MILESTONE
HELPING CHEMISTS



ADVANCED
FAT DETERMINATION
FOR FASTER AND MORE EFFICIENT FOOD ANALYSIS



ETHOS™ X and ETHOS™ X LEAN

Microwave Platforms for Food Extraction Workflows











RETHINKING FOOD EXTRACTION WORKFLOWS

MODERN EXTRACTION PROCESSES FOR FOOD ANALYSIS

Food and feed laboratories are routinely required to determine total fat content for labeling, quality control, and regulatory compliance. In addition to fat determination, laboratories increasingly perform the analysis of fatty acid profiles (FAMEs), mineral oil hydrocarbons (MOAH/MOSH), and organic contaminants such as PAHs, dioxins, and PCBs to ensure product safety and meet evolving regulatory requirements.

Food sample preparation often involves:

- Time-consuming and multi-step extraction methods
- Matrix-dependent procedures requiring method adjustments
- High solvent consumption and operating costs
- Limited productivity due to long extraction cycles
- Complex workflows involving multiple techniques and instruments

Traditional techniques such as Soxhlet and automated extraction systems are still widely used, but they rely on long processing times and large volumes of reagents, often requiring different methods and setups depending on the application.

To overcome these limitations, Milestone has developed the ETHOS X and ETHOS X LEAN microwave platforms, providing a modern approach to food extraction workflows. These platforms enable faster analysis, reduced solvent consumption, and simplified laboratory operations across a wide range of food applications.



FASTER TOTAL FAT DETERMINATION • Combined hydrolysis and extraction

SIMPLIFIED WORKFLOW • One method for different food matrices without re-optimization

SAFE OPERATION • Closed-vessel system reduces operator exposure to reagents

RELIABLE RESULTS • Controlled conditions ensure consistent performance across samples

BEYOND TOTAL FAT ANALYSIS • Expand to FAMEs, MOAH/MOSH, and organic contaminants

TOTAL FAT DETERMINATION MADE EFFICIENT

HYDROLYSIS AND EXTRACTION AT ONCE

The ETHOS X and ETHOS X LEAN platforms apply microwave heating and closed-vessel technology for total fat determination, enabling a modern approach to food sample preparation. Hydrolysis and extraction are performed in a single step, significantly simplifying the overall process.

Unlike traditional methods, which require multiple steps and matrix-dependent procedures, the ETHOS platforms use a single approach applicable to a wide range of food and feed samples. This reduces method development, minimizes operator intervention, and ensures consistent performance across different matrices.

Samples and reagents are placed directly into the closed vessels, where microwave heating and controlled conditions enable efficient hydrolysis and extraction. The process is automatically managed, ensuring reproducible results while reducing handling steps and overall analysis time.



1 - Weighing step on the hydrolysis/extraction vessel



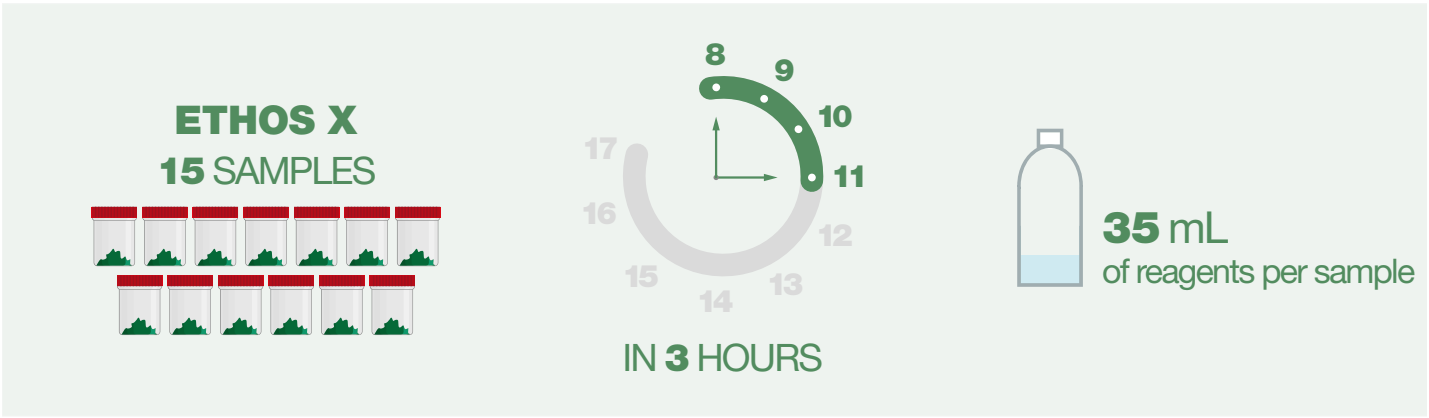
2 - Hydrolysis/Extraction step



3 - Data processing

FASTER RESULTS WITH LOWER SOLVENT CONSUMPTION

Compared to traditional techniques such as Soxhlet and automated extraction systems, microwave-assisted extraction significantly reduces analysis time. Hydrolysis and extraction are combined into a single step, enabling laboratories to process multiple samples in a shorter time and improve overall turnaround.
The ETHOS X and ETHOS X LEAN platforms enable simultaneous processing of multiple samples in a single run, supporting efficient laboratory operations. This approach increases daily sample throughput while reducing operator intervention and manual handling steps.





The use of closed-vessel technology reduces reagent and solvent consumption compared to conventional methods. Lower solvent usage, combined with shorter processing times and simplified workflows, contributes to a reduced cost per sample and more sustainable laboratory operations.
The accuracy of the extraction process is confirmed by results obtained on certified reference materials, demonstrating excellent agreement with reference values across different food matrices.

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

RELIABLE OPERATION FULL PROCESS CONTROL

SAFE AND ROBUST HARDWARE

The ETHOS X and ETHOS X LEAN platforms are designed to ensure safe and reliable operation in food laboratories. The closed-vessel configuration, combined with controlled operating conditions, protects both the sample and the operator while enabling consistent extraction performance. The robust design supports daily laboratory activities with confidence.



ACCURATE TEMPERATURE CONTROL

Accurate and safe temperature control is essential for reproducible results. The ETHOS X platforms use Milestone's easyTEMP technology, an advanced contactless sensor that directly monitors the real temperature of the sample during the process. This ensures uniform heating and consistent extraction performance across different food matrices.



INTUITIVE CONTROL AND USER SUPPORT

The ETHOS X platforms feature an intuitive control interface that simplifies method selection and system operation. The integrated method library supports users in setting up analyses quickly, reducing manual steps and minimizing the need for method development.

Milestone Connect provides access to a comprehensive library of methods, applications, and technical resources, helping laboratories optimize their workflows and operate with confidence.



BEYOND TOTAL FAT DETERMINATION

FATTY ACID METHYL ESTERS (FAMES)

The ETHOS X platforms enable direct extraction and derivatization of fatty acids within a single workflow, eliminating separate preparation steps. This approach simplifies fatty acid profiling, reduces analysis time, and improves reproducibility compared to traditional multi-step procedures.

Single-step derivatization

Reduced prep time

Reliable profiling

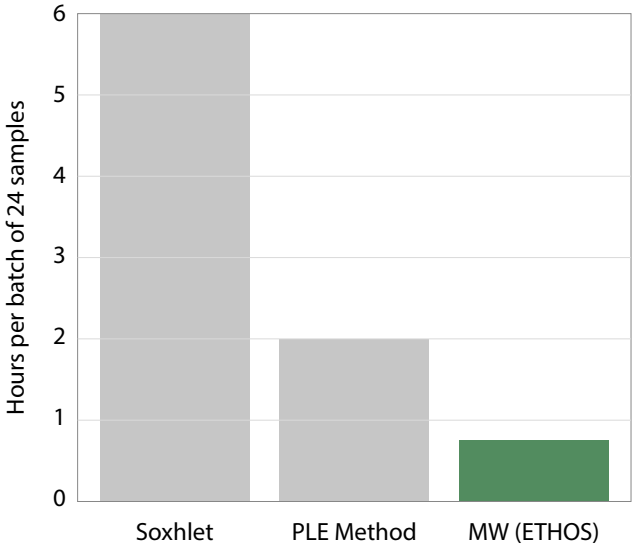
MINERAL OIL HYDROCARBONS (MOAH & MOSH)

Microwave-assisted extraction supports the simultaneous saponification and extraction of mineral oil hydrocarbons from complex food matrices. The controlled conditions reduce sample preparation time and improve repeatability, simplifying a typically labor-intensive and multi-step workflow, reducing preparation time from several hours to less than one hour.

CONVENTIONAL WORKFLOW	**Sample** (5 min)	**Saponification** (60 min)	**Extraction** (120 min)	**Cleanup** (30 min)	TOTAL TIME **215 MINUTES**
ETHOS WORKFLOW	**Sample** (5 min)	**Microwave step** (Hydrolysis + Extraction) (30-40 min)		**Cleanup** (10-15 min)	TOTAL TIME **45-60 MINUTES**

ORGANIC CONTAMINANTS (PAHS, DIOXINS, PCBS)

The ETHOS X platforms enable efficient extraction of organic contaminants using closed-vessel microwave technology. Compared to conventional techniques such as Soxhlet or pressurized liquid extraction, this approach reduces solvent consumption and extraction time while maintaining comparable recovery and reproducibility, significantly faster than Soxhlet and PLE methods.



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Established in 1988, Milestone is headquartered in Italy with its R&D and manufacturing centre in Germany and Switzerland and offices in the United States, China, Japan and Korea. We operate worldwide through a network of over 100 exclusive distributors, all providing our customers with premium application and service support. Milestone's mission is to help chemists by offering them the most advanced instrumentation for sample preparation and direct mercury analysis in the world. Our industry-leading technology, in combination with fast, responsive service and applications support, allows Milestone to support our goal of giving you the highest return on investment possible.

ADDITIONAL MILESTONE SOLUTIONS



ETHOS™

Microwave Labstation



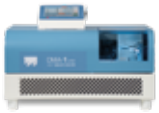
ETHOS™ LEAN

Compact
Microwave Labstation



DMA-80 *evo*

Direct Mercury Analyzer



DMA-1 *evo*

Compact
Direct Mercury Analyzer

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MILESTONE SpA - Via Fatebenefratelli, 1/5 - 24010 Sorisole (BG) - Italy
Tel: +39 035 573857
www.milestonesrl.com - email: analytical@milestonesrl.com

MILESTONE INC. - 25 Controls Drive - Shelton, CT 06484 - USA
Tel: (203) 925-4240 - Toll-free: (866) 995-5100 - Fax: (203) 925-4241
www.milestonesci.com - email: mwave@milestonesci.com

MILESTONE GENERAL K.K. - KSP, 3-2-1, Sakado - Takatsu-Ku,
Kawasaki 213-0012 - Japan - Tel: +81 (0)44 850 3811 - Fax: +81 (0)44 819 3036
www.milestone-general.com - email: info@milestone-general.com

MLS GmbH - Auenweg 37 D-88299 Leutkirch im Allgau - Germany
Tel: +49 (0)7561 9818-0 - Fax: +49 (0)7561 9818-12
www.mls-mws.com - email: info@mls-mikrowellen.de

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