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# N/Protein Determination in Cured Meats according to the Dumas combustion method

Reference: **AOAC 992.15** Crude Protein in Meat and Meat Products

Tested with **VELP Scientifica NDA 701 Dumas Nitrogen Analyzer** (Code F30800070)



## Introduction

*Mortadella* is a large Italian sausage or cold cut made of finely hashed or ground, heat-cured pork sausage, which incorporates at least 15% small cubes of pork fat (principally the hard fat from the neck of the pig). Mortadella is flavoured with spices, including whole or ground black pepper, myrtle berries, and pistachios and is a staple product of Bologna.

*Salame* is an Italian word defining crude or cooked meat obtained after a long period of seasoning, with the addition of several different kind of ingredients as salt, garlic, wine, herbs in a spice mix.

The variety of cured meat types is huge, depending on the meat origin, the grinding way, the ingredients and method of cure. Salame can have different textures, tastes and flavors; it can be hot or smoked.

For this reason, almost every Italian town has a local salame with a typical name.

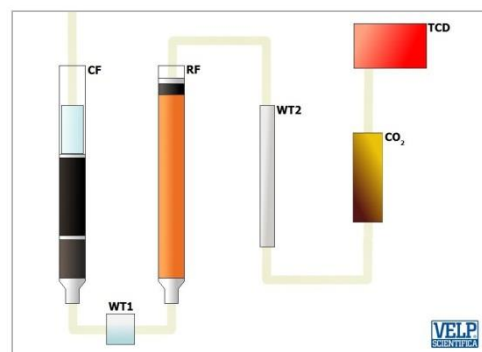
## Protein Determination in Cured Meats

The Dumas method starts with a combustion furnace (CF) to burn the sample, obtaining elemental compounds.

Water is removed by a first physical trap (WT1 - **DriStep™**), placed after the combustion, and a second chemical one (WT2). Between the two, the elemental substances passed through a reduction furnace (RF).

The auto-regenerative CO<sub>2</sub> adsorbers (CO<sub>2</sub>) let pass only the elemental nitrogen that is detected by the **LoGas™** innovative Thermal Conductivity Detector (TCD) with no requirement for a reference gas.

The NDA 701 is controlled via PC through the intuitive **DUMASoft™**.



## NDA 701 Preliminary Operations (daily)

Follow the operating manual to start the NDA 701 and check that the following parameters are set:

**Temperature Combustion reactor**(Code A00000158): 1030°C

**Temperature Reduction reactor** (Code A00000226): 650°C

**Flow rate MFC1 He**: 190 ml/min

**Flow rate MFC2 He**: 200 ml/min

Condition the system by testing 2 EDTA standard (Code A00000149) and 3 to 5 empty tin foils (Code A00000153) as Check up. Verify the calibration curve with one or more tests as Standard by testing the same standard used for the curve creation.

## Sample Preparation

Weigh around 200 mg of the cured meat in a tin foil directly on the balance.

Close the tin foil, obtaining a capsule.

Load the capsule into the autosampler.

## Analysis Procedure


Fill the following fields in the database: **Sample name, Weight, Method, Sample type, Calibration number**

The "MEAT AND DERIVED PRODUCTS" method shows the following parameters:

**Protein factor**: 6.25

**O<sub>2</sub> flow rate**: 400 ml/min

**O<sub>2</sub> factor**: 1.4 ml/mg

Press  to start the analysis.

Analysis time: from 3 minutes for one run.

### Typical Results on Cured Meats

The obtained results are in accordance with the expected value. Results have been obtained with the following calibration curve: in a range of 0 - 12 mg N with 5 measurements of EDTA standard (N% = 9.57) (Code A00000149).

The data obtained are included in the tolerance admitted by the EDTA certificate.

This is "protein" on a total nitrogen basis.

Sample	Sample quantity (mg)	Nitrogen %	Protein %
Italian "Mortadella"	197.80	2.310	14.437
	206.50	2.283	14.271
	207.00	2.295	14.343
	203.10	2.293	14,331
	201.70	2.305	14.406
	<b>Average ± SD%</b>	<b>2.297 ± 0.011</b>	<b>14.358 ± 0.065</b>
	<b>RSD% *</b>	<b>0.461</b>	<b>0.455</b>
Italian "Golfetta"	205.00	4.001	25.006
	199.30	4.046	25.287
	211.90	4.056	25.350
	199.80	4.029	25.183
	197.80	4.056	25.350
	<b>Average ± SD%</b>	<b>4.038 ± 0.023</b>	<b>25.235 ± 0.145</b>
	<b>RSD% *</b>	<b>0.576</b>	<b>0.575</b>
Italian Pepper Salami	204.90	5.099	31.866
	205.60	5.197	32.478
	200.60	5.057	31.605
	215.30	4.953	30.957
	198.20	5.119	31.993
	<b>Average ± SD%</b>	<b>4.038 ± 0.023</b>	<b>31.780 ± 0.559</b>
	<b>RSD% *</b>	<b>0.576</b>	<b>1.758</b>

Expected Protein Value: Mortadella P%= 14.0; Golfetta P%= 25.0; for Salami P%=31.0

Protein Factor: 6.25

\* RSD% = (Standard Deviation \* 100) / Average

### Conclusion

In order to compare samples with varying nitrogen contents, three different types of cured meats were tested.

The results are extremely reliable and reproducible, as demonstrated by the RSD, since the goal is to obtain < 2.0% relative standard deviation, as requested by official methods.

The results confirmed the no-matrix effect of nitrogen determination and the complete combustion of all three types of cured meats' samples.

NDA is the innovative solution for nitrogen/protein determination, according to the Dumas combustion method offering accurate and precise results.