

CODEX ALIMENTARIUS COMMISSION



Food and Agriculture
Organization of
the United Nations



World Health
Organization

Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (+39) 06 57051 - Fax: (+39) 06 5705 4593 - E-mail: codex@fao.org - www.codexalimentarius.org

Agenda Item 2

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME CODEX COMMITTEE ON METHODS OF ANALYSIS AND SAMPLING

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MATTERS REFERRED BY THE CODEX ALIMENTARIUS COMMISSION AND OTHER SUBSIDIARY BODIES

(Comments of AOAC, IDF and ISO)

Trans fatty acids

Performance characteristics of the *trans* fatty acids method currently under standardization with ISO/IDF & AOAC in reply to CCNFSDU request to CCMAS about the lowest level of TFAs that current analytical methods can accurately detect as well as consistently reproduce

Title of the method

Determination of Fatty Acids in Milk Products, Infant Formulae and Adult/Pediatric Nutritional Formula Products

Method description

This ISO/IDF International Standard/AOAC Final Action Method specifies a single method for the quantification of all labelled fatty acids. This includes groups of fatty acids (i.e. TFA, CLA, SFA, MUFA, PUFA, omega-3, omega-6, omega-9) and/or individual fatty acids (i.e. LA, ALA, ARA, EPA, DHA) in milk products, infant formulae and adult/pediatric nutritional formula products (i.e. all forms made from any combination of milk, soy, rice, whey, hydrolyzed protein, starch and amino acids, with and without intact protein) containing milk fat and/or vegetable oils, supplemented or not supplemented with long chain polyunsaturated fatty acids (LC-PUFA).

The determination is performed by direct *trans* esterification of fatty acids in food matrices, without prior fat extraction. Consequently, it is applicable to liquid and powder samples. Products containing less than 1,5 % fat and dairy products like soft or hard cheeses with FFA level ≤ 1 mmol/100g of fat can be analyzed after preliminary fat extraction using methods described in the standard.

The method is particularly adapted to quantify low levels of *trans* fatty acids coming from partially hydrogenated oils (C18:1 *trans*), deodorized vegetable oils (C18:2 *trans*, C18:3 *trans*) and/or *trans* fatty acids naturally present in ruminant fats (C18:1 *trans*, C18:2 *trans*). The method can be used for checking compliance of 'trans fat free' labeled products with regulatory limits.

Collaborative study results for trans fatty acids

A collaborative study in accordance with ISO 5725 with 18 participants from 9 countries was performed on 12 samples.

The calculated precision parameters SDr% and SDR% are presented in Table 1 and Table 2¹.

The lowest total *trans* fatty acids amount (sum of C18:1 *trans*, C18:2 *trans* and C18:3 *trans*) was quantified in an adult nutritional formula product at a level of 0.009 g *trans* FA/100 g product, with SDr<10% and SDR<40%. The lowest amount of *trans* fatty acid (18:1 *trans*) was quantified in an adult nutritional product at a level of 0.003 g C18:1 *trans*/100 g product, with SDr<13% and SDR<36%.

Method status

- IDF/ISO/AOAC publication expected end of 2015

¹Note: Reported results for some of the individual fatty acids (which also contribute in summated values) showed to be erroneous (*i.e.* deviating response factors of instrument, co-elution, wrong peak identification or integration, errors in reporting). Precision parameters for low *trans* fatty acid amounts calculated from proficiency tests organized in 2014 using the same material (e.g. infant formula products included in the collaborative study) were two times lower than values found with the collaborative study.

Table 1: Summary of calculated precision data for the determination of trans fatty acids in dairy products, Infant formula and pediatric and adult nutritional products. Fatty acid amounts are expressed in g/100 g product.

Products	Fat %	Results	C18:1 <i>trans</i>	C18:2 <i>trans</i>	C18:3 <i>trans</i>	total <i>trans</i>
Milk products	3.5 to 100.0*	Range	0.134 - 4.131	0.031 - 0.888	no present	0.167 - 5.056
		SD r%	2.9 - 5.3	2.7 - 10.5		2.8 - 3.7
		SD R%	6.8 - 9.9	29.0 - 36.7		8.7 - 11.2
Infant formulae and Adult/Pediatric Nutritional Formula products	3.4 to 28.4	Range	0.003 - 0.034	0.003 - 0.056	0.003 - 0.047	0.009 - 0.109
		SD r%	5.7 - 13.4	6.9 - 9.8	5.7 - 26.8	5.4 - 16.6
		SD R%	16.4 - 36.2	11.0 - 34.5	28.5 - 72.9	21.3 - 42.5

*fat extracted from cheese having 13.3% fat

Table 2: Summary of calculated precision data for the determination of total trans fatty acids amount in dairy products, Infant formula and pediatric and adult nutritional products. Results (Mean) are expressed in g total trans fatty acids/100g product)

Products	n	Mean	SD r%	SD R%
Cheese	12	5.056	3.4	11.1
Butter	17	4.235	3.0	10.4
Full cream	17	1.624	3.7	11.0
Full cream Milk powder	17	1.032	3.4	11.2
Full Liquid milk	17	0.167	2.8	8.7
Infant Formula Milk based powder	17	0.109	6.4	29.2
Infant Formula Partially Hydrolyzed Soy powder	18	0.091	16.6	40.0
Infant formula	17	0.073	9.8	32.9
Adult Nutritional Milk Protein powder	15	0.056	13.0	23.5
Infant Formulan Ready to drink (liquid) Milk based	17	0.027	8.0	21.3
Adult Nutritional Ready to drink (liquid) High fat	11	0.010	10.0	42.5
Adult Nutritional Ready to drink (liquid) High protein	16	0.009	5.4	38.5