

# **Foods with a high fat quality are essential for healthy diets**

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# Agenda

- Main dietary sources of fat
- Basic technology and production of oils, margarines and cooking products
- Improving their nutritional characteristics
- Impact of modern fat and oil products on diet and health
- Conclusions



# **Main dietary sources of fat**

# Many different fat-rich products

- Primary:
  - Vegetable/plant oils
  - Butter/milk fats
  - Lard/tallow/suet/dripping (derived from animals)
  - Marine
- Secondary: (made from one or more of the above)
  - Margarine, Melanges, Reduced fat spreads
  - Butter and Ghee
  - Vanaspati
  - Cooking fats/white fats/shortenings
  - Mayonnaise

# Main dietary sources of fat

- Major contributors to intake of saturated fat

- Dairy (cheese, butter, milk)
- Meat
- Baked goods and snacks
- Cooking fats/oils



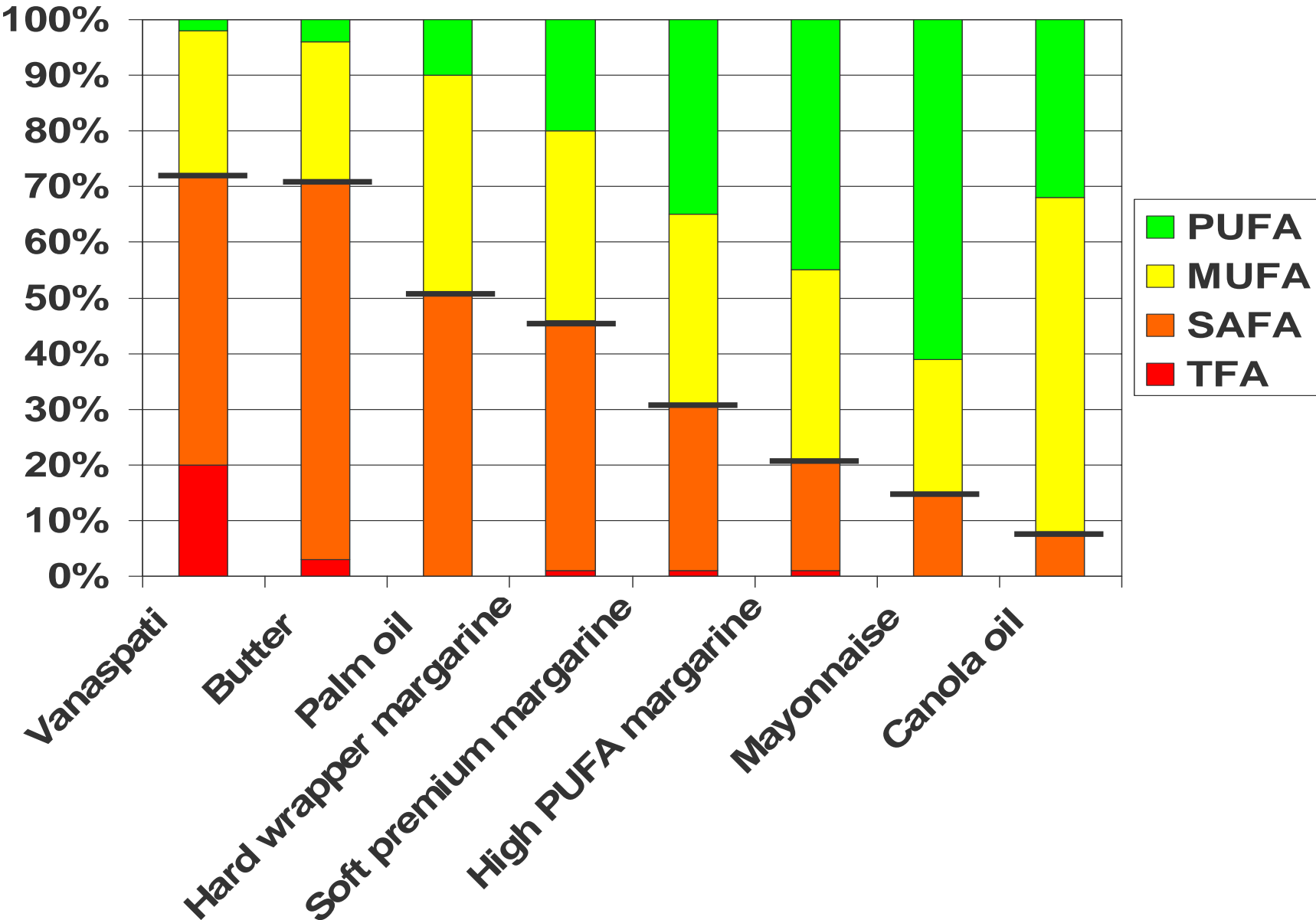
- Major contributors to intake of polyunsaturated fat

- Vegetable oils
- Margarines and mayonnaise



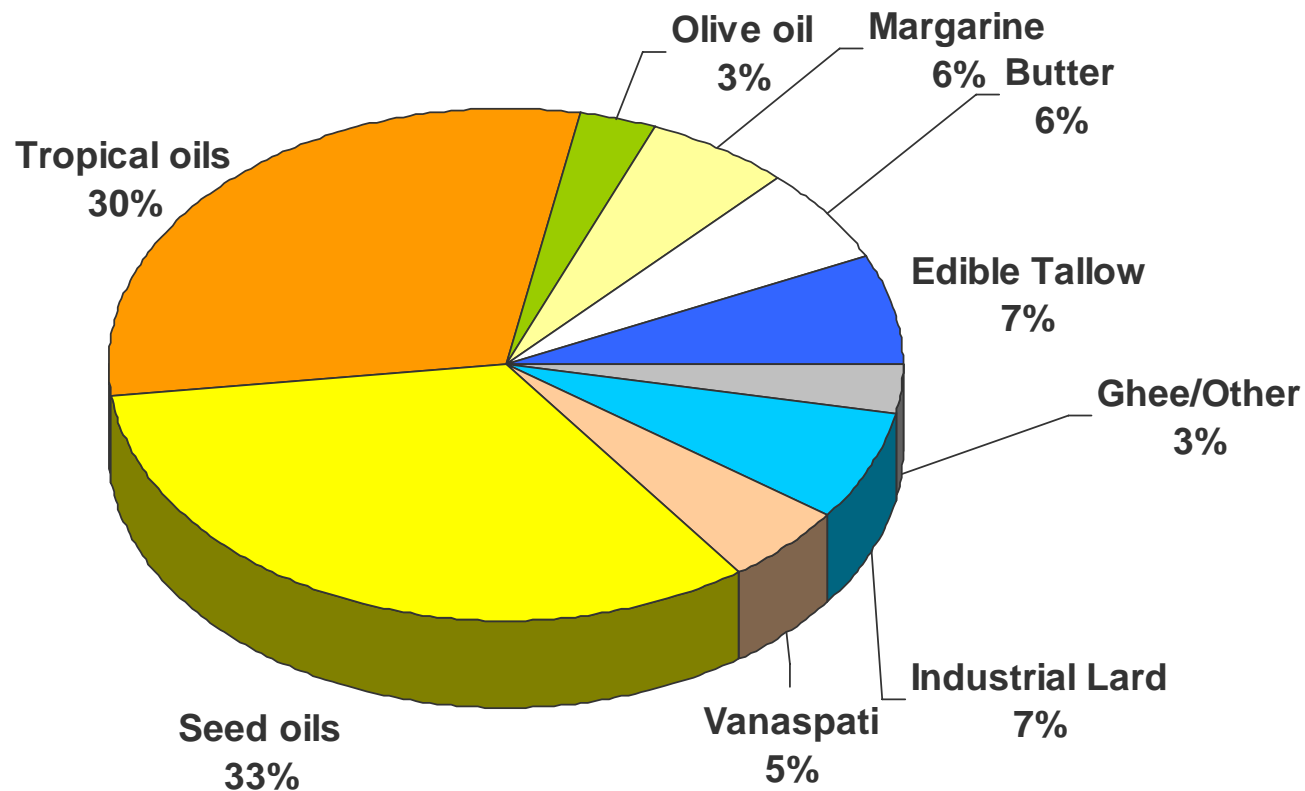


# Fatty acid composition of common fat rich products



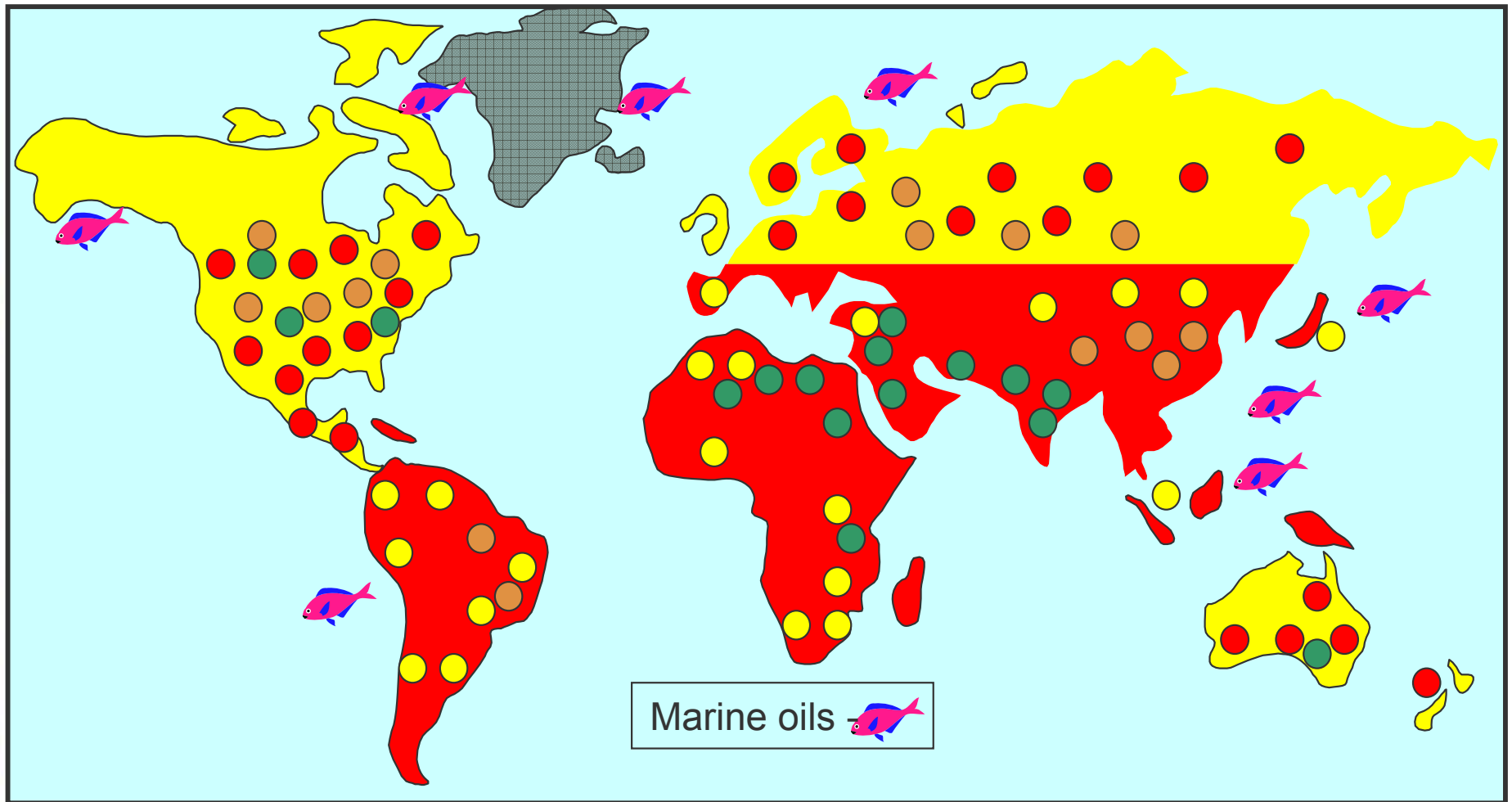
# Oils and fats in perspective

**6.5 b people consume about 120 m tons pa  
That is almost 20 kg per capita**



**Annual value of oils and fats market over €120b**

# Regional consumption patterns



Liquid Oils - ●

Lard - ●

Ghee/Vanaspati/Cooking - ●

Margarine/Butter - ●





**Basic technology and  
production of oils,  
margarine and cooking  
products**



# Vegetable oil sources

*Soybean oil*



*Sunflower oil*



*Canola oil*



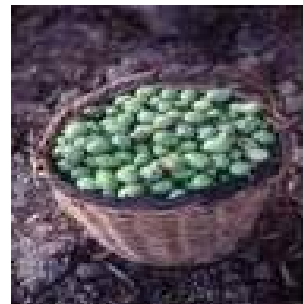
*Corn oil*



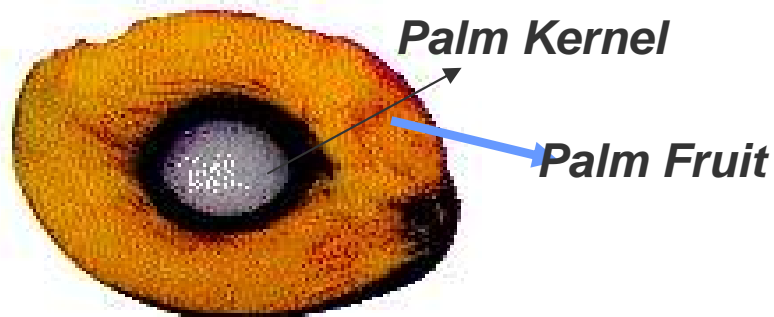
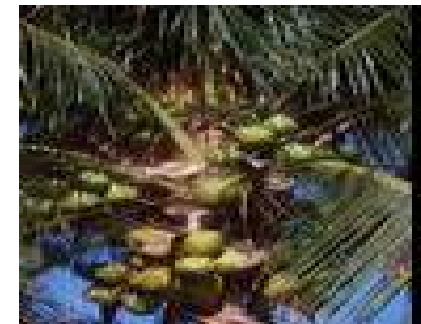
*Palm Oil*



*Olive Oil*



*Coconut Oil*



# Vegetable oil products - farm to table

agriculture



oil milling



crude oils and fats

selective removal of undesirable components

OIL PROCESSING

Table oil



Mayonnaise



Margarine



modification of the physical properties

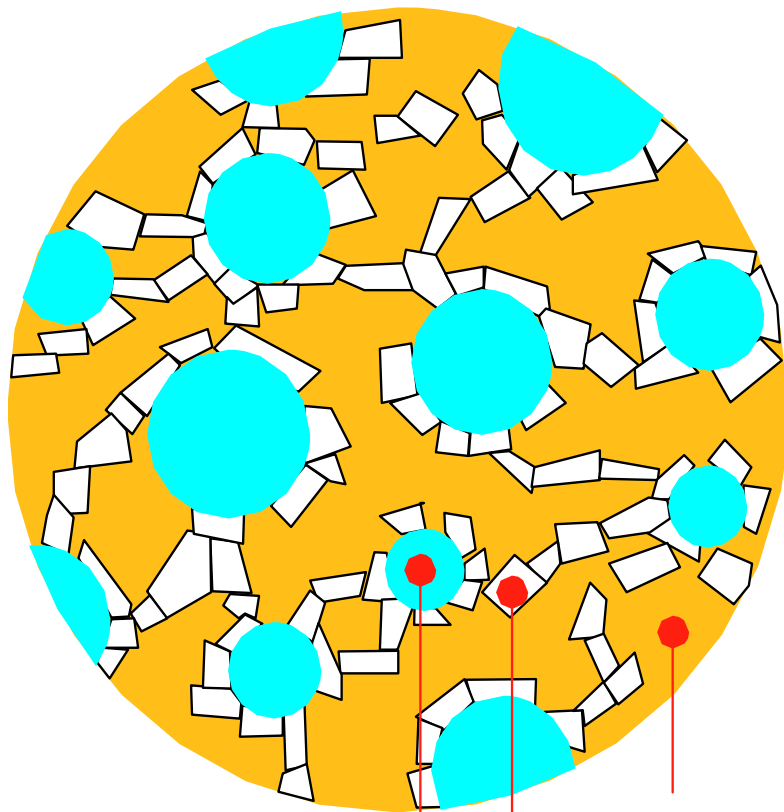


consumer

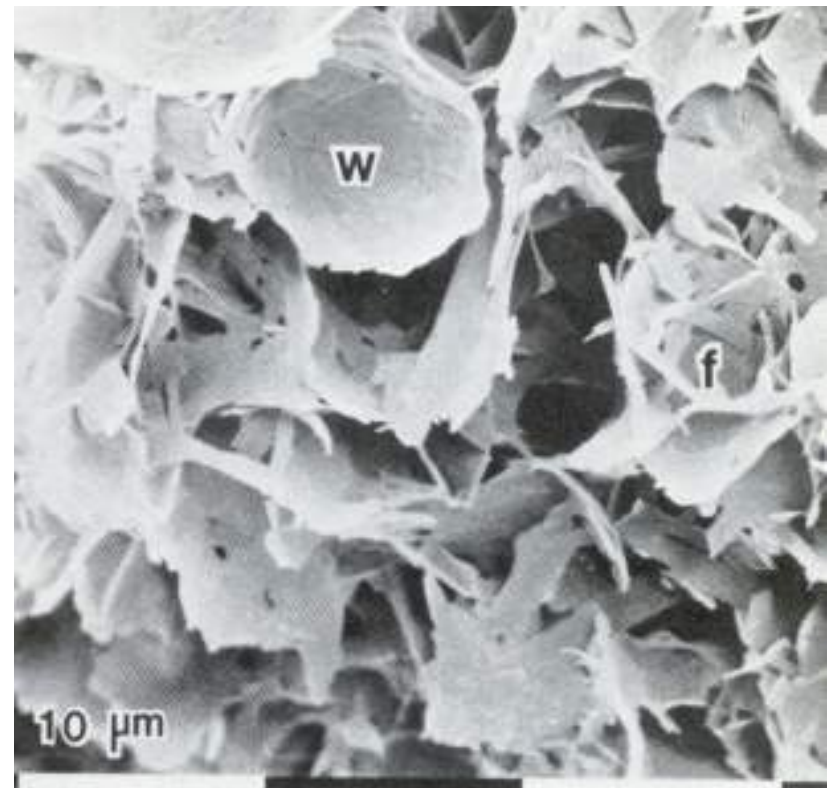


# What is a margarine ?

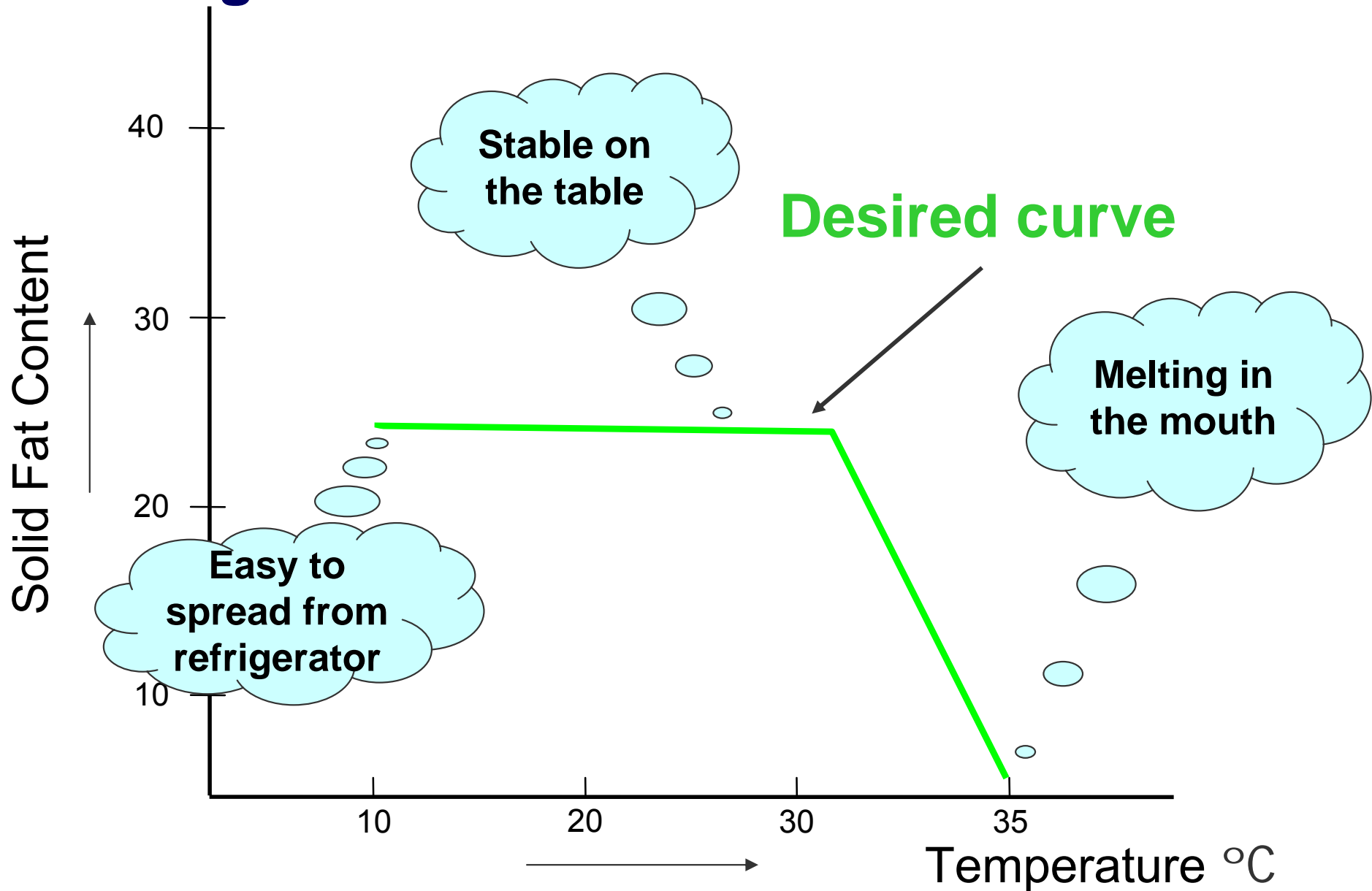
A structured water-in-oil emulsion with properties like spreadability, stability and mouthfeel



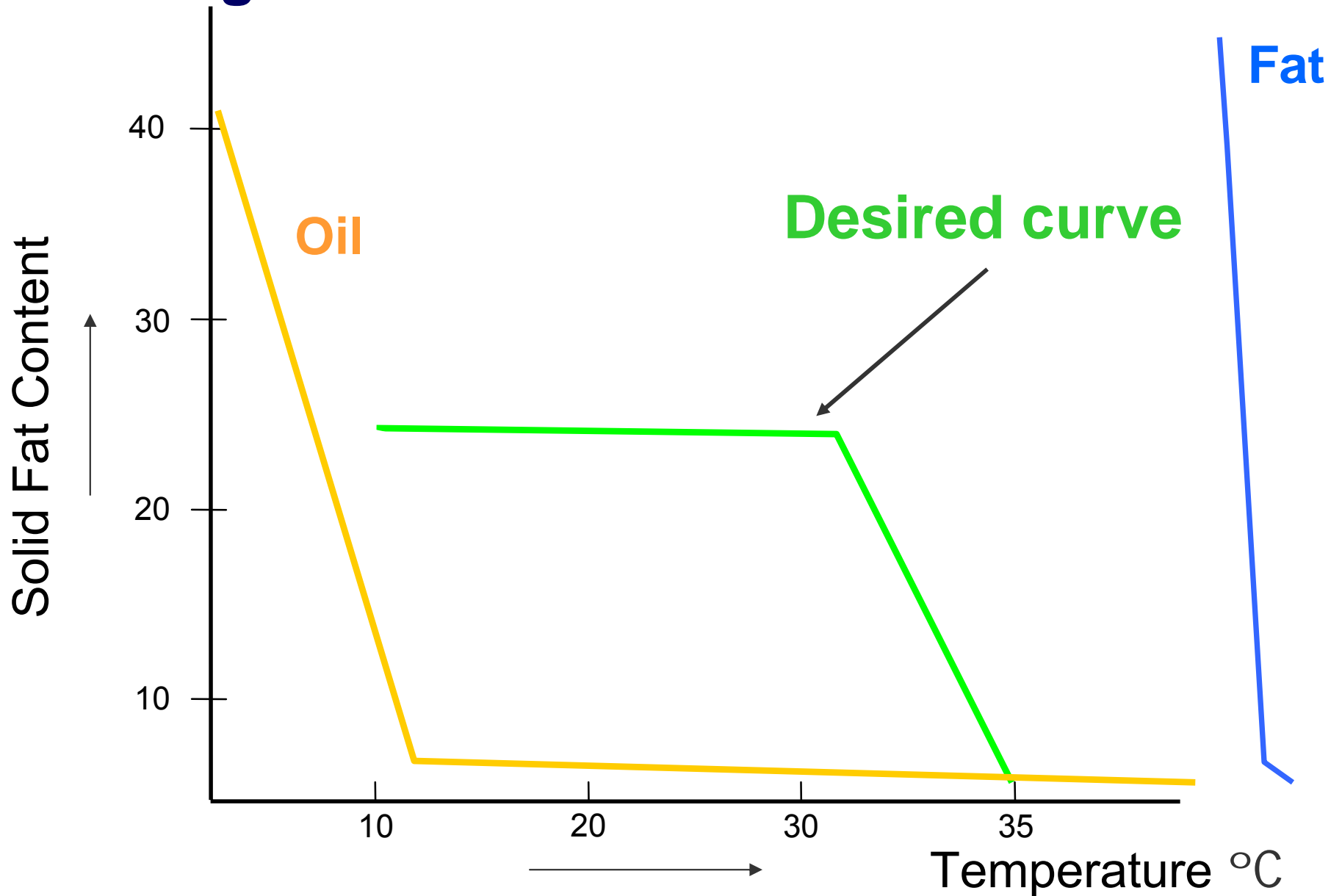
*liquid oil*  
*fat crystals*  
*water droplets*



# Consumer requirements of solid fat content in margarine

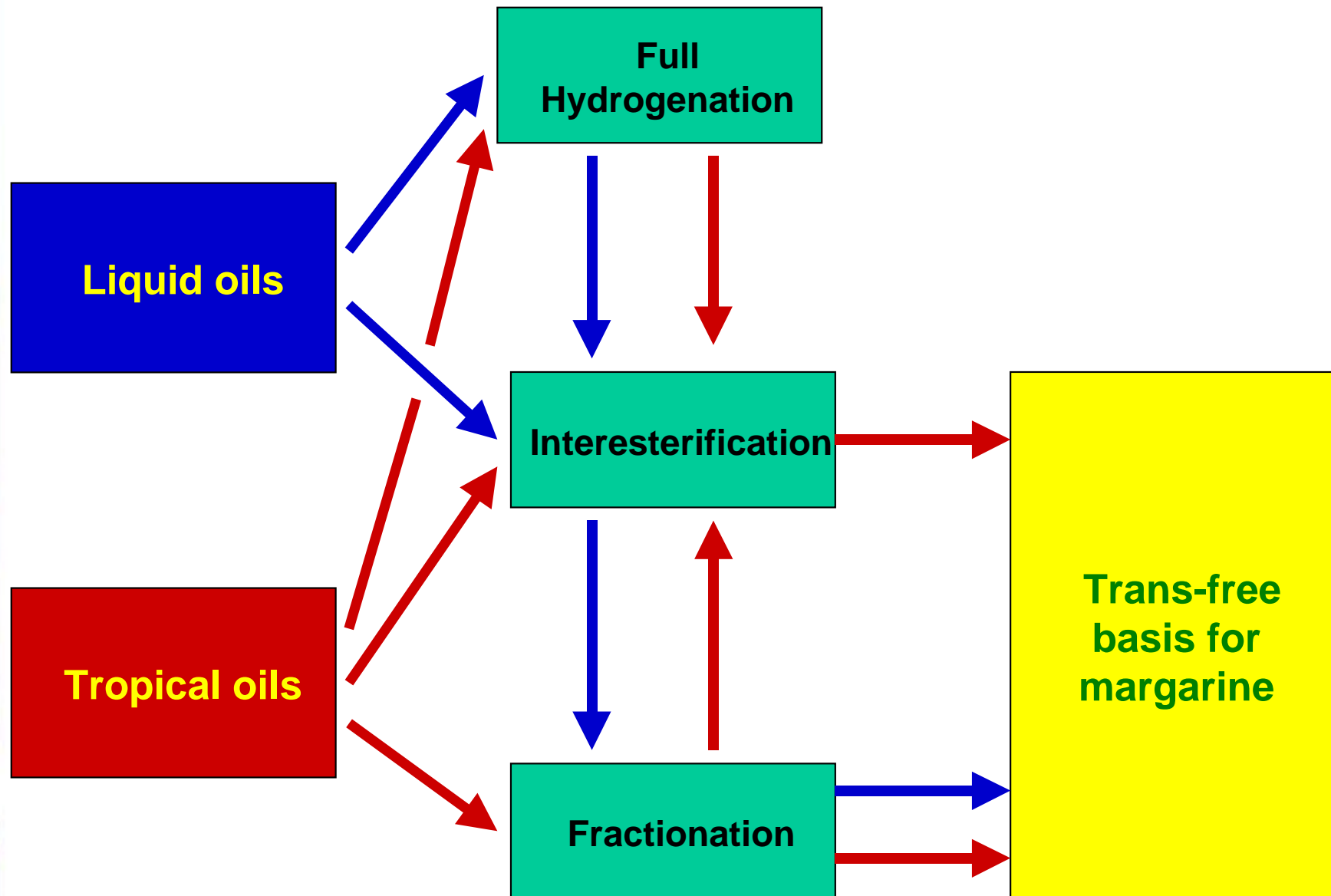


# Consumer requirements of solid fat content in margarine





# Modifications and blending of oils for optimal margarine



# Modification of natural fats and oils

## Partial or full hydrogenation

*cis-unsaturates* →



*trans-unsaturates* →

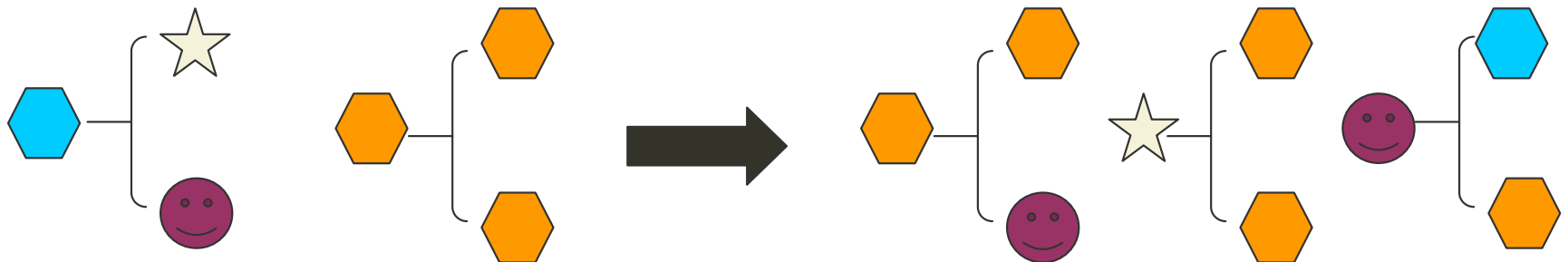


*saturates*




→ Full hydrogenation does not lead to trans !

## Interesterification



→ Interesterification leads to rearrangement of the fatty acids on the glycerol backbone

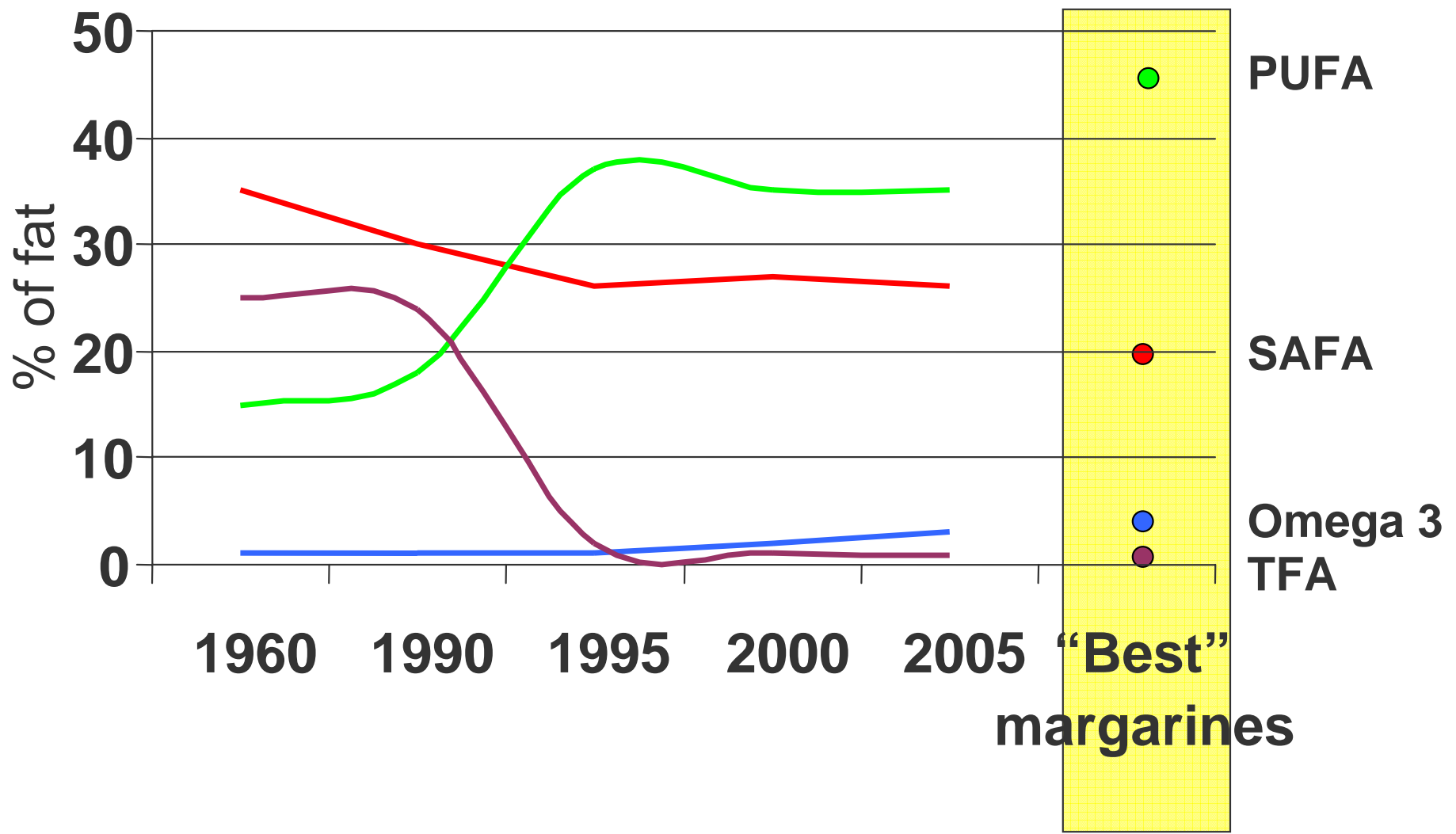
The image features a variety of glass containers filled with yellow oils. From left to right, there is a small vial, a tall rectangular bottle, a standard wine bottle, a bulb-shaped bottle, and a glass pitcher. The oils vary in color from light yellow to dark amber. On the left side, there are decorative yellow and white swirls and heart shapes. The text is centered over the bottles.

**Improving the nutritional characteristics of products made from oils and fats**

# Drivers of nutritional improvements for food industry

- Replace SAFA by MUFA or preferably PUFA
- Practically eliminate TFA
- Ensure delivery of essential Omega 3 and 6
- Fortify with fat soluble vitamins A and D
- Preserve natural antioxidants (e.g. vit E)

# Improvements in margarine



# Trans fat removal: example of industry action for better health

## ***Special Article***

*Nutrition Reviews*®, Vol. 64, No. 6

June 2006: 275–279

## **The Elimination of Trans Fats from Spreads: How Science Helped to Turn an Industry Around<sup>a</sup>**

Onno Korver, PhD, and Martijn B. Katan, PhD

- Based on reports showing an untoward effect of trans on blood lipids in 1990 (studies sponsored by Unilever) Unilever started an extensive development program
- Margarines with very low trans fat content were developed 1993
- Implemented by 1995 in most regions using tropical oils and in US with non – tropical oils.
- Unilever led; most of industry followed



# Normal heating does not affect the nutritional quality of oils

- shallow frying for 20 mins at 150-180 C
  - Relative loss of linoleic acid < 1% and  $\alpha$ -linolenic acid < 2%
  - No formation of trans-isomers



→ As long as excessive temperatures are avoided, EFA survive cooking.

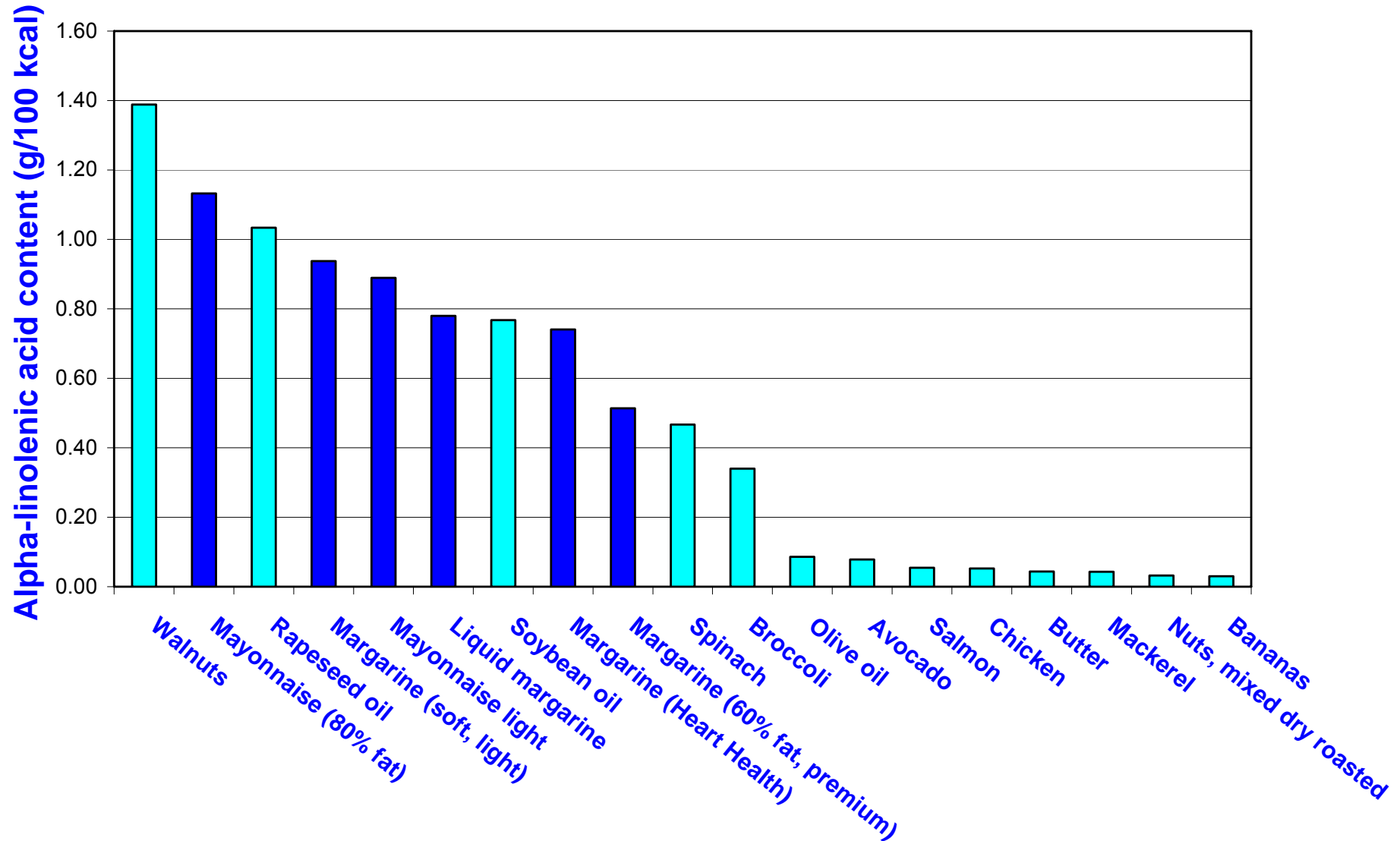
The image features a variety of glass containers filled with yellow and golden oils. From left to right, there is a small bottle with a dark liquid, a tall rectangular bottle with a light yellow liquid, a standard wine bottle with a light yellow liquid, a shorter bottle with a light yellow liquid, a tall slender bottle with a light yellow liquid, a wine glass with a light yellow liquid, and a glass pitcher with a light yellow liquid. The background is white with a decorative yellow and white swirl pattern on the left side.

# **Impact of modern fats and oils products on diet and health**

# Impact of modern fat products on health: three examples

1. Oils, margarines and mayonnaise are nutrient-dense sources of essential fats
  2. Significant contribution to the required intake of vitamins A,D and E via margarines
  3. Relevant impact on LDL-cholesterol level and hence on CHD incidence by soft margarines
- Potentially significant impact on public health from oils, margarine and mayonnaise

# 1. Margarine, mayonnaise and vegetable oils are nutrient-dense source of ALA



# 1. Role of margarine recently confirmed by the Netherlands Nutrition Centre

Intake of ALA for large part of the Dutch population is below recommended level

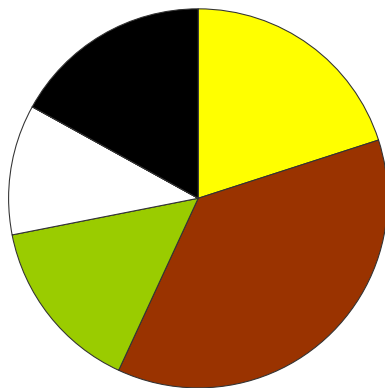
- Margarines (40% fat) are nutrient-dense source of ALA
- Margarine is also nutrient-dense source of fat soluble vitamins
- Therefore Dutch nutrition policy makers have increased the recommended amount of margarine (40% fat) from 20g/d to **30-35g/d (6-7 slices of bread with margarine every day)**

Based on Guidelines good nutrition, Oct 2007 [www.voedingscentrum.nl](http://www.voedingscentrum.nl)

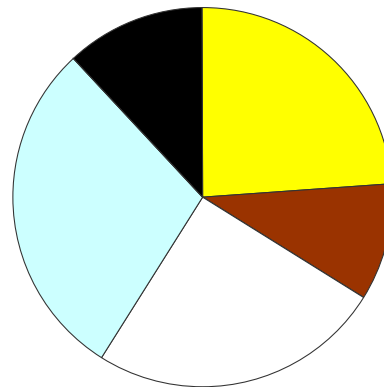
## 2. Margarines can be significant providers of fat soluble vitamins in the diet

Finnish men 25-64 years

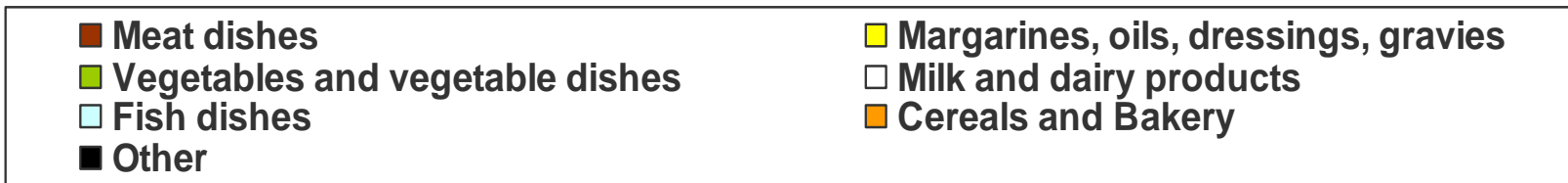
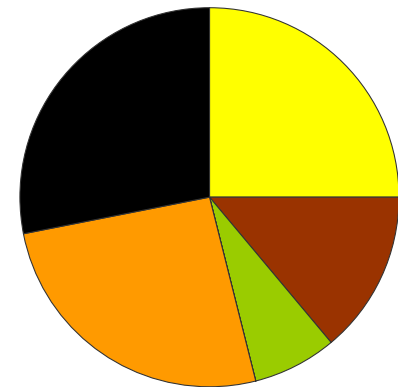
Vitamin A



Vitamin D



Vitamin E

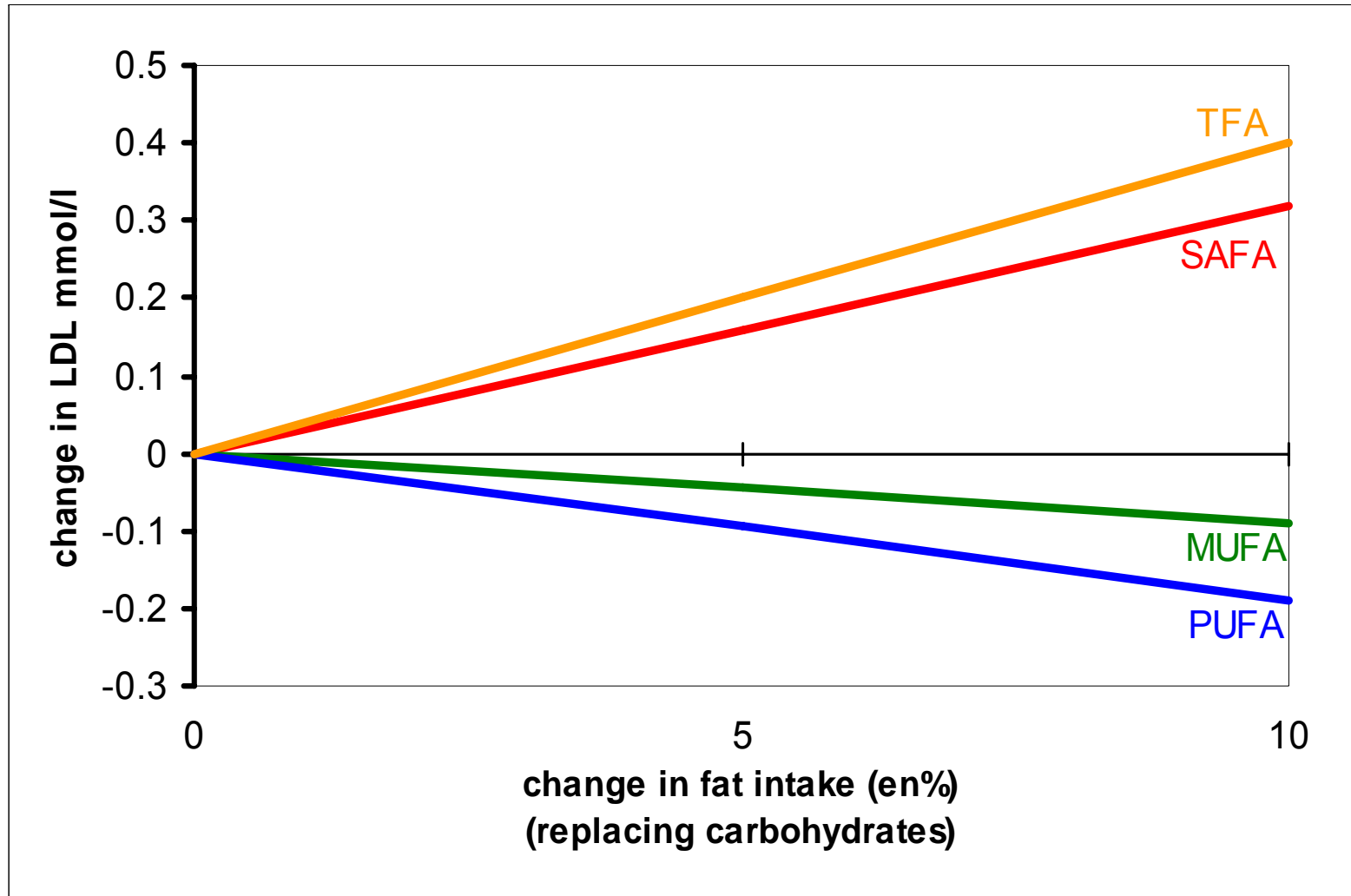


From National FINDIET 2007 Survey, 2008



### 3. Assessing the impact of fat products on blood cholesterol

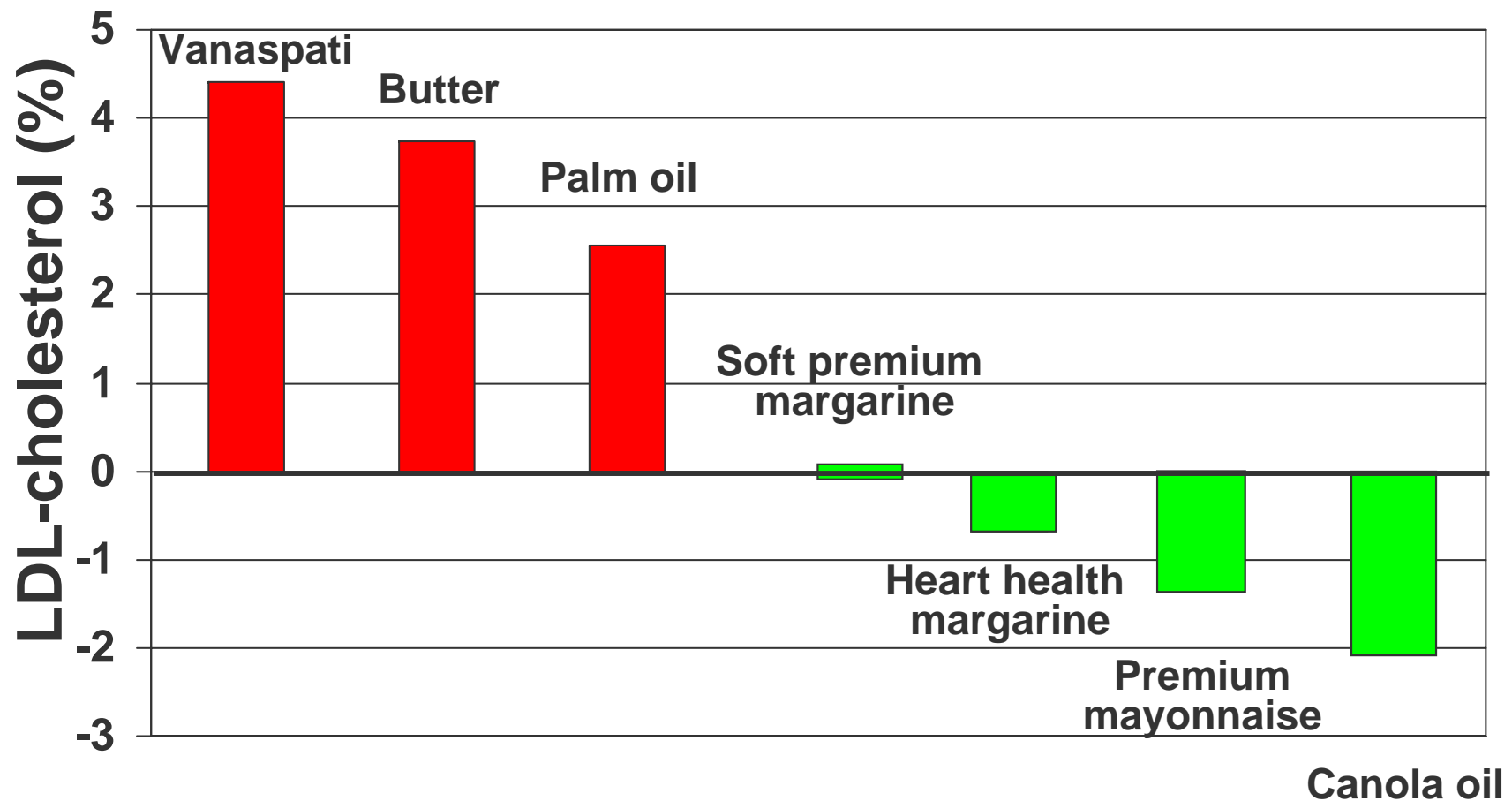
Meta-analysis of Mensink et al. 2003



Mensink, Zock, Kester, Katan. Am J Clin Nutr 2003;77:1146-55.

### 3. Butter and fats raise LDL-cholesterol; soft premium margarines and mayonnaise don't

*Fat composition of foods influences their ability to lower or increase blood cholesterol: predicted effect of consumption of 20 g per day*



Adapted from Mensink, Zock, Kester, Katan. Am J Clin Nutr 2003;77:1146-55.

### 3. Switching butter, vanaspati and palm oil for soft margarines can reduce the risk of CHD

- Per year nearly 8 million people die of CHD
  - 1% reduction in LDL-cholesterol level translates to ~1-2 % reduction in CHD risk (NCEP, 2001)
  - Switching 20 g /day soft margarine for butter or cooking oils/fats is predicted to lower LDL-cholesterol by 3-4%
- using soft margarines instead of butter or cooking fats worldwide could mean a reduction of annual CHD deaths by more than half a million !

# Conclusions

- Oils and fats and products made thereof play an important role in our diets worldwide
- The food industry has made significant improvements to the nutritional quality of products like margarines and cooking products
- Switching products from animal fats or cooking fats to soft margarines or oils contributes positively to a healthy diet
- Despite wide differences in dietary habits, modern products made from fats and oils are essential for healthy diets for children and adults worldwide
- Many people are not aware of the benefit of soft margarines and cooking products:  
time to educate and motivate for better health !

**Thank you**

