several hours as with many traditional chemical analysis methods. NIR instrument usage provide great values in production of mechanically separated poultry, ground meats, sausage and other meat products.

DA 7250 NIR Analyzer

The DA 7250™ uses novel Diode Array NIR technology and performs a multi-component analysis in less than 10 seconds. During this time a large number of full spectra are collected and averaged.



As samples are analyzed in open cups, or even disposable petri dishes, no or minimal cleaning is required and there is no risk of sample cross-contamination.

The DA 7250 Sanitary Design version is IP65 rated and its stainless-steel design and open analysis area make it easy to clean and ideal for use in food production areas as well as in the lab.

Method

More than 5,000 meat and meat product samples were collected throughout the world. Samples included raw meat (beef, poultry and pork), in-process products, and various finished products including sausages (raw, raw cured, cooked cured, precooked). Samples were homogenized and analyzed on multiple DA 7250 instruments using open faced dishes.

Reference methods were mainly ISO and AOAC approved methods including Soxhlet for fat, drying cabinet for moisture, Kjeldahl for Protein, via hydroxiprolin for Collagen, muffle furnace for Ash and ICP-MS for salt methods. Several regression techniques were evaluated for calibration development, including ANN and Honigs Regression™, a proprietary regression technique developed by PerkinElmer.

Results and Discussion

The best performance was achieved using Honigs Regression, which made it possible to combine all different types of samples into one global calibration, without loss of performance. The DA 7250 performance proved to be similar to the reproducibility of the respective reference method.

Table 1. Statistics of developed calibrations

Parameter	N	Range	R
Fat % asis	5200+	0.01 – 92.4	0.99
Moisture %	4600+	0.7 – 89.9	0.99
Protein % asis	4600+	0.6 – 40.6	0.97
Collagen % asis	2000+	0.6 – 6.3	0.82
Salt % asis	1100+	0.2 – 5.7	0.95
Ash % asis	2800+	0.04 – 5.7	0.95

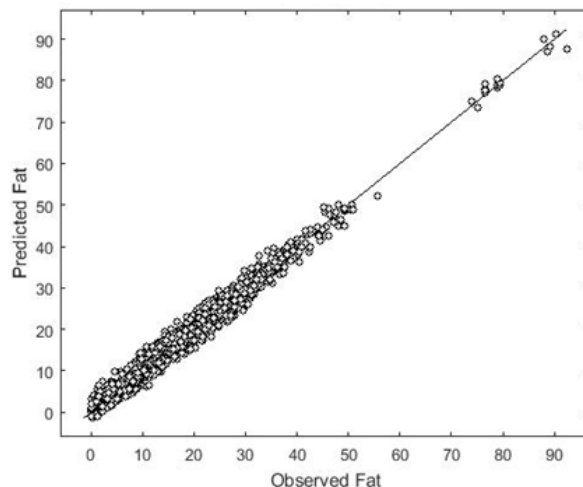
It is concluded that the DA 7250 can accurately determine multiple parameters in a few seconds using one calibration for a wide range of meat and meat products. This makes it highly suitable for incoming raw materials inspection, analyzing samples in production to optimize lean/fat usage, and verifying finished product quality.

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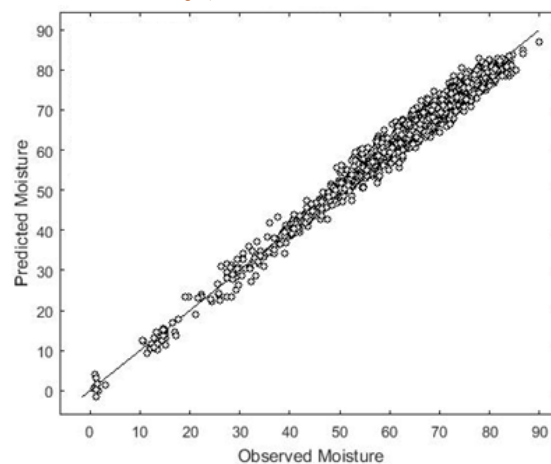
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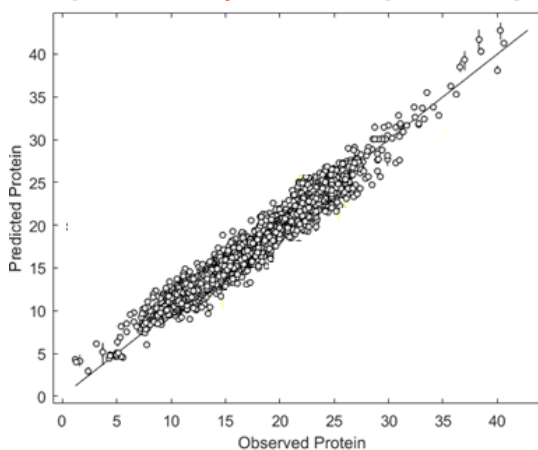
Fat

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



Moisture

The moisture calibration predicts accurate results along the whole range from dry to wet samples, for a wide range of raw meats and processed meat products.



Protein

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

