

SmartNotes

QA

How Nitrogen/Protein Determination performed with Elemental Analysis can be used for quality and labeling purposes of food and animal feed?

The nutritional composition of food and animal feed is regularly analyzed by food and animal feed manufacturers to comply with official regulations. One of the tests performed is the determination of protein content. The accurate determination of the amount of protein, through the determination of the nitrogen content, is fundamental to define the nutritional features of animal feed and the safety of final food products intended for human consumption. Official regulations establish the protein content and labeling requirements, which enable consumers to perform price and quality comparisons based on % protein declarations.

The Kjeldahl Method is the traditional technique used for the protein determination, even though it is recognized not to meet modern laboratories requirements. An alternative to the classical Kjeldahl method is the Dumas (combustion) method, which is comparatively quicker, cheaper, and easier to perform, and, most importantly, it doesn't involve the use of toxic chemicals. The Dumas method is approved by different associations (AACC, AOAC, AOCS, ASBC, IDF, IFFO and ISO) and it allows the analysis of fresh and processed products in various physical states, from either animal or plant source.



Table 1. Most common Official Methods for food and animal feed.

Application	Official Association	Official Method
	AACC (American Association of Cereal Chemists)	Crude Protein in Cereal, 46-30, 1999
	AOAC (Association of Official Analytical Chemists)	Official Method 990.03. Protein (crude) in Animal Feed 4.2.08
	AOAC (Association of Official Analytical Chemists)	Official Method 992.15. Crude Protein in Meat and Meat Products including Pet Foods 39.1.16
	AOAC (Association of Official Analytical Chemists)	Official Method 992.23. Crude Protein in Cereals, Grain and Oilseeds 32.2.02
	AOCS (American Oil Chemists Society)	Official Method Ba 4e-93 (revised 1995). Combustion Method for Determination of Crude Protein
	ASBC (American Society of Brewing Chemists)	Official Method 1996. Nitrogen Determination in Barley
	ASBC (American Society of Brewing Chemists)	Total Nitrogen in Wort and Beer by Combustion Method. Report of Subcommittee, 1994
	Office International de la Vigne et du Vin	Resolution OENO 13/2002 Quantification of Total Nitrogen by Dumas Method (Must and Wines) Quantification de l'Azote Total Selon la Methode de Dumas (Mouts et Vins)
	IFFO (International Fishmeal and Fish Oil Organization Ltd.)	Nitrogen Determination in Fish Meal by Combustion Method
	ISO 14891 (International Organization for Standardization) FIL 185 (International Dairy Federation)	Nitrogen Determination in Dairy Products by Combustion Method
	DIN, EN, ISO 16634-1, 2008 (International Organization for Standardization)	Food Products – Determination of the Total Nitrogen Content by Combustion According to the Dumas Principle and Calculation of the Crude Protein Content. Part 1: Oil Seeds and Animal Feeding Stuffs
	DIN, EN, ISO 16634 – 2 (International Organization for Standardization)	Food Products – Determination of the Total Nitrogen Content by Combustion According to the Dumas Principle and Calculation of the Crude Protein Content. Part 2: Cereals, Pulses and Milled Cereal Products

The Thermo Scientific™ FlashSmart™ Elemental Analyzer (Figure 1) is based on the dynamic combustion method (modified Dumas method). By providing rapid and automated nitrogen determination without the use of hazardous chemicals, it offers advantages over traditional methods. With the FlashSmart EA, analyses of high and low nitrogen levels can be performed without the need for changing the configuration. The protein content is calculated automatically using the dedicated conversion factor in the Thermo Scientific™ EagerSmart™ Data Handling Software.

The FlashSmart Elemental Analyzer fulfills the requirements of several Official Methods for food and feed applications. The table above shows the most common Official Methods for food and animal feed (see Flyer FL42237).



Figure 1. FlashSmart N/Protein Elemental Analyzer.

Summary

Food market globalization requires accurate control of product characteristics to protect commercial value, to safeguard consumer health, and to maintain manufacturer reputation. For example, official regulations establish the protein content and labeling requirements, which enable consumers to perform price and quality comparisons based on % protein declarations.

Although the Kjeldahl Method has been for long the preferred technique for the protein determination, the Dumas (combustion) method is comparatively quicker, cheaper, easier to perform. It doesn't involve the use of toxic chemicals and it is approved by official associations. The Thermo Scientific FlashSmart Elemental Analyzer is based on the dynamic combustion method and offers advantages over traditional methods in terms of automation and cost per sample for the N/Protein determination, while being compliant with Official Methods for food and feed applications.

Find out more at thermofisher.com/OEA

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