





Health Benefits

A Comparison: Various Oils and Fats

Chris Calvert,
Ciario Fruit & Nut LLC

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The Religion of Nutrition

OR

What Happened to Science?

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March 26, 1984

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June 23, 2014

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Our Fat Inventory

- 9 lb Butter
- 5 gal Peanut Oil
- 8 Bottles Olive Oil - Open
- 9 Bottles Other Oils - Open
- 1 Tub Goose Fat
- 3 Quarts Whipping Cream
- 1 Tub Beef Tallow
- 1 Tub Bacon Fat



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A QUICK
OVERVIEW

- Fatty Acid Structure
- What is Oil (FAT)
- How Do We Limit Oxidation



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Fatty Acids

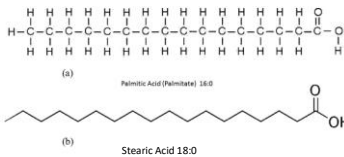
1. Carbon chains of 2 to 29 carbons
2. Saturated or Unsaturated with Hydrogen
3. *Cis versus Trans Unsaturated Fatty Acids*



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Fatty Acid Structure



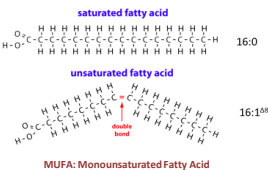
3 Dimensional (3D – 4D)



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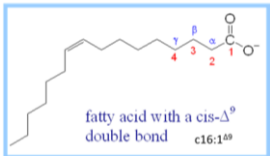
Saturated vs Unsaturated Fatty Acid



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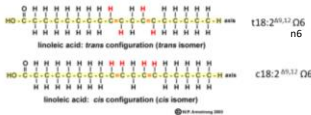
Unsaturated 16:1ⁿ⁷ Fatty Acid (Palmitoleic)



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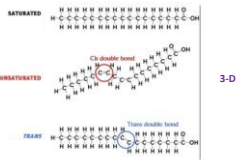
Cis vs Trans Fatty Acids



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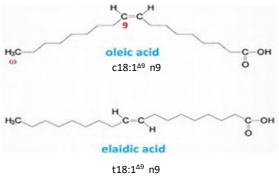
Cis vs Trans Fatty Acids



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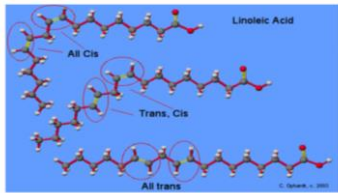
Cis vs Trans Fatty Acids



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Cis vs Trans Fatty Acids



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A QUICK
OVERVIEW



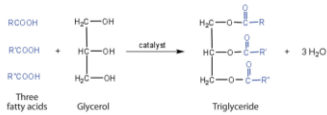
- Fatty Acid Structure
- What is Oil (Fat)
- How Does Oil Oxidize



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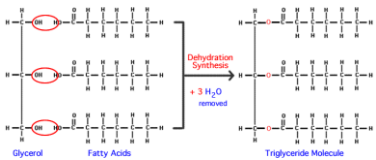
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Fat and Oil – Triacylglycerol



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3-D
&
Attraction Between Fatty Acids

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Fats: Esters of fatty acids with glycerol.
Oils: Fats in the liquid state.

Two Primary Determinants of Fat vs Oil

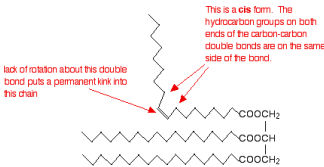
- 1. Length of fatty acids (↑ Melting Point)
- 2. More saturated (↑ Melting Point)



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Saturated vs Unsaturated in a TAG



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Saturated vs Unsaturated in a TAG

In a **trans** form, the two hydrocarbon groups are on opposite sides of the carbon-carbon double bond. This doesn't cause quite so much distortion (although more than this simplified diagram shows).



Similar to a saturated fatty acid



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With Fatty Acids –
You Are What You Eat



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Fatty Acid Composition of Fats and Oils			
Percent of Total Fatty Acids			
Kind of Fat or Oil	Saturated	Monounsaturated	Polysaturated
Safflower oil	9	13	78
Sunflower oil	11	20	69
Corn oil	13	25	62
Olive oil	14	77	9
Soybean oil	15	24	61
Peanut oil	18	48	34
Sockeye salmon oil	20	55	25
Cottonseed oil	27	19	54
Lard	41	47	12
Palm oil	51	39	10
Beef tallow	52	44	4
Butterfat	66	30	4
Palm kernel oil	86	12	2
Coconut oil	92	6	2



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Fatty acids composition of vegetable oils

Fat (%)	SAF	CBP	SEL	BDP	SFL	WAG	PMS	SES	BB	ALM	RPO	PNT	OL	COC
C16:0	67	66	79	64	62	174	151	97	200	68	46	75	163	nd
C17:0	0.04	0.06	0.06	0.05	0.05	0.05	0.13	nd	nd	0.05	0.04	0.07	nd	nd
C18:0	24	35	45	26	28	0.7	5.7	65	23	1.7	2.1	2.3	2.7	nd
C20:0	nd	0.16	2.6	nd	0.25	nd	0.47	0.60	nd	0.09	nd	1.00	0.40	nd
C22:0	nd	nd	nd	nd	nd	nd	nd	0.14	nd	nd	nd	nd	0.15	nd
C18:1 (n-7)	0.08	0.08	0.05	0.11	0.12	0.21	0.12	0.11	0.19	0.33	0.21	0.07	1.8	nd
C17:1 (n-7)	nd	nd	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
OLEIC ACID	C18:1n6 (n-9)	115	143	204	115	280	127	249	415	427	672	653	713	664
C18:1n6 (n-9)	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
C20:1n-9	nd	0.40	0.15	165	0.18	7.91	1.08	0.32	1.11	0.36	9.1	nd	0.30	nd
Linoleic Acid	C18:2n-6 (n-6)	79.0	74.7	63.3	79.4	62.2	59.7	54.2	40.9	33.1	22.8	19.6	18.2	16.4
α-Linolenic Acid	C18:3 (n-3)	0.15	0.15	0.36	0.36	0.16	1.2	0.12	0.21	0.45	nd	1.2	nd	1.6
γ-Linolenic Acid	C18:3 (n-6)	nd	nd	nd	3.0	nd	nd	nd	nd	nd	nd	nd	nd	nd
Stearic Acid	C18:0	6.3	10.4	15.1	9.2	9.4	18.2	19.6	14.9	22.5	6.3	6.7	10.7	19.1
MUFAs		11.6	14.8	20.7	28.1	26.3	20.9	26.1	42.0	44.0	67.9	72.8	71.1	68.2
PEFAs		79.1	74.9	64.2	62.8	62.4	61.0	54.3	41.2	33.6	22.8	20.9	18.2	16.4
n-7 PEFAs		6.2	6.2	0.9	0.4	0.2	1.2	0.1	0.2	0.5	0.0	1.2	0.0	0.0
n-6 PEFAs		79.0	74.7	63.3	62.4	62.2	59.7	54.2	40.9	33.1	22.8	19.6	18.2	16.4



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MUFAs and Oleic Acid (18:1^ω n9)

Monounsaturated Fats Reduce Low-Density Lipoprotein
Monounsaturated Fats May Increase High-Density Lipoprotein
Oleic Acid (18:1) may be responsible for the hypotensive effect of olive oil
MUFA and Oleic Acid are associated with increased risk of breast cancer
Consumption of Olive Oil is associated with a decreased risk of breast cancer



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Conjugated Linoleic Acid (CLA)

A family of at least 28 isomers of linoleic acid,
Found in the meat and dairy products derived from ruminants.
CLAs can be either cis- or trans-fats
Double bonds of CLAs are conjugated and separated by a single bond between them.



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Antioxidants

Polyphenols

Hydroxytyrosol



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