

NUTRITIONAL BENEFITS OF PALM OIL

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The Importance of Fat in Your Diet

- **Macronutrients**

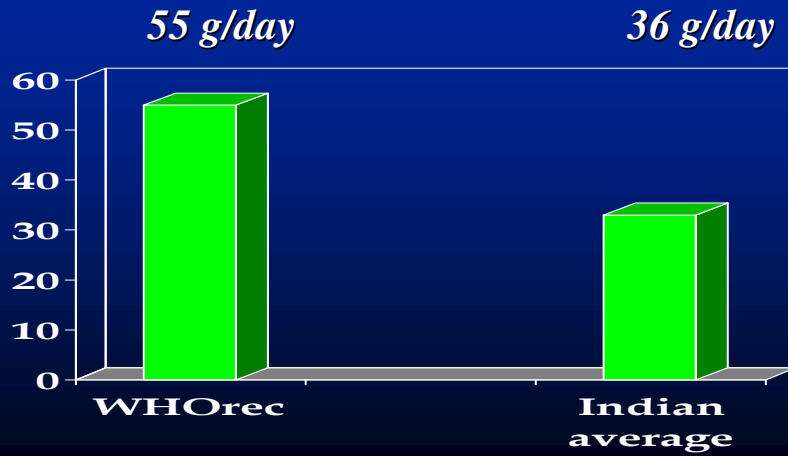
FATS (fatty acids - some are essential)	9 kcal / g
CARBOHYDRATES (simple, complex)	4 kcal / g
PROTEIN (amino acids - some are essential)	4 kcal / g
WATER	

- **Micronutrients**

VITAMINS (fat and water soluble)
MINERALS

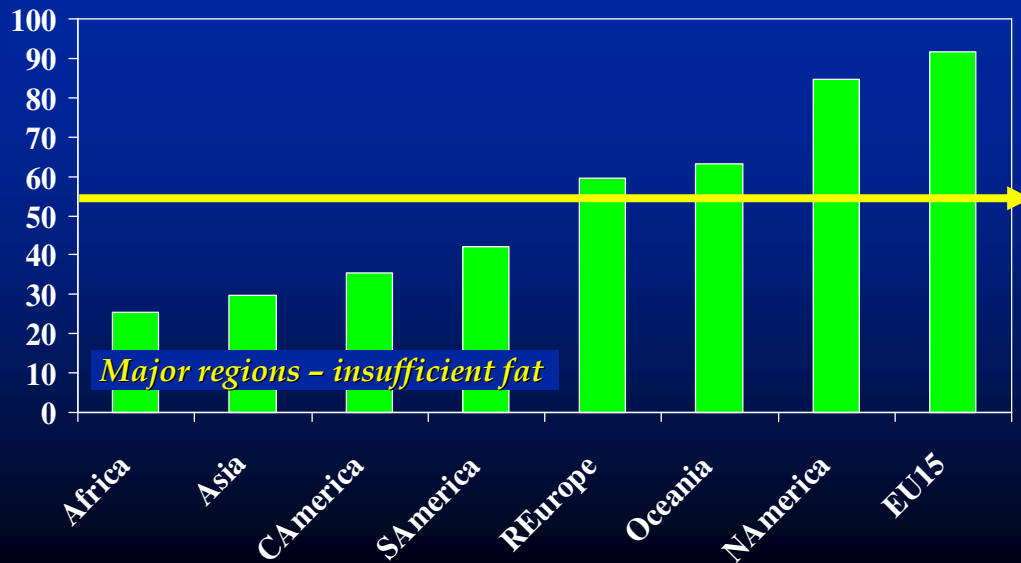
- **Fat is a component of every single cell**

Fat consumption: Recommendation vs Reality



Source : FAO website

Per Capita Fat Consumption - g/day



Source : FAO website

Sufficiency of Oils & Fats

Oils and Fats Balance 2006 ('000 MT)					
	Production	Disappearance	Imports	Exports	Net Exports / (Imports)
Malaysia	18,139	3,662	1,287	15,535	14,248
Indonesia	18,366	4,504	86	13,761	13,675
Argentina	8,222	942	17	7,374	7,357
Brazil	7,922	4,899	224	2,399	2,399
Ukraine	2,362	955	244	1,676	1,432
Others	2,400	4,000	200	4,500	4,300
<i>- handful of countries are sufficient in terms of edible fat production</i>					
Australia	944	769	287	449	162
Colombia	867	824	237	272	35
USA	16,699	16,202	2,637	2,596	(41)
Russia	3,169	3,444	923	671	(252)
Taiwan	512	812	312	16	(296)
<i>- Why palm oil?</i>					
<i>-Largest production, largest amount exported, highest yield - no supply problem</i>					
<i>-- India imported ~ 8.6 million tonnes</i>					
Pakistan	1,666	2,212	1,750	116	(1,635)
India	9,161	13,741	4,949	299	(4,650)
China P.R.	19,519	27,710	7,840	110	(7,829)
EU-25 World	18,072	26,294	9,800	1,384	(8,416)
Others	11,211	19,541	13,540	5,134	(8,406)
World Total	149,616	148,263	55,839	56,042	203

* North Africa=Algeria, Libya, Morocco, Tunisia

Nutritional attributes of Palm Oil/Palm Olein

- Variety of carotenoids (Vitamin A)

"Vitamin A" activity of red palm oil

	RE Per 100 g	Relative quality (Times <red palm oil)
Red Palm Oil	30,000	-
Carrots	2,000	15
Leafy Vegetables	685	44
Apricots	250	120
Tomatoes	100	300
Bananas	30	1000
Orange Juice	8	3,750

Carotene Profile of red palm oil

Phytoene	2.0%
Phytofluene	1.2%
Cis- β - Carotene	0.8%
β - Carotene	47.4%
α - Carotene	37.0%
Cis- α - Carotene	6.9%
ζ - Carotene	1.3%
δ - Carotene	0.6%
γ - Carotene	0.5%
Neurosporene	Tr
β - Zeacarotene	0.5%
α - Zeacarotene	0.3%
Lycopene	1.5%

Numerous human studies showing efficacy of red palm oil in fighting Vitamin A deficiency

... studies have adopted different approaches to provide Vitamin A naturally

- Children fed traditional Indian sweets made with redPO
- School children fed biscuits baked with redPO
- School children given 5 - 10 mL redPO daily
- Cooking green leafy vegetables in redPO

- Also Vitamin A status improved by feeding redPO to pregnant mothers at various stages of pregnancy.

- Also lactating mothers

... Palm Oil/Palm Olein

- Variety of carotenoids (Vitamin A)
- Vitamin E (tocopherols and tocotrienols)

Comparison of Vitamin E Content of red palm oil & other Vegetable Oils

Oil	Tocopherols(ppm)				Tocotrienols(ppm)				Ppm T+T3
	α T	β T	γ T	δ T	α T3	β T3	γ T3	δ T3	
Red Palm Oil	152	-	-	-	205	-	439	94	890
Soyabean	101	-	593	264					985
Cornoil	112	50	602	18					782
Groundnut	130	-	216	21					367
Safflower	387	-	174	240					801
Sunflower	487	-	51	8					546

Numerous in vitro studies showing efficacy of tocotrienols in inhibiting breast cancer cell proliferation and decreasing neurodegeneration

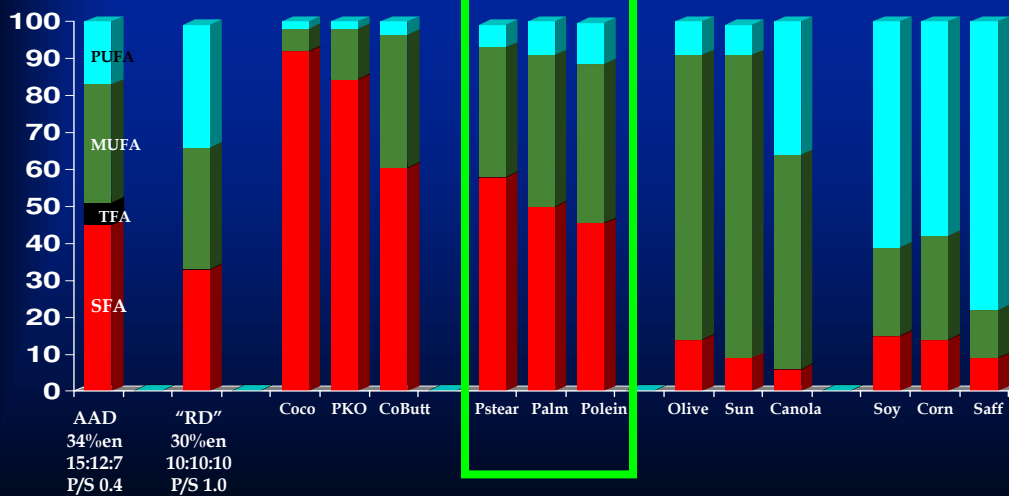
... Palm Oil/Palm Olein

- Variety of carotenoids (Vitamin A)
- Vitamin E (tocopherols and tocotrienols)
- **Fatty acid composition - replacement for trans Fatty acids**

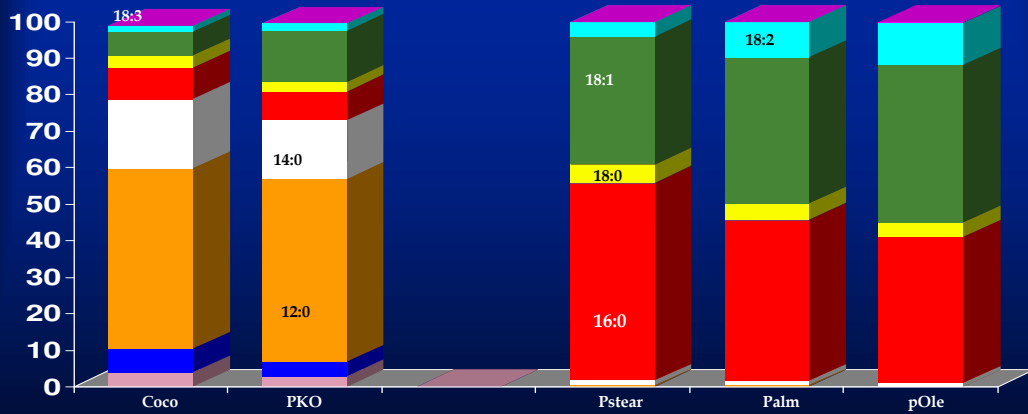
CHD risk

- Numerous factors
- **CHD risk calculator** - Age, Gender, TC, HDL-C, Smoking status, Blood pressure and treatment for Hypertension
- Lipids - not just LDL - LDL particle size, Lp(a) levels
- Also **HDL** levels
- Blood lipids affected by Diet (Fat, Fatty acids, carbohydrates, protein)

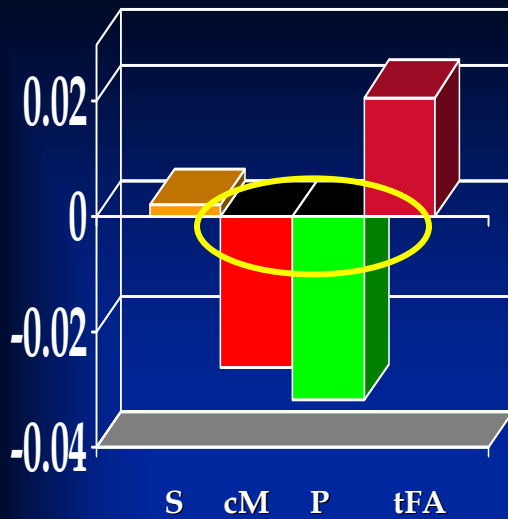
Dietary fat composition: by fatty acid classes



Palm Oil is distinct from Palm Kernel Oil



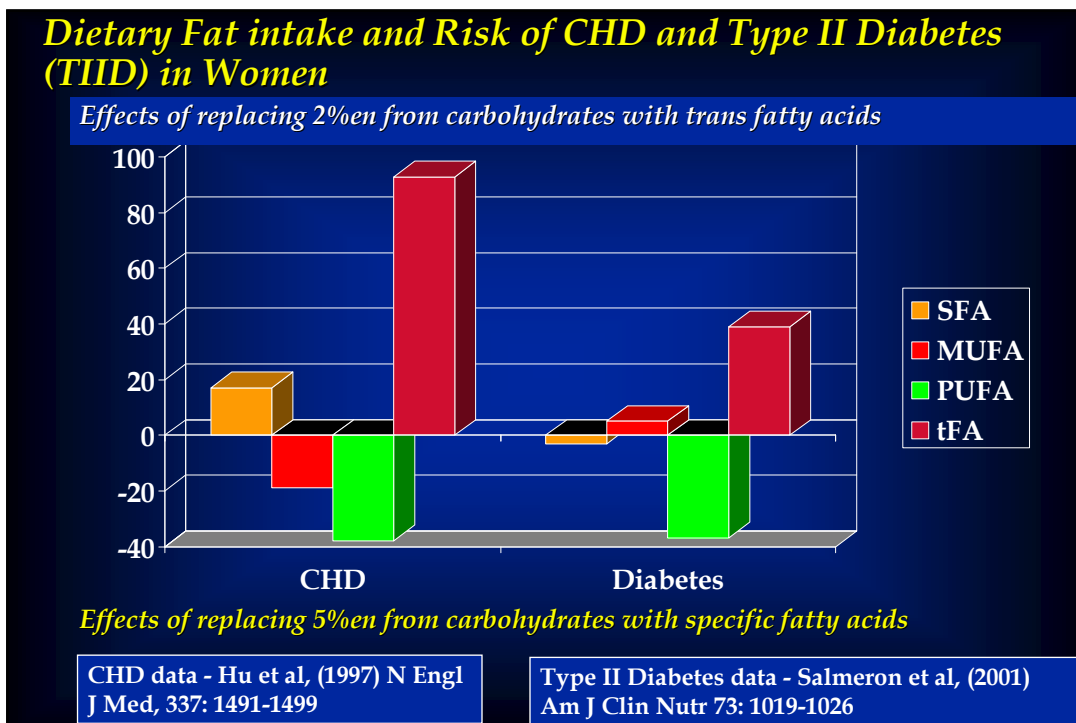
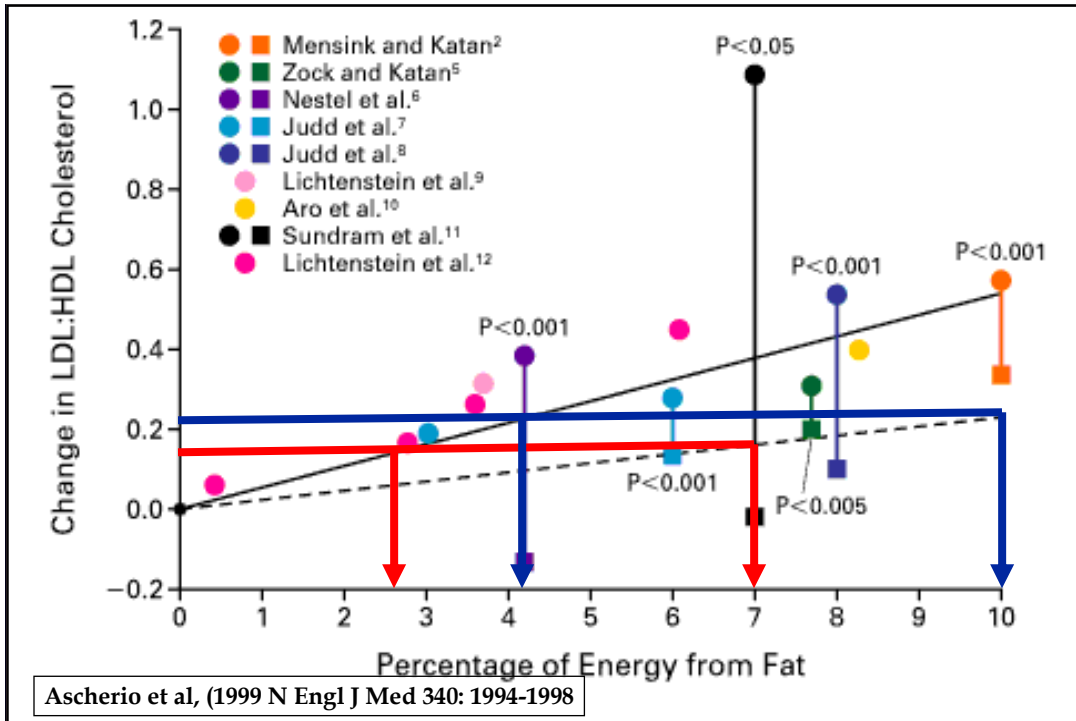
Effects on the TC/HDL-C ratio



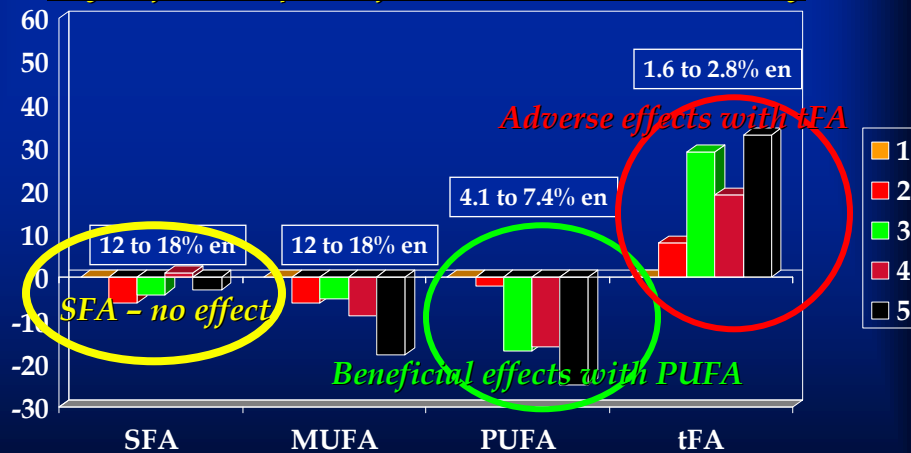
MUFA & PUFA best.
Trans worse than SFA

CHO → FA

Am J Clin Nutr (2003) 77: 1146-1155



*Relative risk of CHD based on quintiles of dietary fatty acid intake (Multivariate analyses)
20 year follow-up data from the Nurses Health Study*



from Oh et al (2005) Am J Epidemiol, 161: 672-679

...as a result

- Various countries have legislation on trans FA
- Denmark, Canada, US
- India ??
- ...so seeking viable alternatives

TRANS FAT REPLACEMENT ROUNDTABLE

Moderator

Dennis Bier, M.D.

Professor of Pediatrics, Baylor College of Medicine

Participants

Margo A. Denke, M.D.

Clinical Professor of Medicine, University of Texas Health Science Center, San Antonio

Joseph Judd, Ph. D.

Former Research Leader, Diet and Human Performance Laboratory, Beltsville Human Nutrition

Research Center, USDA Agricultural Research Service

Richard O'Brien

Industry Consultant, Author, "Fats and Oils Formulating and Processing for Applications"

Fran Seligson, Ph. D.

Independent consultant and Associate Professor in the Nutrition Department at Penn State

Howard Weintraub, M.D.

Co-Clinical Director, Lipid Treatment and Research Center, New York University Medical

Center, Clinical Associate Professor of Medicine

Palm Oil "reasonable" replacement for trans fats

How much palm oil? Conservative approach -- based on current recommendations for restricting SFA -- can calculate the amount of palm oil in a prudent diet that satisfies various dietary guidelines

% calories from SFA	% calories from total fat				
	20	25	30	35	40
5	54	43	36	31	27
6	65	52	43	37	32
7	76	61	51	43	38
8	87	69	58	49	43
9	97	78	65	56	49
10	100**	87	72	62	54

Khosla (2006) J Agro Food Ind. 17: 21-23

Hayes and Khosla, Eur J Lipid Sci Tech (2007) 109: 453-464

- Since trans are **twice** as potent as SFA - an **equal** replacement of trans with SFA (e.g. 1 g with 1 g) will **improve** lipids and decrease risk
- .. further **improvement** with unsaturated oils

How would this affect CHD risk?

Has been calculated that based on

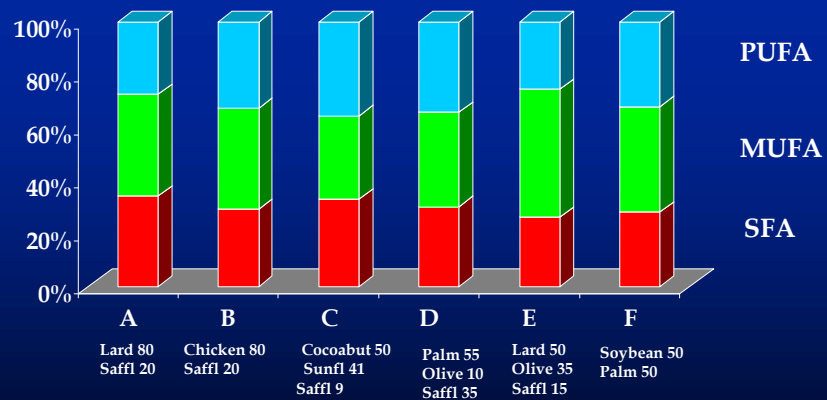
- 1) Changes in plasma lipoproteins, replacing 2% calories from trans FA with saturated fatty acids... would decrease risk by 4%
- 2) Changes in additional parameters for CHD, besides lipoproteins, replacing 2% calories from trans FA with saturated fatty acids... would decrease risk by 17%

[Mozaffarian and Willett, \(2007\) Curr. Ather. Rep., 9: 486-493.](#)

- Since trans are **twice** as potent as SFA - an **equal** replacement of trans with SFA (e.g. 1 g with 1 g) will **improve** lipids and decrease risk
- .. further **improvement** with unsaturated oils

Sunflower	7	4 - 6	20 - 30	60 - 70	<1
	5	4 - 5	80 - 90	5 - 9	<1
	4-5	4 - 5	55 - 75	15 - 35	<1
Soybean	11	4	23	54	8
	10 - 15	5 - 6	32 - 41	41 - 45	2
	25	4	16	44	10
	9	26	18	39	8
	8	3	84	3	1
Canola	4	2	62	22	10
	4	2	89	2	3
	Palmitic	Stearic	Oleic	Linoleic	Linolenic

Blending of oils/fats



Fatty acid compositions (percentage) of Palm Oil and soft oil blends

Olive Oil Canola Soy Oil Safflower

SFA	14 - 50	6 - 50	15 - 50	9 - 50
MUFA	77 - 41	58 - 41	24 - 41	13 - 41
PUFA	9	36 - 9	61 - 9	78 - 9

... .. practical aspects

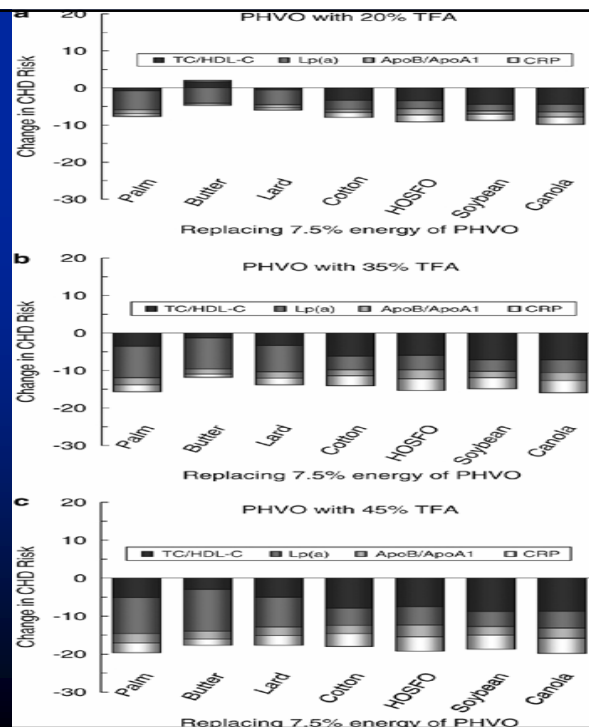
SFA vs tFA- not a realistic comparison

Look at specific fats/oils replacing PHVO containing tFA

CHD risk based not just on changes in plasma lipoproteins.

Report of [Mozaffarian and Clarke \(2009\)](#) is of interest

Also risk assessment papers ([Barraj et al 2008](#), [Mente et al 2009](#))



Summary

Palm Oil and its products – serve a multitude of nutritional needs

Adequate supply makes palm oil *the* important player on the global stage

Natural fatty acid profile of palm eliminates need for hydrogenation – so ideal for trans fat-free formulations.

Even if trans FA replaced exclusively with **SFA**, CHD risk improved

Vast array of products using palm oil blended with other oils already in the US

Help in removing trans FA

Trans Fat Help Center

www.notransfatnyc.org

Margarines Spreads - 0 grams trans fat

- Promise
- Gold-N-Sweet Zero Trans Whipped Spread
- Smart Balance 67% Buttery Spread
- Smart Balance Omega Plus Butter Spread
- Gold-N-Sweet Zero Trans Whipped Margarine
- Sunglow Zero Trans European Style Whipped Butter Blend
- Gold'n Flavor Table Grade Margarine
- Old World Table Grade Zero Trans Margarine
- Aurora Trans Free Butter Blend
- Aurora Table Grade Margarine
- Admiration 0 Grams Trans Fat Margarine
- Ventura Table Grade Margarine - Natural
- Ventura Table Grade Margarine - Natural Non-Dairy
- Plus 7 others

Baking Shortening, Baking Margarines and Doughnut Fry Oils - 0 grams trans fat

All purpose baking shortening

- Majestic NH 20 Plus
- Transadvantage P-100 NH Palm Shortening
- Sanstrans RS 39 T20
- BBS Z
- Elite Vream NH
- Primex Z
- Sanstrans 39
- Sanstrans 39 T15
- Richtex P-ZT
- Ventura All Purpose Palm Oil Shortening

Butter, Butterblend and Bakers Margarine

- Buckeye Z
- Gold'n Flavor Palm/Soy Table Grade Margarine W
- Old World Zero Trans Table Grade Margarine
- Coral NH White Margarine
- Gold'n Flavor Baker's Margarine (Palm/Soy)
- Smart Balance Butter Blend
- Ventura Cookie Dough Margarine (GMO free)
- Old World Zero Trans Bakers Margarine
- Victor NH Margarine
- BBS Z
- Bunge Donut Fry NT

Doughnut Fry Shortening

- Primex Z
- BBS Z
- Bunge Donut Fry NT
- Sans Trans Donut Fry P

Cake and Icing Shortening

- Cremol NH Icing Shortening
- Sweetex Z
- Alpine Z
- Hymo Z Emulsified Cake and Icing Shortening

Roll-in/Flake Shortening (Puff Pastry/Danish/Biscuit)

- Bunge NH Hi Ratio Roll In
- Bunge Biscuit Flake NH
- Golden Brands LP415NT Zero Trans Shortening Flake
- Golden Brands LP480NT Zero Trans Shortening Flakes

Roll-in/Flake Margarine (Puff Pastry/Danish/Croissant)

- Ventura NTF Puff Pastry Margarine
- Bunge Croissant NH Roll-in Margarine
- Ventura Pastry Margarine
- ZT Puff Pastry Margarine (Con Agra)

Fry Oils and Shortenings - 0 grams trans fat

- Fry Chef
- SansTrans Fry HD-50
- Old World Trans Free Liquid Margarine
- Palm Oil