

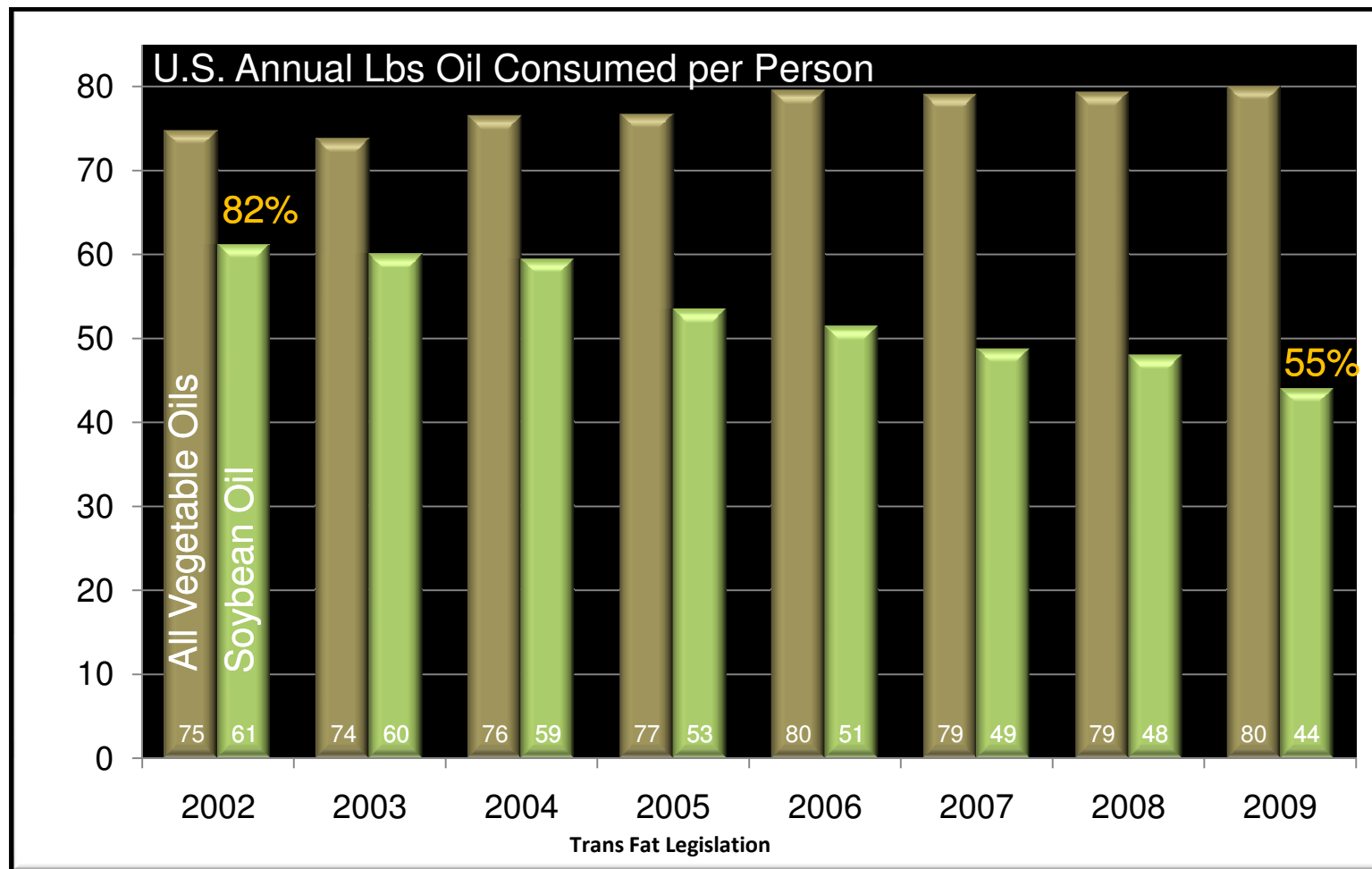
A GOOD THING JUST  
GOT BETTER:  
SOYBEAN OILS THAT  
CAN OFFER  
NUTRITION AND  
FUNCTIONAL  
SOLUTIONS

2011 Soybean Breeders  
Workshop

Federico A. Tripodi  
Omega-3 Program Lead  
Monsanto Company

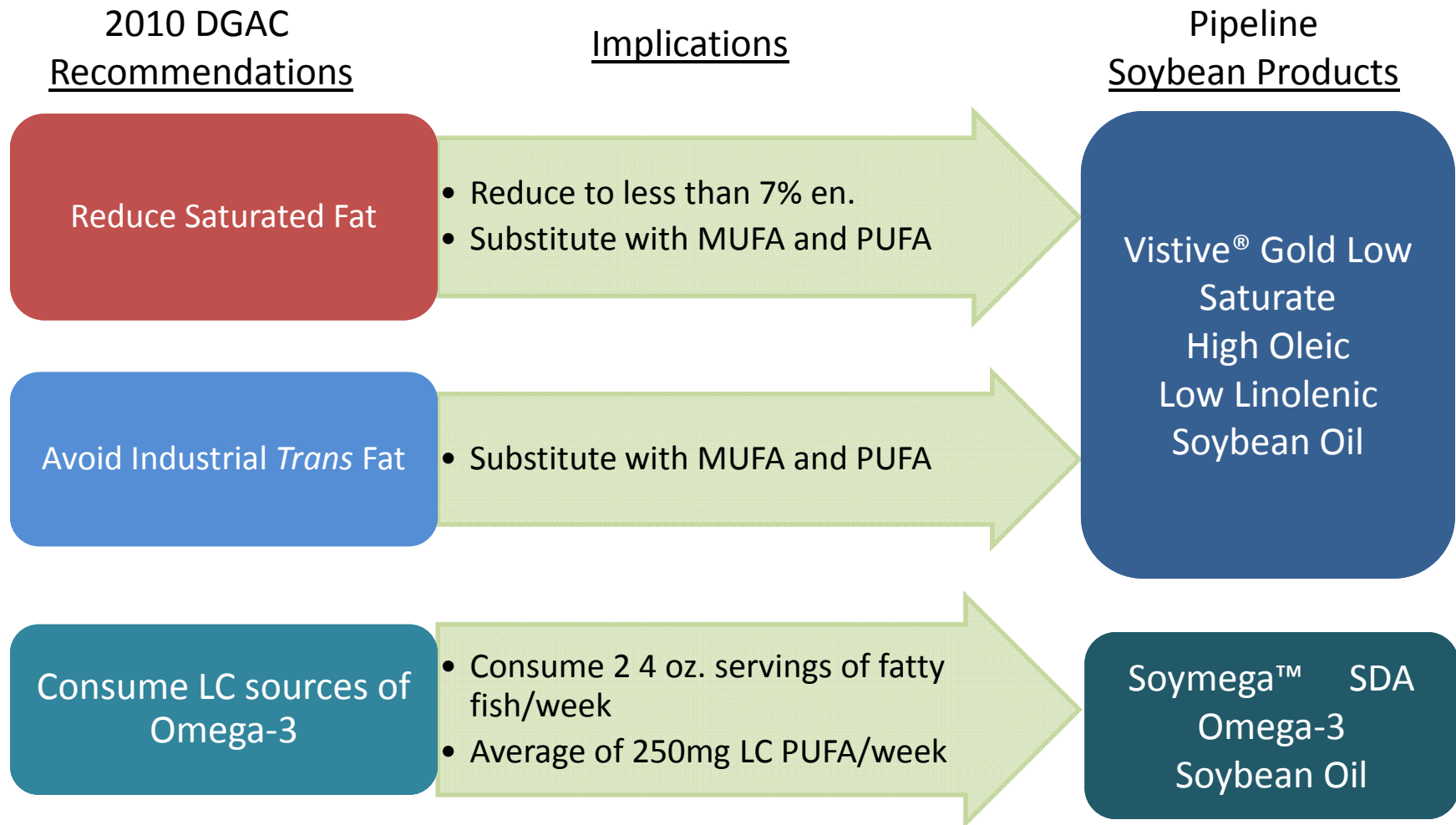


# U.S. Vegetable Oil Consumption Increased 5.3%, While Soybean Oil Share Decreased 27% (2002-2009)



*Decline in Food Oil Market Share Results in Reduced Soybean Value*

# Improved Oils Pipeline Can Help Meet Recent Dietary Guideline Recommendations



# Stearidonic Acid (SDA) Omega-3 Soybeans

Collaborative Partner: **Solae, LLC**

Development Phase: **Phase 4**

Market Focus: **Food**

## Fatty Acid Composition:

	C16:0 Palmitic	C18:0 Stearic	C18:1 Oleic	C18:2 Linoleic	C18:3n6 $\gamma$ -Linolenic	C18:3 Linolenic	C18:4n3 Stearidonic
<b>Commodity Soybean</b>	11	4	24	52	0	8	0
<b>SDA Omega-3 Soybean</b>	11	4	20	24	6	10	20

Key Benefits:

**Optimal omega-3 for food**

**Readily converts to EPA**

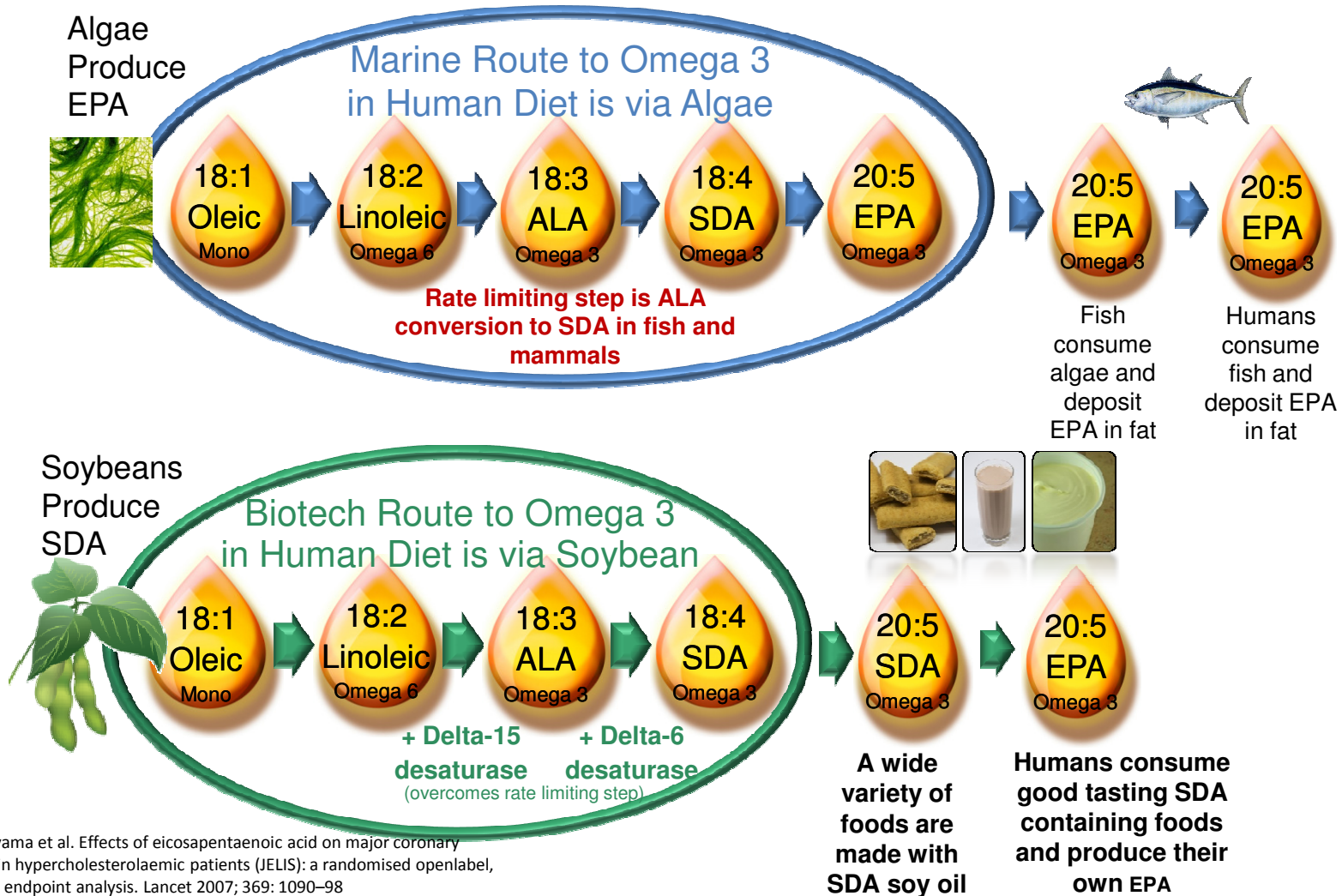
**Excellent taste and stability**

**Can be added to a broad range of food products**

**Provides consumers with desirable heart healthy foods**

# Producing SDA-Omega 3 in Soybeans a Better Solution

Dietary EPA has been demonstrated in clinical trials to benefit heart health\*

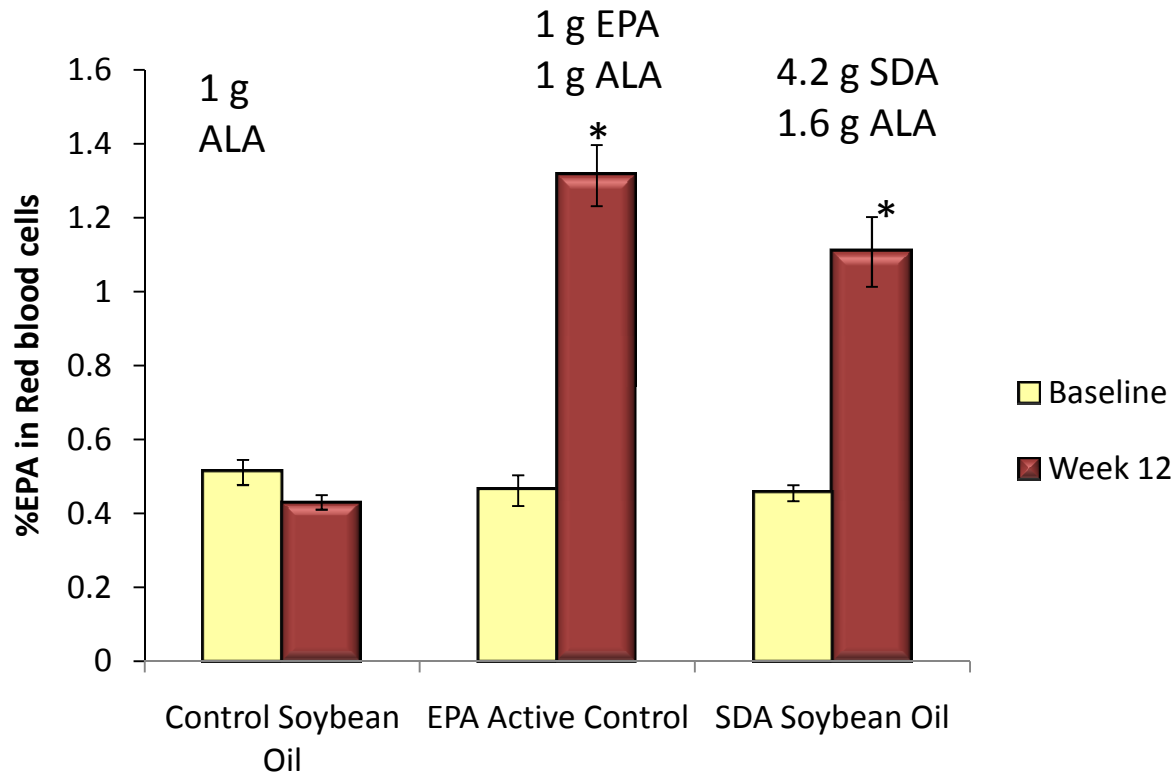


\* Yokoyama et al. Effects of eicosapentaenoic acid on major coronary events in hypercholesterolaemic patients (JELIS): a randomised openlabel, blinded endpoint analysis. Lancet 2007; 369: 1090-98



# SDA Omega-3: Nutrition Benefits

## Both SDA and EPA Result in a Rise in %EPA



Mean ( $\pm$  SEM) for per protocol population of 157 subjects

•  $p < 0.001$  compared to soy oil control; delta for SDA and EPA not different  $p = 0.101$ ; ANCOVA

Harris, et al. Presented at 2009 AHA Conference.

Monsanto Data

- James et al. 2003 found differential increases in EPA content in plasma lipids and RBC membranes  
14 (ALA) ~ 3 (SDA) ~ 1 (EPA)
- Recent clinical study demonstrates SDA conversion to EPA at significantly higher levels than ALA
- In a high triglyceride sub-population, fasting triglycerides were reduced

# SDA Omega-3: Product Benefits

## Potential Broad Range of Applications

### **Beverages**

Soy Milk/Smoothies  
Fruit Juices/Drinks  
Vegetable Juices/Drinks  
Enhanced Waters

### **Dairy Products**

Dairy Drinks  
Yogurt/Yogurt Drinks  
Cheese Products  
Sour Cream/Dips  
Ice Cream/Frozen Desserts  
Non Dairy Creamers

### **Oil Based Foods**

Margarine/Spreads  
Shortenings  
Mayonnaise  
Salad Dressings  
Peanut Butter

### **Baking**

Breads  
Muffins  
Cookies/Crackers  
Pastries/Cakes  
Baked Cereal Bars

### **Snack Foods**

Granola/Cereal Bars  
Nutritional Bars  
Snacks  
Confectionery

### **Prepared Foods**

Processed Meats  
Processed Fish  
Entrees/Sides  
Soups/Sauces  
Pet Foods

- Conventional soybean processing
- Clean, neutral oil taste
- Oil stability improved vs. other omega-3 oils
- Broad range of food applications
- Maintain traditional flavor and shelf life

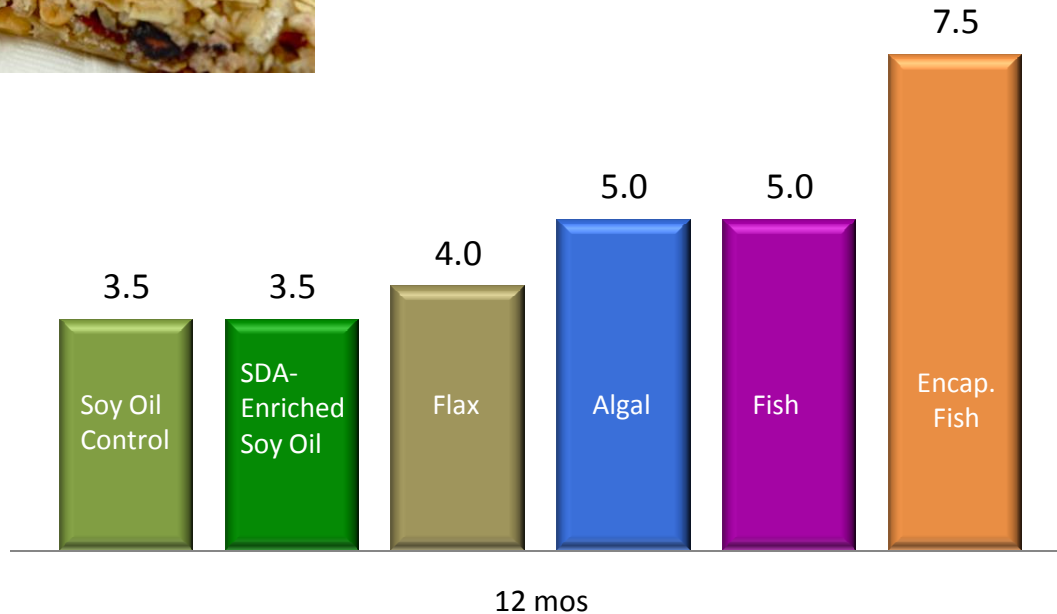


# SDA Omega-3: Product Benefits

## Granola Bar Shelf Life Results



Nut and Berry Granola Bar  
Total Off Flavor - 12 mos.



- Granola Bar shelf life study demonstrated SDA and the control were lower than all other omega-3 oils for off flavor, and off aftertaste throughout the 12 month study.
- Similar results have been found across a range of applications including spreads, salad dressings, yogurt, dairy drinks, soy milk, baked cereal bars
- The SDA enriched granola bar exhibited the least quality change at 12 months compared to all other prototypes.

15 point descriptive scale  
n=5 trained panelists  
12 month shelf life  
Ambient storage

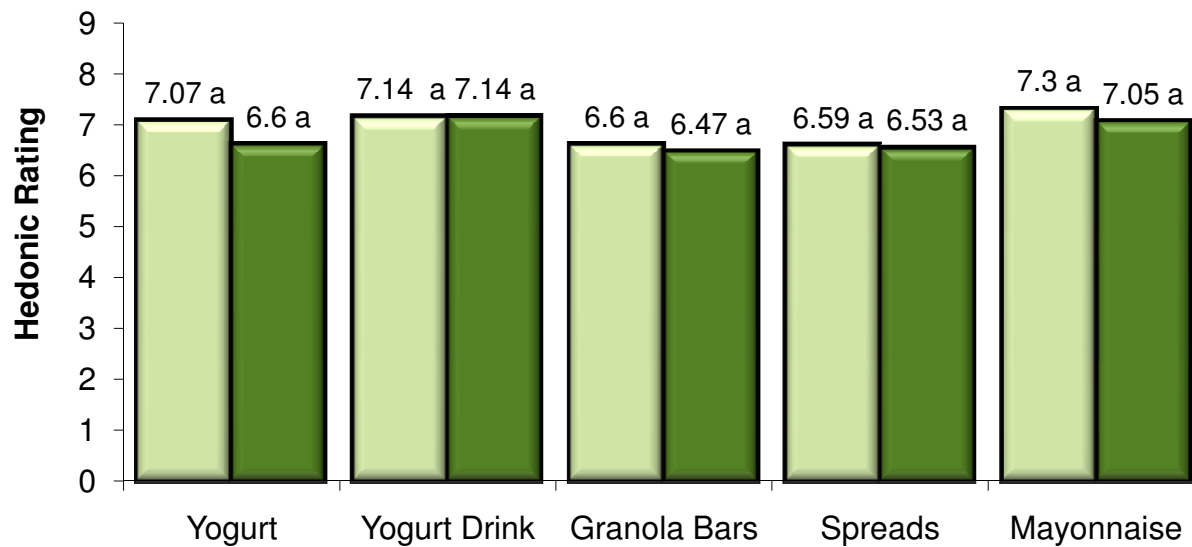
Enrichment levels:  
SDA: 375mg SDA/42 gram bar  
Fish/Algal: 120 mg EPA/DHA/42 gram bar

Monsanto Data



# SDA Omega-3: Product Benefits

## Consumer Acceptance Overall Liking



- Consumer acceptance testing across a range of food products enriched with SDA Omega-3, there is equal consumer acceptance for overall liking and flavor.
- SDA provides the opportunity to develop foods with acceptable taste and shelf life.



Monsanto Data



# Vistive® Gold Low Saturate/High Oleic/Low Linolenic Soybeans

Development Phase: **Phase 4 (prelaunch)**

Market Focus: **Food**



## Fatty Acid Composition:

	C16:0 Palmitic	C18:0 Stearic	C18:1 Oleic	C18:2 Linoleic	C18:3 Linolenic
Commodity Soybean	11	4	22	55	8
Low Linolenic Soybean	11	4	26	52	<3
Low Saturate High Oleic Soybean	3	3	68-74	15	<3

*Reduced Saturates*

*Improved Stability*

### Nutritional Benefits

- 0g *trans* fats
- Lowest sat fat of soybean oils

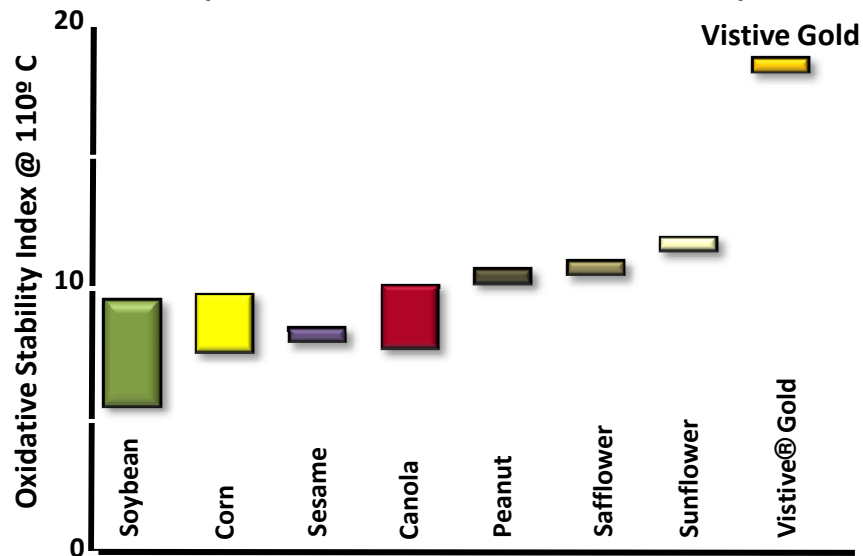
### Functional Benefits

- Excellent flavor
- High stability
- Eliminates polymer buildup

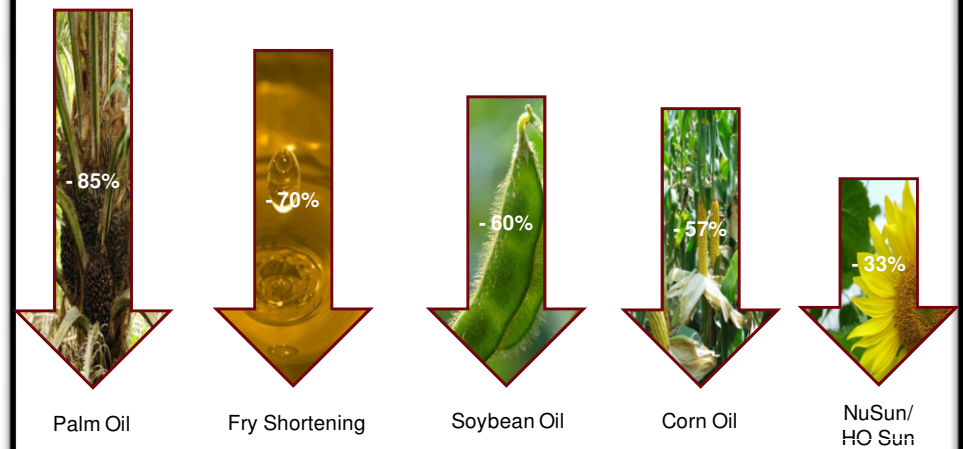
### Targeted Use

- Frying
- Spray for crackers/snacks
- Baking blends

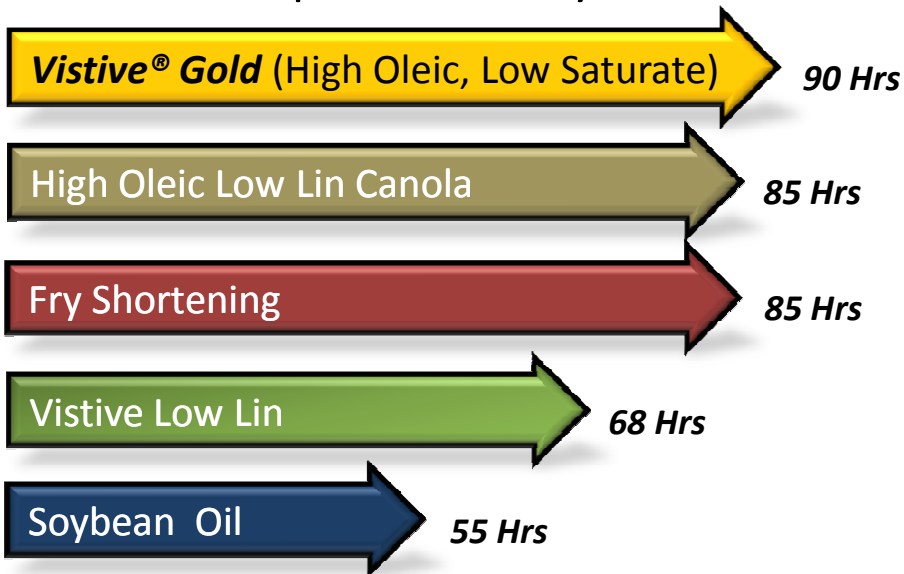
### Improved Oxidative Stability



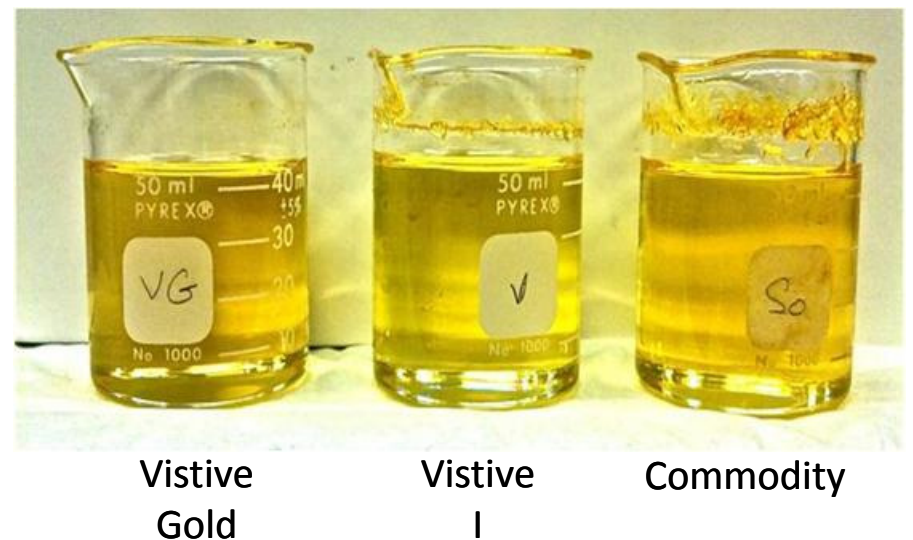
### Vistive® Gold is Significantly Lower in Saturated Fat



### Improved Oil Fry Life



### Reduced Polymer Buildup During Frying



*"The greatest danger for most of us is not that our aim is too high and we miss it, but that it is too low and we reach it."*

*Michelangelo*



*Vistive® Gold* low saturate high oleic soybeans and SDA omega-3 soybeans are not commercial. Commercialization is dependent on several factors including successful conclusion of the regulatory process.

SDA omega-3 soybean oil will be commercialized as *Soymega™*. *Soymega* is a trademark of Solae, LLC.

*Monsanto, the vine design and Vistive®* is a registered trademark of Monsanto Company