# Health Effects of Palm Oil - looking beyond the saturated fatty acids

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Sufficiency of Oils & Fats								
Oils and Fats Balance 2006 ('000 MT)								
		Net Exports /						
	Production	Disappearance	Imports	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	7,022	4,803	224	2,558	2,334			
Ukraine	2,362	955	244	1,676	1,432			
Canada	2,488	1,377	434	1,567	1,133			
Philippines	1,533	698	268	1,084	816			
Thailand	1,119	997	105	272	167			
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	513	812	312	16	(296)			
Nigeria	1,416	1,763	367	13	(354)			
Rep of S. Africa	450	1,116	733	34	(699)			
South Korea	412	1,160	760	9	(751)			
Japan	1,940	2,859	926	13	(913)			
Mexico	1,667	2,788	1,101	30	(1,071)			
Bangladesh	199	1,318	1,102	0	(1,102)			
Egypt	295	1,431	1,192	48	(1,144)			
Iran	306	1,531	1,282	78	(1,204)			
North Africa *	507	1,758	1,642	313	(1,329)			
Turkey	1,231	2,519	1,691	323	(1,368)			
Pakistan	1,666	3,312	1,750	115	(1,635)			
India	9,161	13,741	4,949	299	(4,650)			
China PR	19,640	27,143	7,943	418	(7,525)			
Denice En 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, Morrocco, Tunisia								

















- 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 but functionality and supply concerns
- Conservative Recommendation: Eliminate trans but ensure that the total SFA + trans content of original formulation is not exceeded by total SFA in new formulation
- Original 3 g SFA + 2g trans. New 5 g SFA or less
- Replacing trans with SFA will improve the scenario
- Palm oil appears to be an ideal and viable alternative

#### TRANS REPLACEMENT FAT 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 <u>prudent</u> diet that satisfies various dietary guidelines

% calories		% calories from total fat			
from SFA	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

<ul> <li>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</li> </ul>									
further improvement with unsaturated oils									
	7	4 - 6	20 - 30	60 - 70	<1				
Sunflower	5	4 - 5	80 - 90	5 - 9	<1				
	4-5	4 - 5	55 - 75	15 - 35	<1				
	11	4	23	54	8				
	10 - 15	5 - 6	32 - 41	41 - 45	2				
Soybean	25	4	16	44	10				
	9	26	18	39	8				
	8	3	84	3	1				
	4	3	25	58	8				
	4	2	<mark>62</mark>	22	10				
Canola	4	2	89	2	3				
	Palmitic	Stearic	Oleic	Linoleic	Linolenic				

















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

	Olive Oli	Cunotu	<i>soy</i> 0 <i>ii</i>	Sujjiower
SFA	14 - 50	6 - 50	15 - 50	9 - 50
MUFA	77 - 41	<b>58 - 41</b>	<b>24 - 41</b>	13 - 41
PUFA	9	36 – 9	61 – 9	78 - 9

### Palm Oil/Soybean Oil mix

Elimination of trans SFA decreased by 25% MUFA unchanged 18:2 increased by 2.1 fold P/S increased 2.7 fold 18:3 has increased 2.6 fold 18:2/18:3 ratio has gone from 10:1 to ~8:1



# .....but let's be practical

In real life – SFA vs tFA– not a realistic comparison

Look at specific fats/oils replacing PHVO containing tFA

Also focus on CHD risk based not just on changes in plasma lipoproteins.

Report of Mozaffarian and Clarke (2009) is of interest



# *"Vitamin A" activity of red palm oil*

RE	Relative quality
Per 100 g	(Times <red oil<="" palm="" th=""></red>
30,000	-
2,000	15
685	44
250	120
100	300
30	1000
8	3,750
	RE         Per 100 g         30,000         2,000         685         250         100         30         8

# 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 <u>red palm oil</u> 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



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

Oil	Tocopherols(ppm)			Tocotrienols(ppm)				Ppm	
	αΤ	βT	γT	δT	<b>α</b> Τ3	βT3	γT3	δΤ3	T+T3
Red Palm Oil	152	-	-	-	205	-	<b>4</b> 39	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



### 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 <u>SFA</u>, CHD risk improved
- Vast array of products using palm oil blended with other oils already in the US

From Jan – Feb 2009, palm oil imports into Japan (~ 96, 500 tonnes) were 13% higher than corresponding figures in 2008