Palm oil is used in more than half of packaged supermarket products today.
Introduction

Global demand for vegetable oil is growing fast

Why is palm oil so popular?

- Relatively cheap
- Most versatile
- High yielding
- Most widely produced

Average Oil Yield (t/ha/year)

<table>
<thead>
<tr>
<th>Oil Crop</th>
<th>Production (mil tonnes)</th>
<th>% of Total Production</th>
<th>Average Oil Yield (t/ha/year)</th>
<th>Total Area (mil ha)</th>
<th>% Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybean</td>
<td>35.19</td>
<td>34.24</td>
<td>0.38</td>
<td>92.63</td>
<td>42.27</td>
</tr>
<tr>
<td>Sunflower</td>
<td>11.09</td>
<td>10.79</td>
<td>0.48</td>
<td>22.95</td>
<td>10.47</td>
</tr>
<tr>
<td>Rapeseed</td>
<td>18.34</td>
<td>17.84</td>
<td>0.67</td>
<td>27.29</td>
<td>12.45</td>
</tr>
<tr>
<td>Oil Palm</td>
<td>36.90</td>
<td>35.90</td>
<td>3.74</td>
<td>9.86</td>
<td>4.50</td>
</tr>
<tr>
<td>Total</td>
<td>102.78**</td>
<td></td>
<td></td>
<td>219.15*</td>
<td></td>
</tr>
</tbody>
</table>

Source: Oil World 2007
** only for the 7 major oils
Introduction

Palm Oil Production (2012)
- Rest of World: 16%
- Indonesia: 47%
- Malaysia: 37%

Oil Palm Plantation in Indonesia
Introduction

INDONESIA: Historical Oil Palm Area

Sources: Statistik Perkebunan, Indonesia (2011); Palm Oil Industry (2013)
Introduction
• Unique Characteristics of Palm Oil

1. Proven — long history of — safe uses for human consumption

2. Wide range of potential applications (cooking oil, shortening, margarine and other)
• Unique Characteristics of Palm Oil

3. Can be utilized as an energy source.
4. “No cholesterol” and no trans fats

Trans fats

Saturated FA - stearic acid (C17H35O2)

Unsaturated trans-FA; trans-9-octadecenoic acid

Unsaturated Cis-FA; cis-9-octadecenoic acid
**Unique Characteristics of Palm Oil**

**Trans fats**

- **Unsaturated fatty acids with one or more double bond in trans configuration**
- **Structure similar to saturated fatty acids**
  - Higher melting point than cis isomers
  - Negative nutritional properties: unwanted in food fats
- **Renewed interest because of stricter legislation**
  - *trans* labelling in USA from 2006
  - Very strict Danish regulation: max. 2% in food fats
  - Canada considers to adopt same regulation

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**Nutrition Facts**

**Trans fats**

**Jan 01, 2006**

U.S. Food and Drug Administration

**Serving Size 1 Tbsp (14g)**

**Servings Per Container 32**

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>Calories</th>
<th>Calories from Fat 100%</th>
<th>% Daily Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Fat</strong> 11g</td>
<td>11g</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Saturated 2g</td>
<td>2g</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td><strong>Trans Fat</strong> 2g</td>
<td>2g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyunsaturated Fat 3.5g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monounsaturated Fat 3.5g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cholesterol</strong> 0mg</td>
<td>0mg</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Sodium 115mg</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Carbohydrate</strong> 0g</td>
<td>0g</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Protein 0g</td>
<td>0g</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Vitamin A 9%**

*Percent Daily Values are based on a 2,000 calorie diet.*
Trans fats
November 8, 2013

The FDA has tentatively determined that partially hydrogenated oils (PHOs) which are the primary dietary source of industrially produced trans fatty acids, or trans fat, are not generally recognized as safe (GRAS).

If finalized, this would mean that food manufacturers would no longer be permitted to sell PHOs, either directly or as ingredients in another food product, without prior FDA approval for use as a food additive.
Trans fats

November 8, 2013

U.S. Food and Drug Administration

- Definition: To treat oil with H₂ and catalyst to decrease double bonds and increase saturated bonds.
- However, in practices, the result of partially hydrogenation reaction -partially hydrogenated oil- is more than saturation of double bonds, but also to include trans-fatty acid formation.
• Unique Characteristics of Palm Oil

Carrots are healthy because they contain natural carotenoids.

6. Rich in natural carotenoids

<table>
<thead>
<tr>
<th>FOOD</th>
<th>μg RETINOL EQUIVALENT / 100g E.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oranges</td>
<td>21</td>
</tr>
<tr>
<td>Bananas</td>
<td>50</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>130</td>
</tr>
<tr>
<td>Carrots</td>
<td>400</td>
</tr>
<tr>
<td>Red Palm Oil (refined)</td>
<td>5,000</td>
</tr>
<tr>
<td>Crude Palm Oil</td>
<td>6,700</td>
</tr>
<tr>
<td><strong>RBO Olein</strong></td>
<td>~ 1000 - 5000</td>
</tr>
</tbody>
</table>
• Unique Characteristics of Palm Oil

6. Rich in natural carotenoids

- Anti-cancer properties for certain types of cancers
- Enhance immunity and protects against toxins, colds, flu and infections
- Prevent night blindness and other eye disorders
- Responsible for reducing the harmful effects of free radicals
- Natural compounds in food, cosmetic and pharmaceuticals

Carotene

F.D. Guazarro (1986)

• Unique Characteristics of Palm Oil

6. Rich in natural antioxidants (tocopherol and tocotrienol)

Vitamin E content in Fats & Oils

F.D. Guazarro (1986)
• Unique Characteristics of Palm Oil

**PHYTOCHEMICALS in PALM OIL**

1. Carotenoids: 500–800 µg/g
   - β-Carotene
   - α-Carotene

2. Tocopherols & Tocotrienols: 500–1000 µg/g
   - α-Tocopherol
   - γ-Tocopherol
   - α-Tocotrienol
   - γ-Tocotrienol

• Unique Characteristics of Palm Oil

1. Crude Palm Oil
2. Crude Palm Olein
3. Crude Palm Stearin
4. RBD Palm Olein
5. RBD Palm Stearin
6. RBD Palm Oil

Red Palm Oil

'mild' refining & degumming
• Unique Characteristics of Palm Oil

Red Palm Oil Is a Feasible and Effective Alternative Source of Dietary Vitamin A

Dr. Enelpege Nestel and Dr. Ritu Nalubola

Crude red palm oil, extracted from the oil palm, is considered the world’s richest plant source of bioavailable provitamin A. It is an important source of vitamin A in many countries, including Brazil, Malaysia, and India, providing 200 to 700 µg provitamin A carotenoids per gram. Efforts continue to be made to improve the technology to minimize provitamin A carotenoid losses during the processing of red palm oil and increase its compatibility with different recipes. Some loss also occurs during cooking. In four different Indian recipes, 70–80% of provitamin A carotenoids were retained from crude palm oil incorporated into foods that were baked, deep-fried, or shallow-fried in crude palm oil. Crude palm oil is not suitable for use as frying oil for more than one frying. In one study, all of the important provitamin A carotenoids in the oil were lost after four consecutive deep

Red palm oil is effective in improving the vitamin A status of children and women.

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Virgin Palm Oil

Virgin Red Palm Oil - Organic from Tropical Traditions

Virgin Palm Oil is palm oil that is traditionally made and maintains the natural

What is Virgin Red Palm Oil?
### Unique Characteristics of Palm Oil

#### 7. Balance composition of fatty acids

#### 8. Contain linoleic as essential fatty acid

<table>
<thead>
<tr>
<th>Fatty Acid</th>
<th>Range</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:0</td>
<td>0.1-1.0</td>
<td>0.2</td>
</tr>
<tr>
<td>14:0</td>
<td>0.9-1.5</td>
<td>1.1</td>
</tr>
<tr>
<td>16:0</td>
<td>41.8-46.8</td>
<td>44.0</td>
</tr>
<tr>
<td>16:1</td>
<td>0.1-0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>18:0</td>
<td>4.2-5.1</td>
<td>4.5</td>
</tr>
<tr>
<td>18:1</td>
<td>37.3-40.8</td>
<td>39.2</td>
</tr>
<tr>
<td>18:2</td>
<td>9.1-11.0</td>
<td>10.1</td>
</tr>
<tr>
<td>18:3</td>
<td>0.0-0.6</td>
<td>0.4</td>
</tr>
<tr>
<td>20:0</td>
<td>0.2-0.7</td>
<td>0.4</td>
</tr>
</tbody>
</table>
   1. Palm Oil
   2. Palm Kernel Oil

• Unique Characteristics of Palm Oil

Composition of PO Mesocarp.

- Oil: 39%
- Water: 41%
- Fiber: 20%
10. Researches show that palm oil has positive health effect.
10. Researches show that palm oil has positive health effect.

![Cholesterol-modulating effects of palm olein and olive oil are comparable](chart.png)

- In Indonesia palm oil generated $7.9 billion in exports in 2007, accounting for 13 percent of agricultural output, second only to rice.
- In Malaysia in 2008, palm oil exports accounted for $19.6 billion.

NEXT …

Introduction to
Palm Oil -2

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Thank you