

Stability and Desired Attributes of Palm Olein in Deep Frying Applications : An Update.



Malaysian Palm Oil Council

Outline

- Frying Basics & Oil Deterioration
- Palm Base Frying Oil Attributes
- Blending & Trans Free Oils
- Frying Applications
- Summary

Frying Process

Saueting

Pan Frying

Stir Frying

Shallow Frying

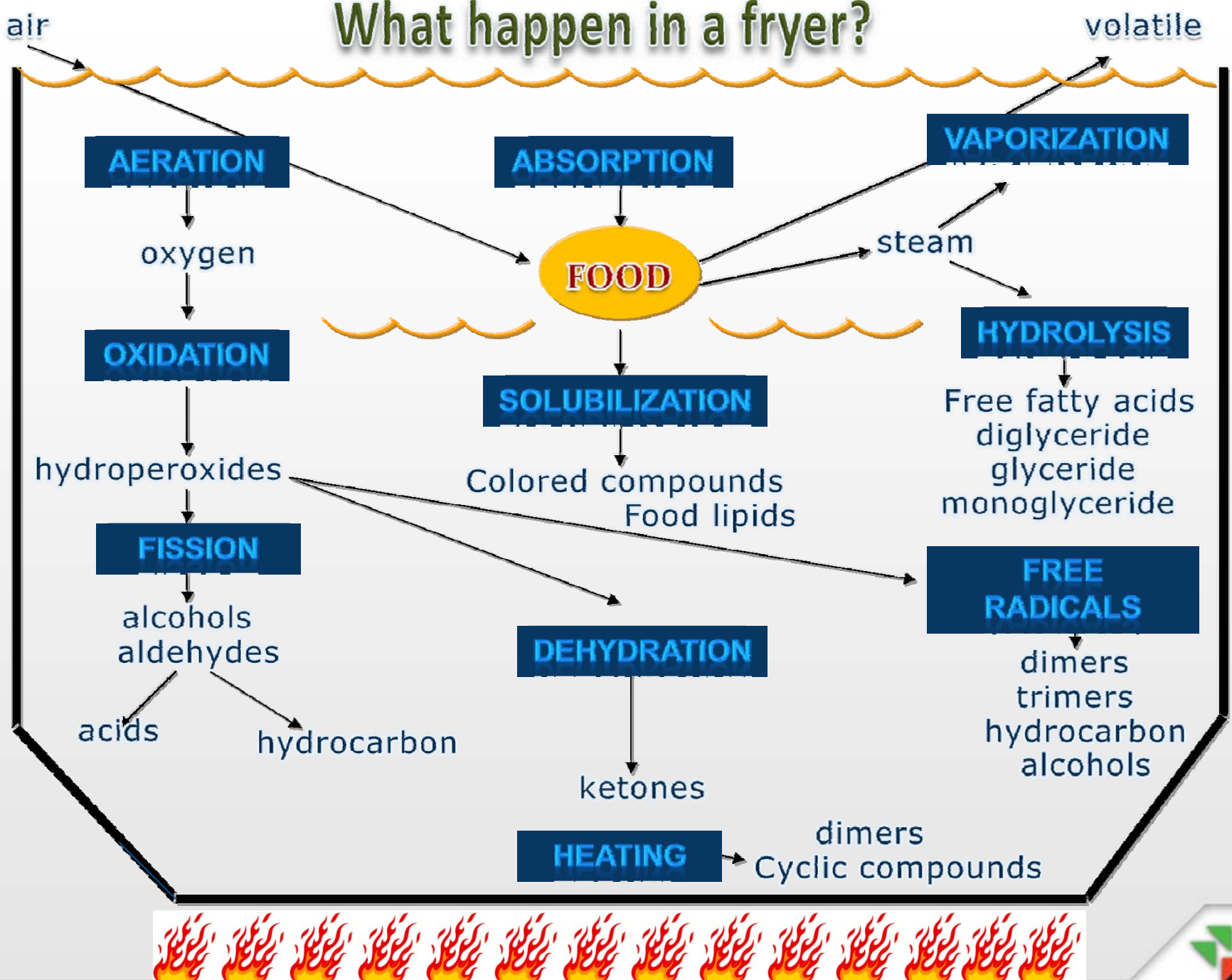
Deep Frying

What is Deep Frying Process???



Definition : Deep Frying is a cooking process, with which water containing Foodstuff is immersed into edible oils at a temperature between 150 – 190 degree Celsius

What happen in a fryer?



Agents of Deterioration

Polymerization

Reaction of fatty acids
creation of long chain molecule
Increase oil viscosity - less effective heat transfer
Cause increased oil absorption in fried products
produce gums which stick to fryer wall



Oxidation

Reaction of hot unsaturated oil with oxygen
Give rise to off flavours (rancidity)
Initiates polymerization

Agents of Deterioration

Hydrolysis

Action of water
Splitting of fatty acids
Creates FFA & reduces smoke point
Creates monoglycerides which stabilize foaming



What do we know about by products of oil deteriorations?

Total Polar Compounds

Free Fatty Acids (FA)

Dimeric and polymerized FA

Dimeric and polymerized triglycerides (TG)



TPM Volatile

Peroxides, monoglycerides, diglycerides
Aldehydes, ketones, carboxylic acids

TPM Non-Volatile

Monomers, dimers, trimers
other high-molecular-weight compounds



Legislative Limits for Used Frying Oils

Country	Minimum	Maximum				
	Smoke pt %	Acid Value %	Free Fatty Acids %	Oxidised Fatty Acids %	T.P.M. %	Polymers %
Austria	170	2.5		1	27	
Belgium	170				25	10
Chile	170		2.5	1	25	
France					25	
Italy					25	
Netherlands		4.5				16
S. Africa					25	16
Spain					25	
Japan	170	2.5				
Finland	170	2.0			25	
Hungary					25	
Taiwan	170	2.0			25	

Sensory: Darkening, smoke, foaming, thickening, rancid taste.

Laboratory: Acidity, anisidine value, viscosity, total polar compounds, polymeric triglycerides.

To Minimize Deterioration/breakdown

- Reduce the amount of water released into the frying fat (water is generally introduced from the food that is being fried).
- Use moderate frying temperature (the higher the temperature, the more rapid the rate of free fatty acid production).
- Fat turn overrate (the more rapid the replacement of used oil/fat with fresh, the slower the rate of free fatty acid development).
- Good Overall Frying Practice
- Use stable frying oils /fats

You can Choose Different Frying Medium?

Liquid oil

Sunflower oil

Soy bean oil

Groundnut oil

Cottonseed oil

Rapeseed oil

Olive Oil

Palm kernel olein

Coconut oil

Palm olein

Semi Solid Fat

Hydrogenated marine oil

Hydrogenated vegetableoil

Lard

Butter oil

Hard Fraction

Hard fraction butter oil

Hard fraction beef fat

Tallow

Palm stearin

Frying Oil

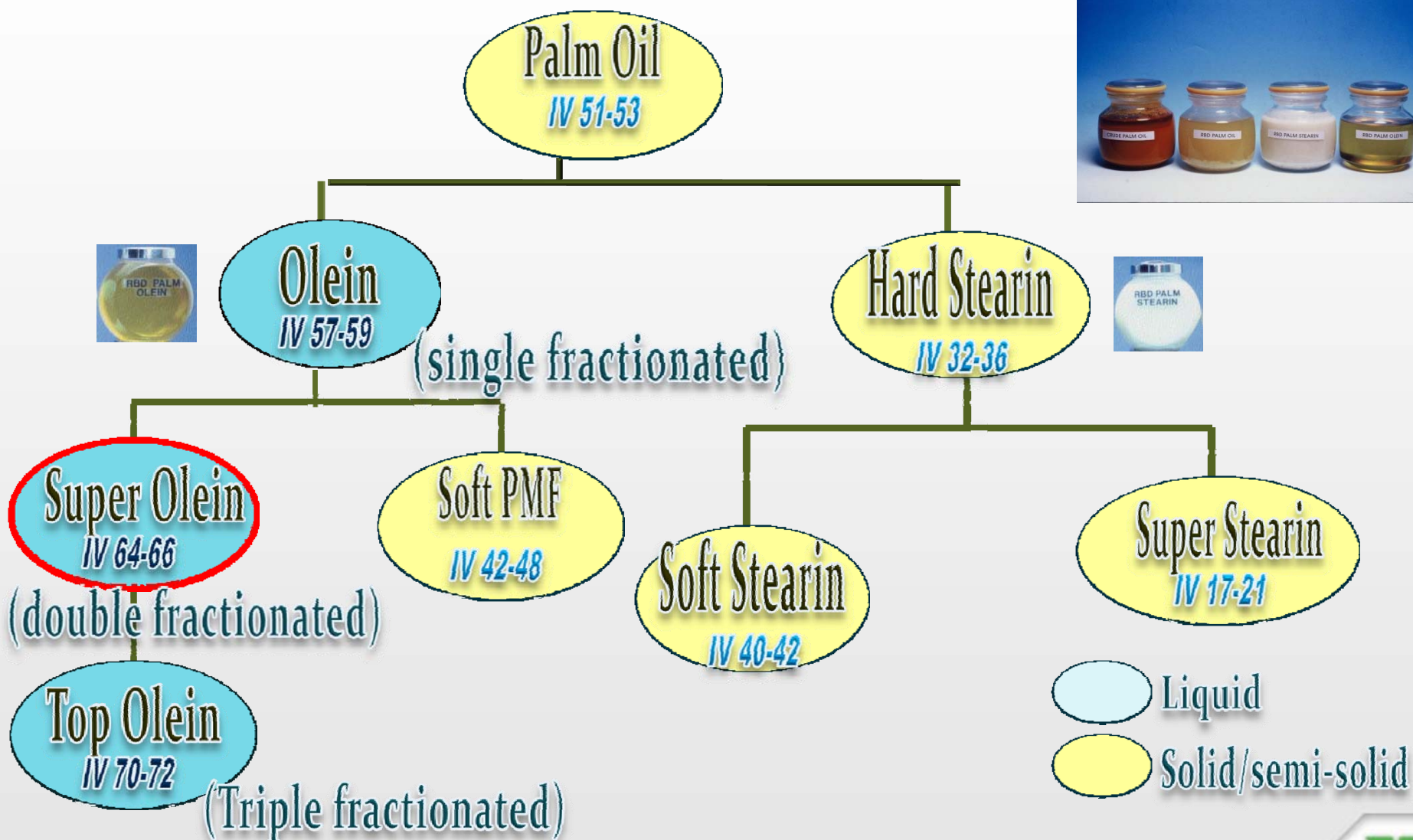


What can you expect



From Palm?

Versatile Frying Medium



PALM FRACTIONS WITH DIFFERENT IV RANGE FOR FOOD

TOP QUALITY

Typical specifications of palm olein for snack food frying

- FFA <0.05%
- PV <1
- M&I <0.1%
- COLOUR <3R
- FLAVOUR BLAND
- SMOKE POINT 220-240C

Our Commitment



Standard

Choose Oil with **high smokePoints**,
in other Words, those which do not break
down at deep frying temperature and have
high oxidative stability
should be the oil of choice



Typical example of Palm Based Frying Oil

JGQ™ Frying Oil From JOMALINA

Description

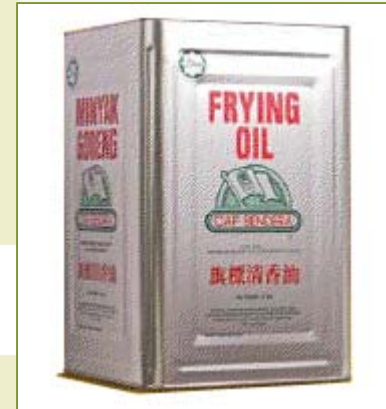
Guaranteed Quality (JGQ™) Frying Oil is produced from premium quality (PQ) Crude Palm Oil (CPO) which is specially produced from selected and segregated fruits from only a selective numbers of estates/ mills, followed by immediate processing with special handling. Give excellent frying stability.

Applications

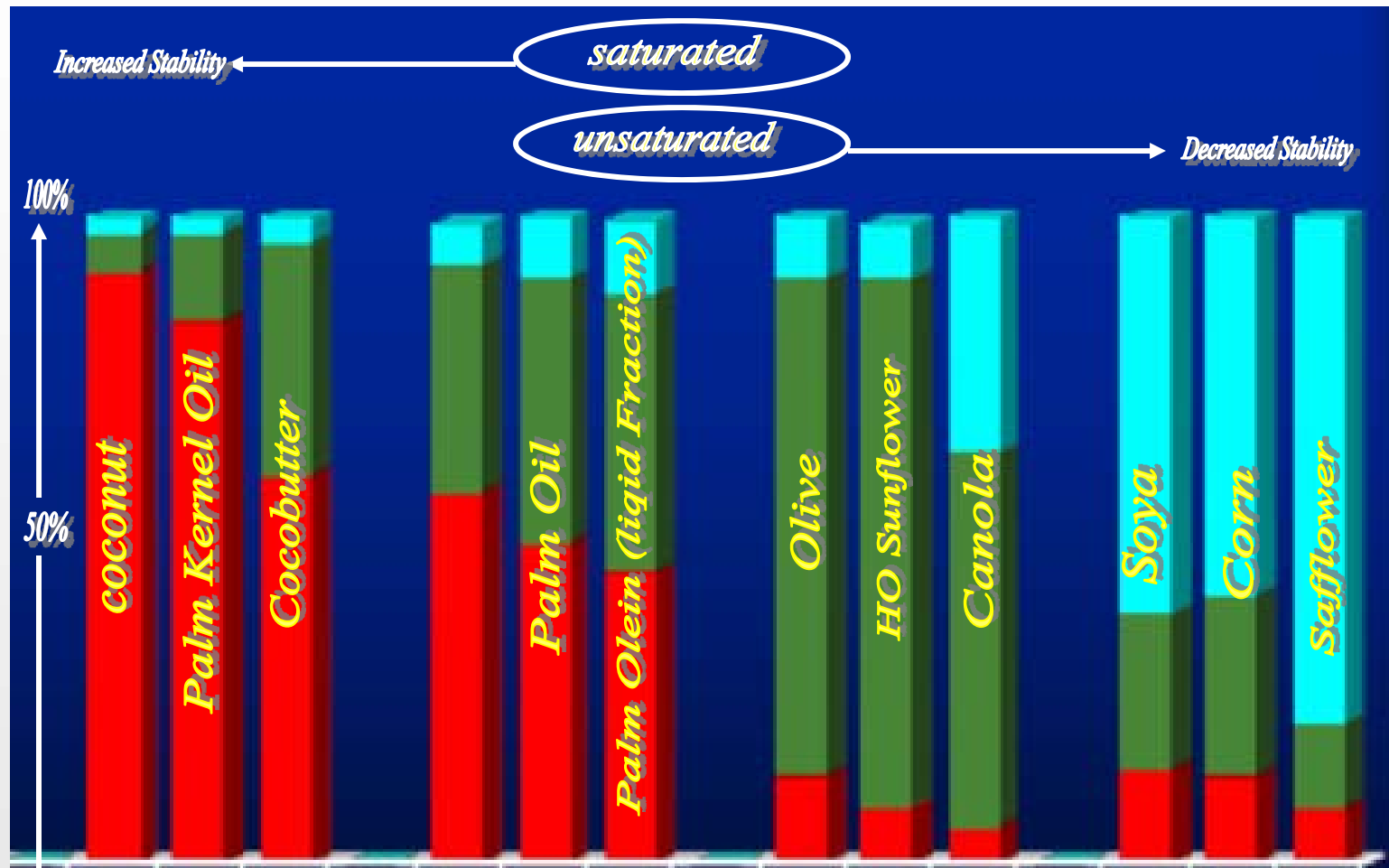
Deep frying.
Instant noodle frying.




Benefit

- High oxidative stability refined palm fats.
- Longer shelf life and slower quality deterioration of finished products.
- No Trans Fatty Acid.
- Guaranteed to be within speciation upon arrival of destinations
- Cholesterol Free.
- Rich in natural antioxidants (Tocopherols&Tocotrienols)



Relationship Between Stability & Saturation



Mono unsaturated 
Poly unsaturated 
Saturated 

Not all saturated fats are cholestrolemic and they contributes significantly to stability of the frying oil.

PUFA are easily oxidized and are not recommended for deep frying

Palm Oil Fatty Acid profile

- *Saturated/Unsaturated ratio = 1.0*
- *Myristic Acid C14:0 1% Sat*
- *Palmitic Acid C16:0 45% Sat*
- *Stearic Acid C18:0 4% Sat*
- *Oleic Acid C18:1 40% Mono Unsat*
- *Linoleic Acid C18:2 10% Poly Unsat*

Balanced Fatty Acid profile

Tocopherol/Tocotrienol Content of Palm Oil (ppm)

		α Tocopherol	α Tocotrienol	γ Tocotrienol	σ Tocotrienol	Total
Crude Palm Oil	Mean (n=9) Range	162 136-241	165 90-205	324 273-439	81 67-94	774 635-890
Refined Palm Oil	Mean (n=3) Range	117 85-180	117 99-147	158 67-239	31 5-62	426 256-630
Refined Palm Olein	Mean (n=8) Range	141 107-163	152 131-177	218 113-293	49 28-68	561 478-673

An important function of the tocopherols/Tocotrienols is to protect the unsaturated fatty acid components of the oils from oxidation

Tocol Content and Unsaturation of some Refined Vegetable Oils

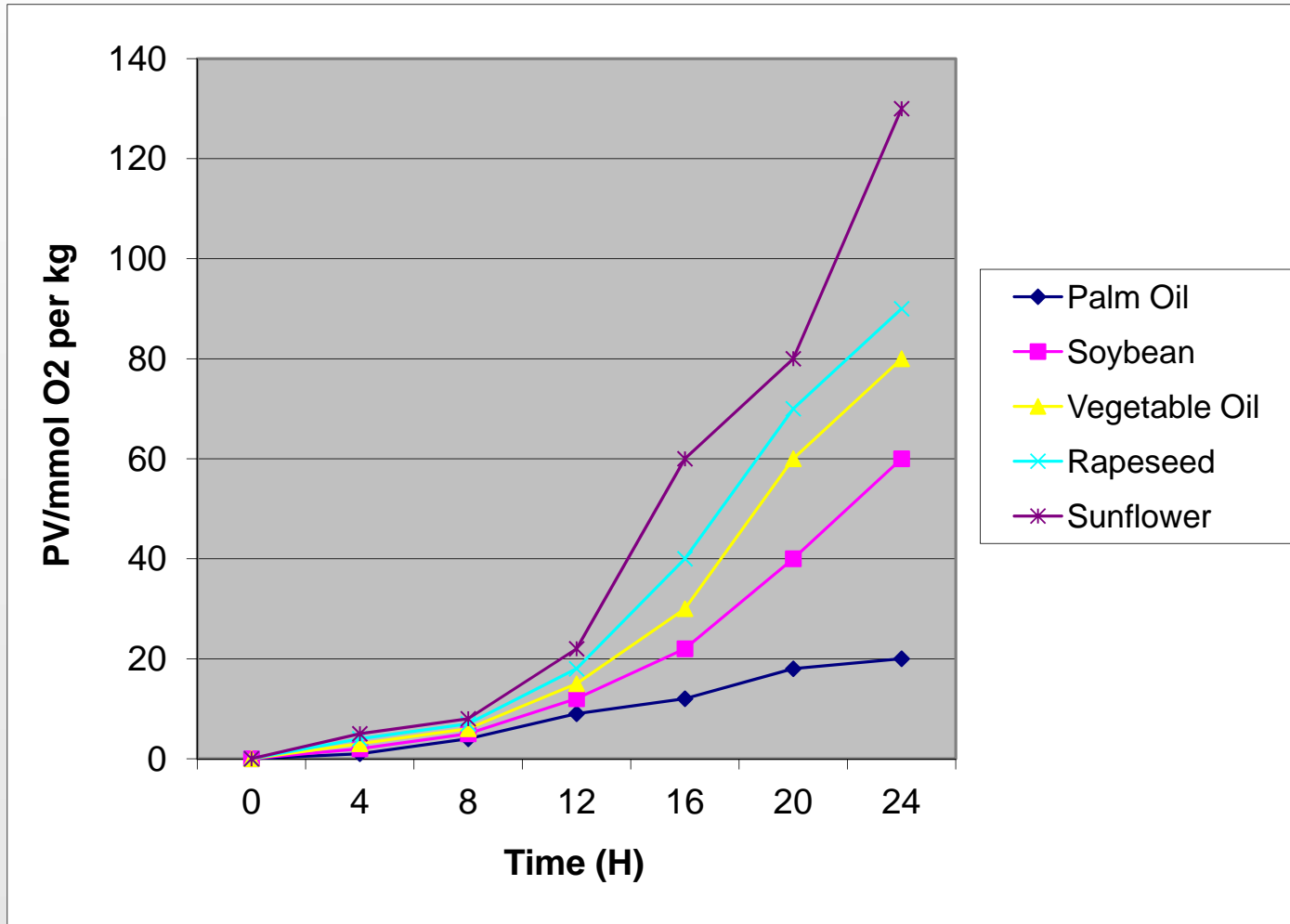
Oil	A PUFA%	B Tocol (mg/kg)	Ratio B/A
Palm Oil	10	498	50
Palm Olein	11	662	60
Rapeseed	38	271	7
Soyabean	60	1162	19
Sunflower	54	636	12
Groundnut	22	331	15

Palm oil and palm olein have a markedly higher proportion of tocopherols in relation to their poly-unsaturated acid content than other oils.

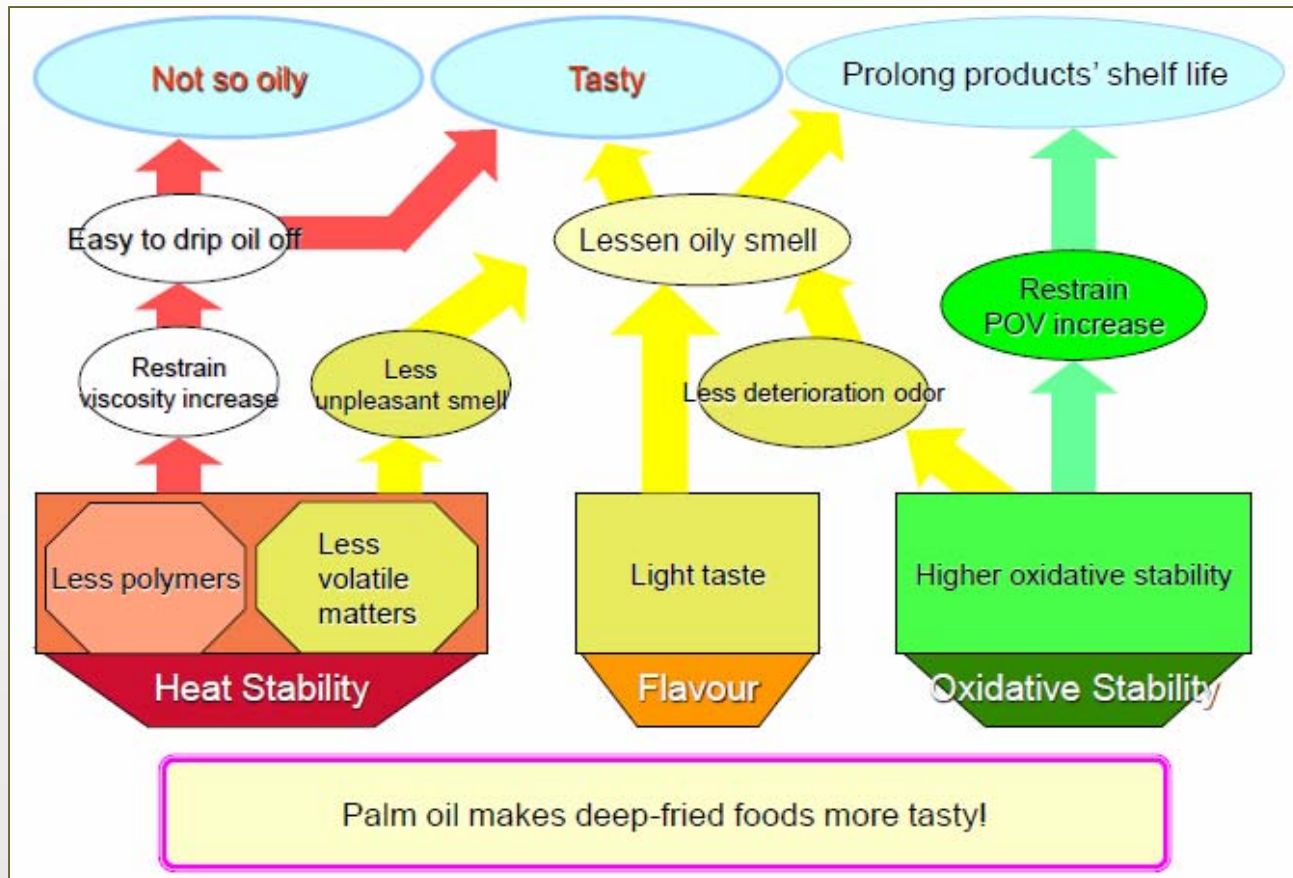
It is thought that this is an important factor in their exceptionally good resistance to oxidation at high temperature during frying.

Gapor, A.T., Berger, K.G., Hashimoto, T., Kato, H., Tanabe, K., Mamuro, H., Yamaoke, M.
Effect of processing on the content and composition of tocopherols and tocotrienols in palm oil. In:
Pushparajah, E., Rajadurai, M. eds.
Palm Oil Product Technology in the Eighties. Kuala Lumpur: Incorporated Society of Planters, 1983,
pp145-156

Oxidative stability of some oils (Oven test at 98 ° C)



Attributes of Good DeepFrying Oil



Courtesy : BK Tan, Nissin Olio

Other Frying Attributes of Palm Oil

Neutral taste - Enhance natural flavor to fried food

Very resistant to foaming

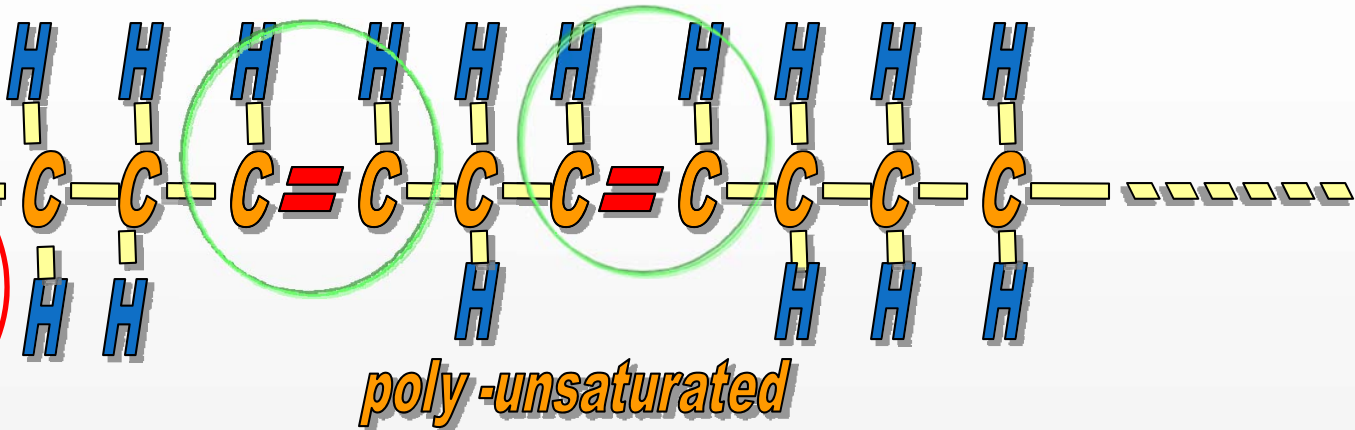
Maintains acceptable color after several frying cycle

Less Volatile Compound formed

Fact : Most soft oils are Partially Hydrogenated to Improved Stability

e.g

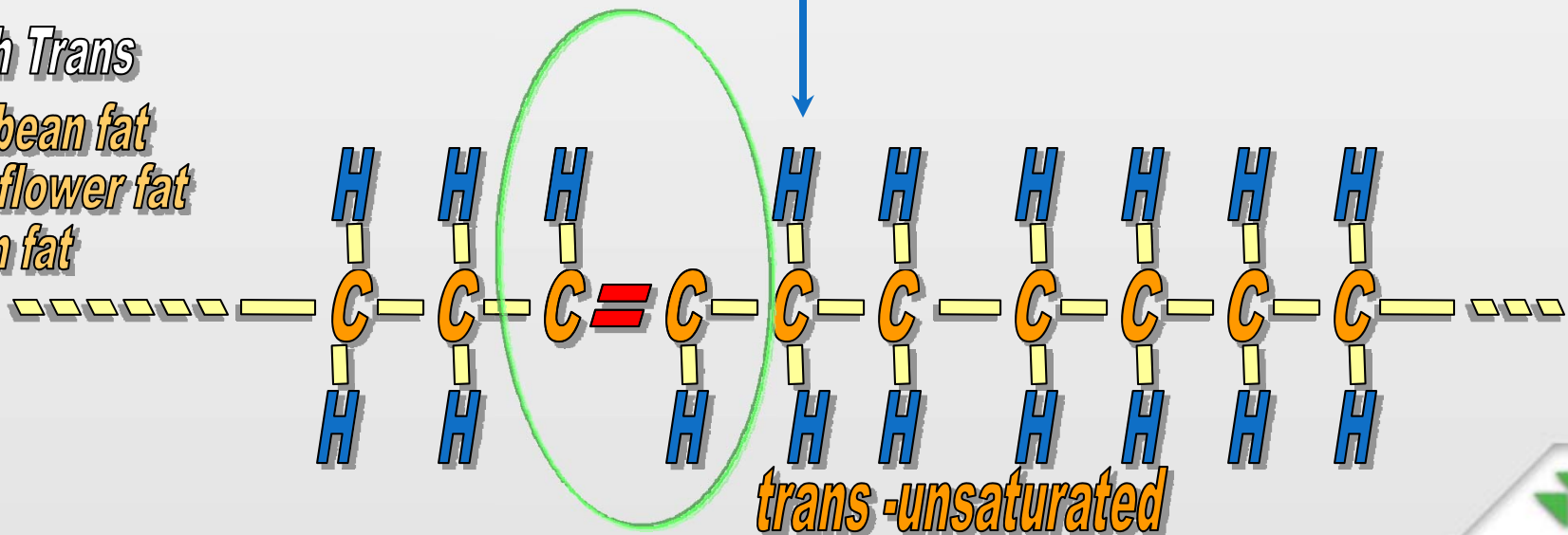
Soybean oil
Sunflower oil
Corn oil



Partial Hydrogenation

High Trans

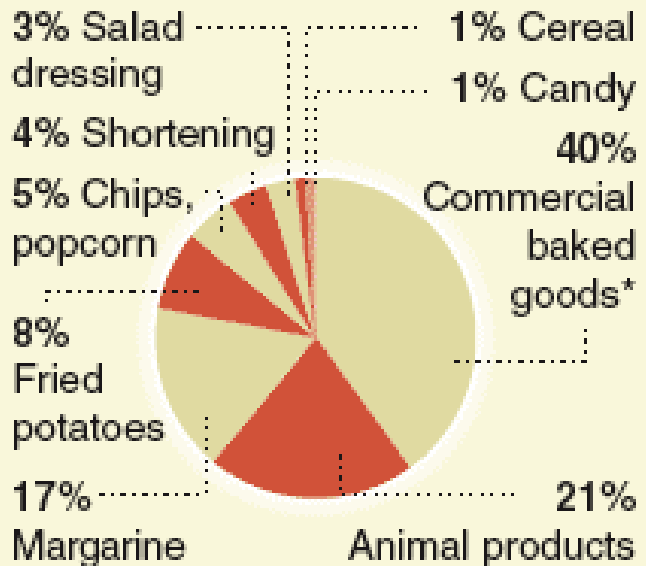
Soybean fat
Sunflower fat
Corn fat



Trouncing trans fat

New York City's board of health is poised to approve the nation's first ban on trans fats – harmful artificial oils that can be replaced with other ingredients.

Major food sources of trans fat for American adults



* Commercial baked goods include cakes, cookies, crackers, doughnuts, pies and bread

SOURCES: Food and Drug Administration; American Heart Association

Current trend in food industry is to move away from trans fat

Banning of Trans Fat in Restaurants In Major Cities Across US

Courtesy : USFDA & American Heart Association



Palm Vs Rapeseed

	<i>French fries</i>		<i>Crisps</i>	
<i>Oil</i>	<i>Polar Compounds</i>	<i>Taste Score</i>	<i>Polar Compounds</i>	<i>Storage Life</i>
<i>PO</i>	<i>22</i>	<i>7.2</i>	<i>20</i>	<i>>6 months</i>
<i>RSO</i>	<i>40</i>	<i>5.7</i>	<i>38</i>	<i>4 months</i>
<i>PO:RSO 50:50</i>	<i>32</i>	<i>6.2</i>	<i>30</i>	<i>5 months</i>
<i>HRSO</i>	<i>22</i>	<i>6.8</i>	<i>20</i>	<i>3 months</i>
<i>PO:POS:RSO 40:40:20</i>	<i>29</i>	<i>6.6</i>	<i>28</i>	<i>5 months</i>

PO = palm olein (IV 56)

(H)RSO = (hydrogenated) rapeseed oil

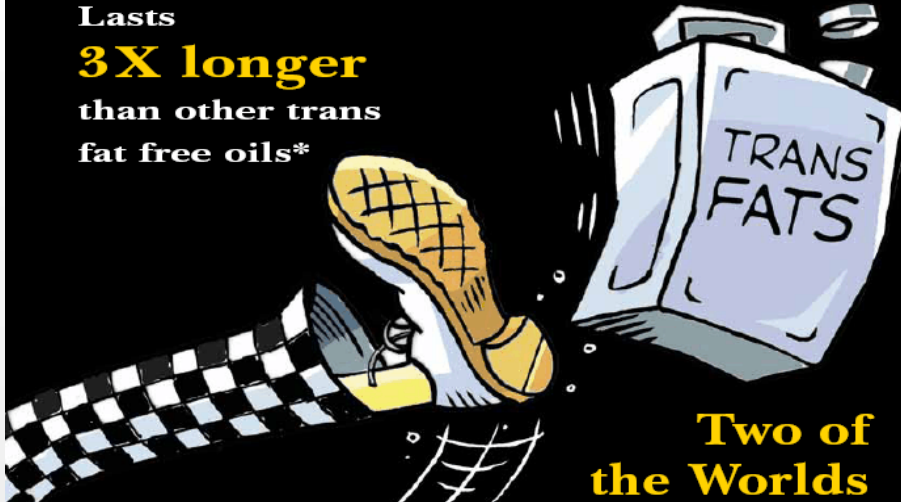
POS = palm stearin (IV 48)

It was concluded that the quality of potato products fried in rapeseed oil / palm olein blends was superior to that using rapeseed oil alone.

Blending with Palm Oil to impart stability

GIVE TRANS FATS THE BOOT...

Lasts **3X longer** than other trans fat free oils*



Two of the Worlds Top Three Fast Food Chains use FryChef™ in Europe!

INVEST IN THE BEST

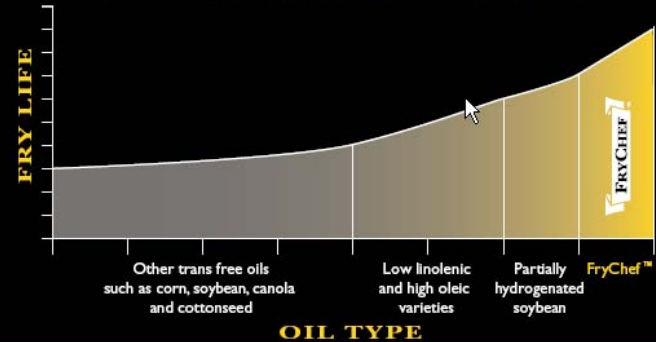
- Lowest cost-in-use trans fat free frying oil
- Lasts up to 3 times longer than other trans fat free oils*
- Lower disposal costs – bag-in-box recyclable packaging
- Lower labor cost – fewer oil changes



HEALTHIER FRYING

- Non hydrogenated – zero trans fats
- Cholesterol free
- Naturally high in Antioxidant Vitamin E
- No GM ingredients

LONG LIFE SAVES MONEY



GREAT TASTING FOOD

- Perfect for deep and shallow frying, roasting and sautéing
- Ideal for fries, chicken, fish and vegetables
- Odorless on food and odorless when cooking



Nutrition Facts	
Serving Size 1 Tbsp (15 kcal)	
Amount Per Serving	
Calories 155 Calories from Fat 155	
% Daily Value*	
Total Fat 1g	2%
Saturated Fat 1g	2%
Total Fat 1g	2%
Hydrogenated Fat 1g	2%
Unsaturated Fat 1g	2%
Cholesterol 1g	2%
Sodium 1g	2%
Protein 1g	2%
Vitamin E	50%

FryChef™

CASE SIZE:
4-gallon Bag-In-Box

CASE WEIGHT:
31.6 lbs

A specially processed
Palm Fruit Oil and Sunflower Oil

CONTACT INFORMATION:



800-642-0088

frychef@parway.com
www.frychef.com

IMPORTED BY:
US Food Group,
Towson, MD 21204

The above figures are verified against Laboratory Rancimat tests at 120°C (248°F) to bring oil to discard point. Source Aarhus/Karlskronn UK Ltd

Courtesy : Parkway Tryson

Palm Oil US Blend



Blending with Palm Oil to impart stability

SansTrans Fry PSF-30

*A Cost Effective Way
of Eliminating Trans Fat
for Heavy Duty Frying*



HEAVY DUTY – Totally eliminate trans fatty acids with a naturally stable palm olein & vegetable oil blend. Has a long fry life compared to other no trans oils.

COST EFFECTIVE – Our non trans 100% vegetable oil blend is readily available. And because it is a commodity oil, is cost effective.

RELY ON A GLOBAL LEADER – Loaders Croklaan is one of the largest suppliers of palm oil and has provided solutions to the food industry for over a hundred years.

Deep Frying Applications

- French Fries -
- Chicken -
- Seafood & Fish -
- Vegetables -
- Appetizers -

Advantages of SansTrans Fry PSF-30

- No Trans Fats, Non hydrogenated
- Odorless and tasteless in finished products
- Perfect for deep and shallow frying
- Long fry life
- Healthier nutritional profile
- Liquid for easy measure and convenience

Call us 24/7 toll free at 1-800-605-4721
sanstransfoodservice@crokiaan.com

www.crokiaan.com



Palm Oil US Blend

Source : Loaders Croklaan US



Texas A&M FryTest.com Zero Trans Fat Cooking Contest



Five different palm olein blends participated in this contest and performed extremely well

Total Polar Materials % after 300 frying over 13 frying days = 11.8%

The oils did not change in sensory attributes except for light color. Very minor changes occurred during repeated heating and usage of the oils. There were no prominent change in odour and off flavors. These changes did not occur in this study indicating that these 10 oils (*out of which 5 were palm olein blend*) maintained quality during repeated frying for 13 days and that differences in French fries cooked in these 10 oils were not practically impacted in flavor, taste, texture or appearance

New Oil Traits (GMO)– Post Trans Era)

Fatty Acid C atoms : double bonds	Oleic 18 : 1	Linoleic 18 : 2	Linolenic 18 : 3	Total Saturate
Soybean Oil High Oleic Low Linolenic Commodity	80% 25% 23%	3% 56% 50%	3% 3% 7%	12% 15% 15%
Canola Oil High Oleic Low Linolenic Commodity	75% 65% 60%	14% 12% 20%	3% 4% 10%	7% 7% 7%
Sunflower Oil High Oleic Low Linolenic Commodity	82% 56% 20%	10% 33% 65%	1% 1% 1%	8% 9% 10%

Problems associated with GMO oils are mainly cost and consumer safety



The Smart Way to Balance your Cholesterol



**SMART
BALANCE**

Smart Balance is a **great tasting cooking oil** with more health benefits and the only oil with **US Patents (5,578,334 & 5,843,497)** to improve **Cholesterol Ratio**.

Good & Bad Cholesterol

Coronary Heart Disease is the Number One killer in Malaysia, and Total blood cholesterol is the most common cholesterol measurement for CHD but it is not the most important.

The best measurement is LDL (low density lipoprotein cholesterol) level, HDL (high density lipoprotein cholesterol) level and the LDL/HDL ratio.

High level of LDL (bad cholesterol) causes narrowing or blockage of blood vessels in the heart. On the contrary, HDL (good cholesterol) reduces risk of heart disease.

A good ratio of HDL/LDL cholesterol is the key to reducing the risk of heart disease. Now, you can achieve this by combining Smart Balance with a healthy diet.

Smart Balance is a great tasting cooking oil :

- It has US Patents (5,578,334 & 5,843,497) to help improve cholesterol ratio in your blood
- It helps to increase the beneficial HDL cholesterol
- It helps to reduce the risk of coronary heart disease and coronary artery disease
- It contains Vitamin E (Tocotrienols & Tocopherols)
- Free from harmful Trans-Fatty Acids
- Now, with an improved and better blend of Soya, Palm Fruit and Canola Oil



Oil with US Patent to improve Cholesterol Ratio

Courtesy : Carotino Sdn. Bhd

Nutritious & healthy Oil from Palm



NUTRITIONAL INFORMATION		
Service Size: 15ml	15ml	100ml
Energy	510kj	3,400kj
Total Fat	14g	95g
Cholesterol, sodium, protein, carbohydrate, potassium	Nil	Nil
Natural Carotenes	1.75mg	11.6mg
- Beta Carotene (pro-vitamin A)	0.8mg	5.3mg
- Alpha Carotene (pro-vitamin A)	0.61mg	4.0mg
- Other Carotenes	0.34mg	2.3mg
Natural Vitamin E (Tocopherols & Tocotrienols)	8mg	52mg
Co-Enzyme Q10	0.14mg	0.93mg
Omega-3 Fatty Acids	1.0g	6.6g
Omega-6 Fatty Acids	3.0g	20.0g
Omega-9 Fatty Acids	7.3g	48.4g



NUTRITIONAL INFORMATION		
Service Size: 15ml	15ml	100ml
Energy	510kj	3,400kj
Total Fat	14g	92g
Cholesterol, sodium, protein, carbohydrate, potassium	Nil	Nil
Natural Carotenes	7.00mg	45mg
- Beta Carotene (pro-vitamin A)	3.3mg	22mg
- Alpha Carotene (pro-vitamin A)	2.6mg	17mg
- Other Carotenes	1.1mg	7.3mg
Natural Vitamin E (Tocopherols & Tocotrienols)	11mg	74mg
Co-Enzyme Q10	0.6mg	4mg



Courtesy : Carotino Sdn. Bhd



Is frying in your kitchen a hassle?

Does frying make your kitchen **SMELLY, SMOKY** and **OILY**?



Does your frying oil turn **DARK** quickly?

During frying, oil is continuously exposed to high temperatures (approximately 180°C) in the presence of food, air and water.

This alters characteristics of the oil resulting in oxidization and darkening of the oil. Thus, the oil gets smoky and emits unpleasant odours. All these are signs of unhealthy trends!

Do you struggle to get **CRUNCHY & YUMMY** fried food with minimal oil pick-up?



A **GOOD FRYING OIL** like **PALM OIL** degrades slowly compared other cooking oils and minimizes the absorption of oil into foods.

Say goodbye to hassles, when frying with Palm Oil



Malaysia Palm Oil Council

For more on healthy living with Palm Oil, visit us @ www.mpooc.org.my

The breakdown and oxidised products formed in the unstable frying oil escape into the atmosphere, and these gummy volatile compounds not only pollute your kitchen environment, but also very often stain and mess up your kitchen walls!

Cooking using palm oil however will not produce excessive smoking, spattering, foaming, and forms less gummy residues in the pans after cooking.

Equally bad if not worse, the non-volatile polar materials formed accumulate in the fried oil and these will spoil the quality and taste of the fried food, as well as nibble away at your health in the long-term!

In your home kitchen



Commercial Applications of Deep Frying?



Restaurants - High end, Food Stall
Catering business

Food Manufacturing Industry
Snack Food - Chips, pretzels, peanuts
Instant Noodles/Ramen
Cooked/processed canned food
sardine, meat curries etc.

Deep Frying Applications



- **Easily available**
- **Cost effective**
- **Can be Used for several cycles**
- **Robust**
- **Minimal Oil Absorption**



Fast Food Chains

Snack Foods/Fried

- *Fried in palm Oil*
- *Good Keeping Quality & Long Shelf Life*
- *High Oxidative Stability*



- **Potato chips**
- **Pretzels**
- **Peanuts**
- **curls**
- **Others**



Processed Noodles/Ramen

- *Fried in palm Oil*
- *Good Keeping Quality & Long Shelf Life*
- *High Oxidative Stability*
- *More economical & cost effective*



Palm Oil in Instant Noodles

Country	Estimate Tonnage
China	500,000
Japan	120,000
South Korea	100,000
Indonesia	160,000
Taiwan	14,000
Thailand	29,000
Malaysia	7,000
Hong Kong	4,000
Singapore	4,000
United Kingdom	3,000
TOTAL	941,000

Source: MPOB Info Series no. 47. 1995

Summary



Stable - High Oxidative Stability

Nutritionally Balanced

Trans free

Halal

Non-GMO

Bland Taste = Carries the Flavor

Competitively priced

Palm Based Frying Oil Fulfilled this requirements

THANK YOU