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FATS AND OILS

Technical Bulletin

by Lori Kjos

Fats and oils are primarily the triesters of fatty acids and a polyhydric alcohol (glycerol). Fats and oils are commonly called triglycerides. Solid triglycerides are referred to as fat while liquid triglycerides are called oils. Lipids, on the other hand, include all the “fatty” materials (i.e. those materials soluble in a fat solubilizing solvent) in a food. This includes the sterols, mono, di, and triglycerides, phospholipids, glycolipids, free fatty acids, fat soluble vitamins etc.

For nutrition labeling purposes, fat is defined as the sum of the fatty acids in the food, regardless of source, expressed as triglyceride equivalents. These fatty acids may be present as free fatty acids, mono, di, and triglycerides, phospholipids, glycolipids, or sterollipids. Individual fatty acids are classified according to their degree of unsaturation. These classifications include saturated, monounsaturated or polyunsaturated fatty acids.

Of recent concern to the food industry are *trans* fatty acids. *Trans* fatty acids occur naturally at low levels in animal products such as milk, and are formed due to isomerization during lipid oxidation. Significant amounts are formed during hydrogenation of vegetable and fish oils to make products such as margarines and shortenings where the *cis* fatty acids occur naturally.

Triglycerides represent 95% or more of the weight in most fats and oils. Triglycerides are essential nutrients in both human and animal diets. Triglycerides provide a concentrated source of energy, a supply of essential fatty acids – linoleic and linolenic, and give a feeling of fullness after eating. Additionally, fat functions as a carrier for fat-soluble vitamins and adds palatability to foods.

Vegetables and fruits (with a few exceptions such as avocados) contain small amounts of fat while animal products, nuts, and vegetable oils and fats provide as much as 43% of available calories in some typical U.S. diets.

Approximately 95% of the fatty acids in the diet are absorbed. In calorie deficient situations, fat together with carbohydrates will spare protein to improve growth rates. Excess calories ingested, regardless of source or form, i.e. fat, carbohydrates or protein, are stored in the body as fat.

FAT CONTENT OF SOME FOODS

FOOD	g/100g	FOOD	g/100g
Peanut Butter	50.0	Froz. Green Bean	0.12
Walleye Fish	1.18	Bacon	57.5
Sausage Link	31.5	Almonds	53.2
Pizza-Pepperoni	15.8	BBQ Potato Chips	32.9
Apple	0.36	Caramel Topping	0.24
Bagel	2.55	Hamburger	10.2
Corn Flakes	<0.5	Onion Rings-fried	19.8

ASSAY PRINCIPAL AND APPLICABILITY

Triglycerides and other fatty acid containing molecules are unbound from food matrices using an acid or base hydrolysis, and extracted into a mixture of petroleum and ethyl ether. Pyrogalllic acid is added to minimize oxidative degradation of fatty acids. The fatty acids of the fatty acid-containing compounds are then transesterified with BF₃/MeOH to form fatty acid methyl esters (FAMES). FAMES are quantitatively measured by capillary gas chromatography by comparing to a known quantity of internal standard. Total fat is calculated as the sum of individual fatty acids expressed as triglyceride equivalents. Saturated, monounsaturated, and polyunsaturated fats are calculated as the sum of the respective component fatty acids. Cis and trans fatty acids can be totaled as well.

Lower Detection Limit 0.01 %
Reporting Units % of sample (w/w)

Recommended Daily Intakes For labeling purposes

Daily calorie intake is 2,000 or less 65g
Daily calorie intake is 2,500 80g

Daily values may be higher or lower depending on your calorie intake.

Information required with sample Estimate of fat content

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