

N/Protein Determination in Sausage according to the Dumas method (He as Carrier)

Reference: **AOAC 992.15** Crude protein in meat and meat products, combustion method

Tested with **VELP Scientifica NDA 702 Dual Carrier Gas Dumas Nitrogen Analyzer** (Code F30800080)



Introduction

Mortadella is a large Italian sausage or cold cut (salume) made of finely hashed or ground, heat-cured pork, which incorporates at least 15% small cubes of pork fat (principally the hard fat from the neck of the pig). Mortadella is a typical product of the area of Bologna; this territory, which in ancient times was first settled by the Etruscans (Felsina) , then by the Gauls (Bononia) and finally by the Romans , has always thrived thanks to the presence of pigs (*Sus scrofa domesticus*) and wild boar (*Sus scrofa majori* or similar). Mortadella was born in this area, whose noun is difficult to trace; plausible hypotheses are two, according to which the term would come respectively from *murtatum* (mortar, tool used in the meat mince) or *myrtatum* (myrtle, originally used in aromatization). Quality control of Mortadella encloses the check of chemical parameters, among these, the protein content. The mortadella proteins are of high biological value.

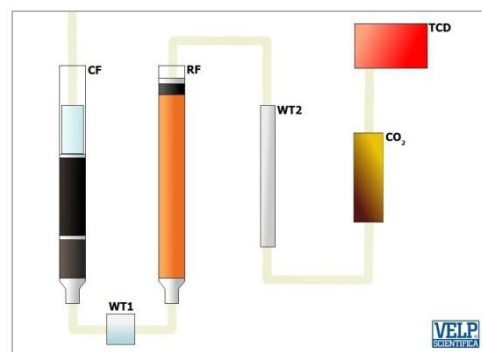
Protein Determination in Mortadella Sausage

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 pass through a reduction furnace (RF).

The auto-regenerative CO₂ adsorbers (CO₂) 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 702 is controlled via PC through the intuitive **DUMASoft™**.



NDA 702 Preliminary Operations (daily)

Follow the operating manual to start the NDA 702 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): 220 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

Mortadella Sausage

Expected Protein range: 15-18 %

Samples have been homogenized by using a grinder, up to creamy consistency.

Using a spatula, put ~ 100 mg of homogeneous sample directly into the tin foil.

Close the tin foil, obtaining a capsule and 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

O₂ flow rate: 400 ml/min

O₂ factor: 1.4 ml/mg

Press  to start the analysis.

Analysis time: from 3 minutes for one run.

Typical Results on Mortadella Sausage

Results have been obtained with the following calibration curve: in a range of 0 – 9 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.

The table below shows the accuracy and repeatability of the data obtained for 30 trials/day of mortadella analysis for 4 weeks. The obtained results are in accordance with the expected value.

| HELIUM as Carrier Gas | | |
|-----------------------|------------------------------|-------|
| Analysis Period | Protein Average \pm SD (%) | RSD % |
| Week 1 | 16.311 \pm 0.191 | 1.172 |
| Week 2 | 16.329 \pm 0.140 | 0.855 |
| Week 3 | 16.766 \pm 0.131 | 0.782 |
| Week 4 | 16.747 \pm 0.210 | 1.255 |

Protein Expected range: 15-18 %
Protein Factor: 6.25

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

Conclusion

The determination of protein in mortadella product with Velp NDA 702 Dumas Analyzer using helium as the carrier gas provides extremely reliable and reproducible results as demonstrated by the RSD, since the goal is to obtain < 2.0 % relative standard deviation, as requested by official methods. The data obtained demonstrates also the stability of the system.