

Crude Fat Determination in Meat according to the Randall method

Reference: ISO 1444:1996 Meat and meat products -- Determination of free fat content
Tested with VELP Scientifica SER 148/6 Solvent Extractor (Code F30300242)



Introduction

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. Salami can have different textures, tastes and flavors; it can be hot or smoked. Also its nutritional composition could be very different and so the fat content.

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

Fat Determination in Salami

Randall method is a modification of the standard Soxhlet extraction: in Randall, the test portion is in contact with pure hot solvent, ensuring a fast solubilization with a considerable reduction of the extraction time (approx. 90 minutes).

Three extraction phases are necessary with SER 148 (see the following picture):



First, the extraction is made by immersion of the sample in the boiling solvent. This step is followed by a rinsing phase with hot solvent. Then, all the solvent evaporates and it is recovered in a condenser. The calculation of the total fat content follows gravimetrically after drying the extract.

Sample

Italian Salami

Fat labeled value: 34 g / 100 g

Moisture value: 33 g / 100 g

Chemicals and Equipment Required

- Gibertini analytical balance, 3 decimals
- Extraction thimbles (33x80 mm) (Code CM0111148)
- Glass extraction cups (Code A0000142)
- Viton seals (Code A00000061)
- n - Exane as solvent
- Grinder

Sample Preparation

Extraction thimbles Preparation

Cut the salami in slices and grind it with a blade grinder for few seconds. Leave it in an oven for 6 hours at 105°C in order to remove all the moisture. Record the weight of the sample before and after the desiccation in order to calculate the loss of humidity.

Put 3 - 4 g of desiccated sample in each of the 6 thimbles, using the Thimble weighing cup (Code A00001146). Fix every thimble with one magnetic Extractions thimbles holders (Code A00001142): it is necessary to transfer directly the sample to SER 148.

Glass Extraction Cups Preparation

Keep the empty glass extraction cups in an oven (105 °C for 1 hour).

Cool them in a desiccator till constant weight of the tare (M_{tare}).

Extraction Procedure with SER 148

Before starting the extraction. Select one of the programs (1-29) and set the following parameters:

- Temperature: 130 °C
- Immersion Time: 30 minutes
- Washing Time: 60 minutes
- Recovery Time 60 minutes

Introduce the glass cups containing the solvent (n-Exane, 70 ml) in the extraction equipment.

Close the extraction unit, and press START button to activate the cooling water flow and the heating. Immerse the thimbles into the boiling solvent by placing the slider into “*Immersion*” position. After 30 minutes press ENTER and extract the thimbles out of solvent, by placing the slider into “*Washing*”.

After 60 minutes of reflux washing press ENTER and close the knob, let the solvent evaporate and recover it by condensation.

- To reduce the recovery time, turn on the air pump pressing AIR.
- Prevent the complete solvent evaporation (few ml are required).

Dry the cups in an oven (1 hour at 105 °C); then, let them cool to room temperature in a desiccator and record the accurate weight (M_{tot}).

Typical Results on Italian Salami

The results are gravimetrically determined, by using the formula:

$$\text{Fat \%} = (M_{tot} - M_{tare}) \times 100 / (M_{sample})$$

Where:

M_{sample} = sample weight considering wet matter (g)

M_{tare} = weight of the empty cup (g)

M_{tot} = weight of the cup containing the fat residues (g)

M_{tare}	M_{sample} on w.m	M_{tot}	Fat	Fat%
73.5710	4.1358	74.9840	1.4130	34.165
74.1790	4.1544	75.6350	1.4560	35.047
75.9670	3.9305	77.3450	1.3780	35.059
72.3740	3.9965	73.7670	1.3930	34.855
71.8050	4.0439	73.2090	1.4040	34.719
74.4420	4.0069	75.8200	1.3780	34.391
			Average ± SD%	34.706 ± 0.362
			RSD% *	1.043

Fat Labeled Value: 34 g/ 100 g

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

Conclusion

The obtained results are reliable and reproducible in accordance with the expected values. with a low relative standard deviation (RSD < 1%). that means high repeatability of the results.

SER 148 Solvent Extractor is ideal for the fat content determination in mayonnaise.

Benefits of Randall method by using SER 148 are:

- up to 5 times faster than Soxhlet (hot solvent vs. cold solvent)
- low solvent consumption (high solvent recovery) - limited cost per analysis
- full operator safety in compliance with IP55
- worldwide official method