



APPLICABLE TO
ANY MATRIX



45 SAMPLES
A DAY



LOWER COST
PER SAMPLE



COMPLETE
FAT DETERMINATION



SAFE AND COMPACT

FAT DETERMINATION: ONE APPROACH FOR ANY SAMPLE

Fat determination in food and feed matrices is a routine analysis for several testing and food processor labs, as it is part of the labelling process and of the QC testing. Nowadays, the process still relies on outdated and matrix-dependent methods which use obsolete and time-consuming technologies. The ETHOS X offers a new approach to gravimetric fat determination, moving toward a more modern, greener and more efficient approach to total fat, Fatty Acid Methyl Ester (FAME) and free fat determinations in food and feed matrices.

The ETHOS X is officially compliant with UNI 11949:2024, the standard method for Oil seeds and fruits, cereals, cereal-based products, and animal feed – Total Fat Determination – Gravimetric analysis via Microwave-assisted Hydrolysis and Extraction (MAHE).



| FAT DETERMINATION BY MICROWAVE

The ETHOS X applies the well-known selectivity of microwave heating and the advantages of closed vessel technology to fat determination. Its configuration and methods have been specifically built to address lab requirements in terms of throughput, ease of use and universal method approach.

STREAMLINE YOUR FAT DETERMINATION

Conventional total fat determination methods, such as Soxhlet and automated Soxhlet, go through a multi-step process, that includes long hydrolysis and extraction procedures, while secondary methods are matrix-dependent and require frequent calibrations. The ETHOS X allows to process any food and feed matrix with a single approach, directly impacting the lab workflow. In addition to the commonly performed total fat determination, the ETHOS X makes FAME and free fat feasible within a single platform.

I TOTAL FAT DETERMINATION

The process begins with the weighing of the sample and the reagents into the SR-15 closed vessels rotor (Picture 1). The process benefits from the microwave heating, the closed-vessel technology and powerful stirring, so that hydrolysis and extraction take place simultaneously and efficiently. The easyTEMP, contactless temperature sensor, controls the entire process ensuring great reproducibility and high safety. Once this step is completed, an aliquot of solvent with the fat is transferred and weighed into the RAR-15 disposable cup (Picture 2) for the evaporation step. The weights are automatically transferred to the easyCONTROL user interface software, which guides the operator throughout the procedure, providing total fat calculation, statistics, and full traceability of the complete process (Picture 3). The determination of total fat in 15 samples is completed in less than three hours.



1 - Weighing step on the hydrolysis/ extraction vessel



2 - Evaporation step



3 - Data processing

MICROWAVE EVAPORATION

The RAR-15 enables the simultaneous evaporation of 15 samples using microwave energy and a dedicated vacuum system. The solvent that contains the extracted fat is placed into a unique evaporation rotor with disposable aluminum caps. The process runs under vacuum, available with a recondensation module too, thus ensure the highest level of safety and not expose the operator to solvent vapors.



ETHOS X with RAR-15 evaporation rotor and vacuum pump

ONE METHOD FITS ALL

The ETHOS X is not matrix-dependent, so it uses a single method and setup for virtually any food such as milk and dairy products, meat, bakery product and chocolate as well as any feed sample. This approach leads also to a lighter accreditation procedure, as it is carried out on several samples using a single technique. Therefore, the ETHOS X method expedites the lab workflow and simplifies the total fat determination.

Standard and QC material	Reference values (%)	ETHOS X (%)	RSD (%)
Wheat Flour (ERM-BC382)	1.39 ± 0.17	1.41	0.20
Lyophilized Pork muscle (ERM-BB384)	8.99 ± 0.2	8.63	0.21
Condensed Milk (TET036RM)	0.33 ± 0.07	0.29	0.06
Dairy feed (BCR-708)	6.5 ± 0.8	6.32	0.28
Butter (quality control material)	81.37 (80.83 – 81.91)	81.38	1.28
Chocolate (quality control material)	34.85 (33.52 – 36.17)	35.74	0.67

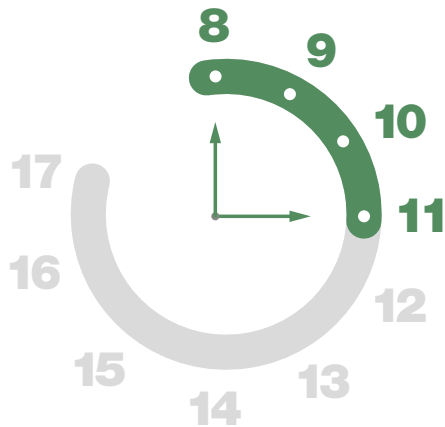
Total fat determination on several CRMs and Quality control materials

IMPROVED TURNAROUND TIME & PRODUCTIVITY

In QC and food testing laboratories a fast delivery of results and high throughput are key factors for total fat determination. Even modern automated Soxhlet techniques require several hours in order to deliver results affecting the competitiveness of the lab too. The ETHOS X processes 15 samples simultaneously, and as many as 45 samples in a single working day, using one rotor and 75 samples with two rotors. Its specific method combines the hydrolysis and extraction into a single step, thus having a direct impact on the lab's turnaround time and throughput.

ETHOS X

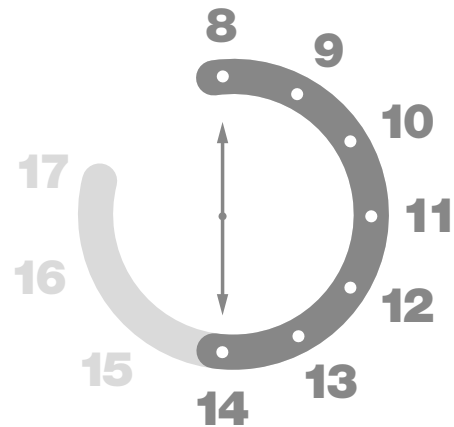
15 SAMPLES



IN 3 HOURS

Automated Soxhlet

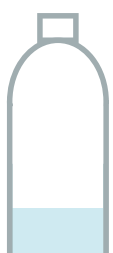
6 SAMPLES



IN 6 HOURS

LOWER COST PER SAMPLE

Automated Soxhlet systems are based on the outdated Soxhlet technology which uses open vessels and large flasks. This approach requires elevated acid and solvent volumes for the hydrolysis and extraction steps. The ETHOS X uses closed vessels technology to increase the temperature and improve extraction efficiency, reducing the reagents volume too. The unique setup offers a reagent and waste reduction of up to 60%. In combination with the higher productivity and compelling initial investment, it provides a lower cost per sample.



ETHOS X

35 mL
of reagents per sample



Automated Soxhlet

125 mL
of reagents per sample

EFFICIENCY & PRODUCTIVITY IN TOTAL FAT DETERMINATION

I COMPLETE FAT DETERMINATION

In addition to total fat determination, Fatty Acid Methyl Ester (FAME) analysis is a common analysis as it determines saturated and unsaturated fats. The flexibility of the ETHOS X configuration and its dedicated procedures enables to perform FAME and free fat determinations of food samples, performing the complete fatty acids profile within a single platform.

	Saturated fat	Monounsaturated	Polyunsaturated
LIVER PATÈ (IFIP 1704)			
Reference value	14.40	15.40	6.40
ETHOS X (%)	16.29	14.53	6.18
LEGUME SOUP			
Reference value	0.27	0.37	0.98
ETHOS X (%)	0.30	0.39	0.94
SUNFLOWER OIL			
Reference value	10.82	30.34	58.85
ETHOS X (%)	10.88	30.57	58.55

Complete fat profiles on three samples using ETHOS X methods

I HIGHER SAFETY & LOWER FOOTPRINT

The traditional approach requires two main systems, one for hydrolysis and one for extraction, offering limited productivity and occupying valuable space in the lab or in the fume hood. The ETHOS X setup allows to carry out all the steps within a single platform while improving productivity, it is not installed in the fume hood and saves over 50% of the lab space. Its dedicated exhaust system combined with up-to-date features, ensures the highest operator safety level throughout the entire process.

I WIZARD PROCESS

The easyCONTROL software, installed on the user interface, fully controls all the parameters of the process, and collects all the data. When connected to a balance, it records and associates every weighing step to the sample, providing great traceability and guiding the operator throughout the entire process. The easyCONTROL software acquires the information needed to support the analysis report, such as automatic calculations and sample statistics, and additionally offers full integration with LIMS.

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