EFFECTIVE DATE	N P Analytical Laboratories	METHOD CODE
REVISED: 10/17/2025	LABORATORY TEST METHOD SUMMARY	FANL
REPLACES: 12/04/2024	Total Fat from Fatty acids by Gas Chromatography	PAGE 1 OF 2
KEY WORDS: NLEA, total fat, saturated fat, trans fat, polyunsaturated fat, monounsaturated fat, fatty acids, FANL, FANL DM, FANL LL, FAPR		

1. SCOPE AND PURPOSE:

This method measures individual fatty acids to calculate total fat, saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, trans fatty acids, and (on request) individual fatty acids in foods, feeds, and ingredients. Test results meet requirements for nutrition labeling of foods products. The method is not suitable for determining epoxy or oxidized fatty acids or fatty acids that have been polymerized. Test results may also be reported as a fatty acid profile with each fatty acid normalized to total 100%.

2. PRINCIPLE:

2.1. Samples are extracted with the AOCS direct methylation method. Samples are extracted with methanolic hydrochloric acid. Extracted lipid, fat or oil is saponified with methanolic sodium hydroxide. The fatty acids are esterified in methanol, with boron trifluoride as a catalyst, taken up in heptane, and injected on a gas chromatograph with a flame ionization detector. Fatty acids are identified by comparison to external standards. The concentration of individual fatty acids are calculated using an internal standard method based on analysis of a standard with known concentrations. Total fat is calculated from the sum of all fatty acids expressed as triglycerides. All other fatty acids or groups of fatty acids are expressed as the fatty acid concentration without conversion to the triglyceride equivalent.

2.2. Specific test codes are used to indicate conditions for determining fatty acids according to the following table:

Test Code	Used for determining:
FANL	Fatty acids by GC
FANL DM	Fatty acids by GC dry basis
FANL LL	Low level fatty acids
FAPR	Fatty acid profile (relative percentages)

2.3. On request, fatty acid results can also be expressed as the relative percent of each fatty acid normalized to 100% (FAPR).

2.4. Using a 1 gram sample, the lowest confidence level of this method is 0.1 g/100g for total fat and 0.04 g/100g for saturated, trans, polyunsaturated, and cis-monounsaturated fatty acids for FANL and FANL DM

2.5. Using a 1 gram sample, the lowest confidence level of this method is 0.1 g/100g for total fat, 0.04 g/100g for saturated, trans, polyunsaturated, and cis-monounsaturated fatty acids, 0.01 g/100g for a-Linolenic Acid, Arachidonic Acid, Eicospentaenoic Acid and Docosahexaenoic acid expresses as Fatty Acids for FANL LL

2.6. FAPR: Using a 1 gram sample, the lowest confidence level for FAPR is 0.1% for all components.

2.7. Known Interferences:

2.7.1. Small amounts of non-fatty acid methyl esters that elute under the conditions of this test may be included in the value reported for total fat content.

2.7.2. Complex mixtures of fatty acids, particularly marine oils, may be difficult to resolve completely under the conditions of this test, resulting in overestimation of an individual fatty acid.

2.7.3. Residual methanol in final heptane extraction may result in a baseline hump after the solvent front in the chromatogram.

3. PRECISION:

Records of method precision based on Method Validation and/or known control summaries are located in the QA Master file for this test method. Assay precision may vary with test matrix and analyte level. Terms used to describe method precision are defined in NPSOP3000, *Validation of Quantitative Chemical Tests*.

4. REFERENCES:

4.1. AOCS Ce 2c-11, Direct Methylation of Lipids in Foods by Acid-Alkali Hydrolysis

4.2. AOCS Method Ce 1h-05, Determination of cis-, trans-, Saturated, Monounsaturated and Polyunsaturated Fatty Acids in Vegetable or Non-Ruminant Animal Oils and Fats by Capillary GLC, Official Methods and Recommended Practices of the AOCS

4.3. AOCS Ce 1i-07, Determination of Saturated, cis-Monounsaturated, and cis-Polyunsaturated Fatty Acids in Marine and Other Oils Containing Long Chain Polyunsaturated Fatty Acids (PUFAs) by Capillary GLC, Official Methods and Recommended Practices of the AOCS

4.4. AOCS Method Ce 1j-07, Determination of cis-, trans-, Saturated, Monounsaturated, and Polyunsaturated Fatty Acids in Extracted Fats by Capillary GLC, Official Methods and Recommended Practices of the AOCS

4.5. AOAC Method 996.06, Official Methods of Analysis of the AOAC International.