Changes to Hydrogenated Fat Requirements

"What will be forbidden
and What alternatives can be used? "

Presented by:

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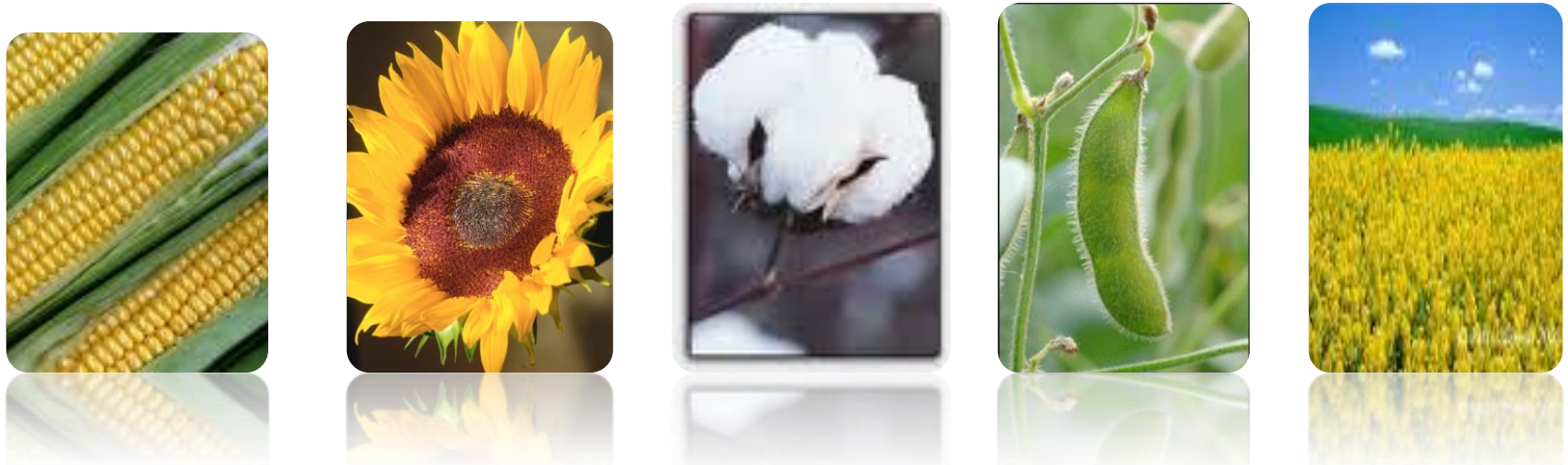
Stratas Foods

TIA Conference Oct 21, 2015



History of Tortillas – Fast Facts

- The word “tortilla comes from the Spanish word “torta” meaning round cake.
- It was given by the Spaniards to the unleavened flat bread they found in Mexico among the Aztec in the sixteenth century.
- The main source of food was *maize* (corn), which supplied the necessary starch, the main source of energy, as well as protein and a little fat.
- During that time maize was eaten straight from the cob or ground into cornmeal maize to make a dough called *masa.*
- Tortillas ar enow mainstream in the USA; sales have now become second only to sliced bread bread, passing bagels and muffins in the “packaged bread” category
- *National Tortilla* Chip *Day* is celebrated on February 24, 2016

Ingredients

Tortillas are simple in basic formulation

Flour Tortilla
Flour
Water
Shortening
Leavening Agent
Batch Pack-leavening agent, flavor, preservatives, etc

Corn Tortilla
Corn
Water

Types of shortenings used

Yet, while simple, the fats or oils used can vary greatly and deliver much different tortilla products!

Common Liquid Oils

- Soybean, canola corn, cottonseed, and sunflower oils are all commonly used

Common Shortenings

- Partially hydrogenated fats
- Animal fats (lard/tallow or A/V)
- Palm and palm blends
- Emulsified shortenings
- Enzymatically inter-esterified soybean shortenings

New innovations

- High Oleic Oils
- New Stratas innovations in functional crystallization

PHO Update

FDA has finalized the action in which Partially Hydrogenated fats are no longer considered to be **GRAS** (Generally Recognized As Safe) for any use in human food.

- Ruling by FDA establishes a compliance period of 3 years for this rule to be enacted with a July 2018 deadline; however, most will be transitioned in 2016 and 2017

- About 78 % of all products have already been converted from PHO to other products.

- Most will make changes soon to adjust labels prior to the deadline, in order to abide by Federal Laws requiring ingredients to be properly labeled, and PHO free by July 2018

PHO Issue Landscape Toplines

Tropical Oils Bad!
1985

Notice to Label Trans
2003

PHO GRAS Revocation Proposed
2013

PHO GRAS Revocation Notice
2015

Evolution of NA Fats and Oils Options

1961

Meat Fat Bad!

1984

CENTER FOR Science IN THE Public Interest

PHO Fat Good!
Margarine better than Butter

1994

CENTER FOR Science IN THE Public Interest

Trans Fat Bad!
Butter better than Margarine

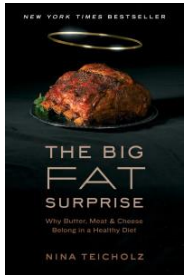
2006

Trans Label Compliance

2009

Petition to Outlaw PHO

2014



Meat Fat & Tropical Oils Good?

Trans consumption goes from less than 1.0 g / day to 4.6 g / day

Trans consumption goes from 4.6 g / day to about 1.0 g / day

Why can't Nutritionists make up their minds?
Nutrition science is based on the scientific method → prove and disprove
As nutrition tools increase in precision and accuracy, findings variability decreases

What's wrong with PHO?

What? Hydrogenation = Incorporation of hydrogen into double bonds of unsaturated compounds

Why? To convert a liquid oil to a more solid state

Increase the melting point

Increase the keeping quality by increasing the resistance to oxidation

How? Contact oil with hydrogen in the presence of catalyst with increased temperature, pressure, and agitation

Partial hydrogenation creates trans fat, which has lost GRAS status due to effects on cholesterol (increases LDL)

However, FULL hydrogenation (all bonds are tied to hydrogen) eliminates trans and remains GRAS

What are my options for PHO free shortenings?

- **Generation 1**: Conventional solutions using palm blends, interesterified soy
  - Palm and IE Soy Shortenings
- **Generation 2**: Solutions that clearly improve the working range, consistency and plasticity of conventional solutions
  - Strats' unique innovation: Flex Processed Palm and EIE Soy Shortenings
- **Generation 3**: Solutions with the marriage of Flex technology, interesterification, and a high oleic fatty acid matrix that gives you full PHO functionality without the PHO.
  - Stratas unique innovation: Apex Shortening processed with Golden Flex Technology

What are my options for PHO free?

Stratas Foods has current generation and “next generation” to replace PHO

Generation 1 approach

- Have been around for many years and can work, but are much weaker than PHO
- Liquid oils: both conventional and high oleic
  - Good for less more brittle tortillas; unstable and may be prone to sticking or tearing (no “body” to masa)
- Physical blends of fully hydrogenated fats with liquid oils
  - Very weak in stability as they can oil out, be too firm, and be difficult to manage in production lines
- Palm and palm blend shortenings
- Interesterified soybean shortenings

Generation 1 Options

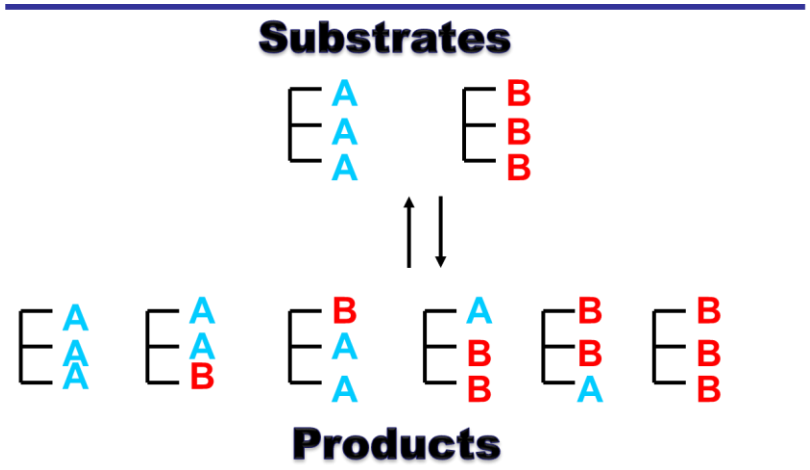
Generation 1 Enzymatically Interesterified (EIE) Soy

- 12-14 years of proven functionality in tortillas and with large national CPG products
- Whiter product, with a cleaner soy flavor
- More functional than basic liquid/fully hydrogenated blends
  - Much more stable
  - Much more plastic and workable
- Delivers chewy tortillas with body, flexibility and less sticking
- No sustainability concerns whatsoever
- “Grown in America” marketing benefits
- Compared to PHO:
  - Generation 1 EIE tends to be softer than PHO
  - Tends to be much less consistent than PHO
  - Is labeled as EITHER “Interesterfied” or “soybean oil, hydrogenated soybean oil,” which maintains GRAS status (not banned)

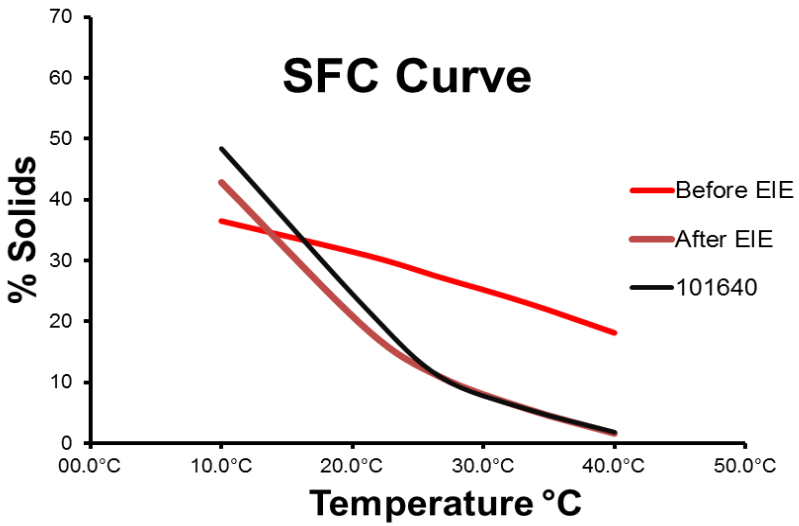
Source: United Soybean Board

What is Interesterification?

- Enzymatic Inter-esterification (Soy)
  - Interesterification: rearrangement of fatty acids on the glycerol backbone.
  - IE has the ability to modify the melting point and functional crystallization characteristics without changing the fatty acid composition.
  - Enzymatic Interesterification: positional selective IE which cleaves and reattaches fatty acids using an enzyme catalyst



Enzymatic Interesterification
• 1, 3 specific reaction but some acylmigration occurs (movement from 2 position)
• Lipase Enzyme catalyzes reaction
• Immobilized Enzyme allows for a continuous rearrangement process
• Only filtration prior to deodorization is required to remove residual enzyme
• Results in minimal oil loss, minimal waste and improved end oil quality (ex. PV and color)



Generation 1 Options

Generation 1 Palm

- Saturated fat / oleic acid content = good structure and stability
- More functional than basic liquid/fully hydrogenated blends
  - Much more stable
  - Much more plastic and workable
- Available in blends with soy or canola to lower saturates and/or for a softer product
- Delivers chewy tortillas with body, flexibility and less sticking
- Challenged for use in some applications due to a relatively narrow temperature working range
- Carries sustainability concerns (deforestation)
- Compared to PHO:
  - Generation 1 palm is much less plastic than PHO
  - Brittle in the winter/soft and oils out in the heat of summer
  - Changes with age, particularly with palm that is not processed in the USA and which is abused in overseas supply chains

Generation 2: Stratas Innovations

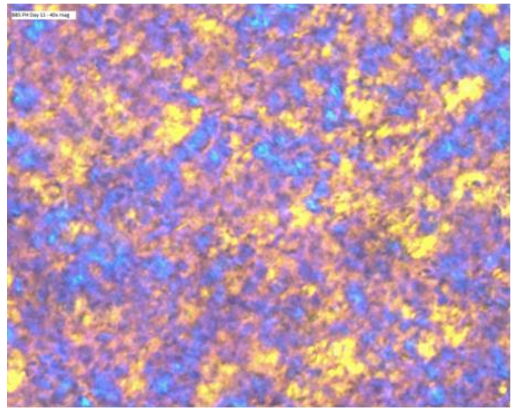
Stratas Foods has developed next generation technologies to replace PHO

Generation 2 approach

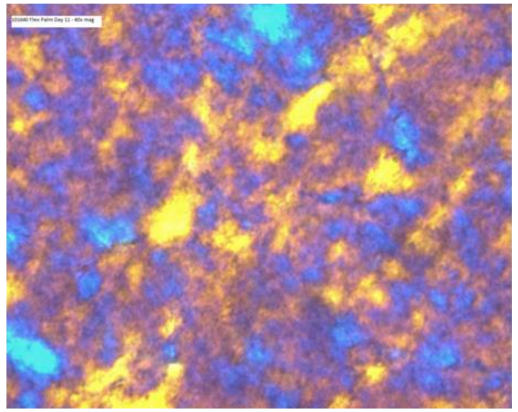
Stratas has developed unique solutions through ***Functional Crystallization*** (branded as “Flex” technology, for flexible)

- Flex technology replaces large, changing, amorphous crystal formations and changes them into small, tight “honeycomb” crystal formations that mimic what PHO delivered
- Flex products (both palm and inter-esterified soy) are wider in working range (temperature) and much more plastic and consisten, reducing tearing, sticking, and other QA issues common the Generation 1 solutions

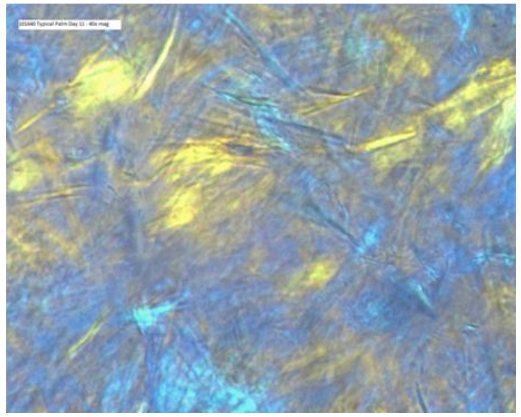
Partial Hydro Soy/Cotton



Flex Palm

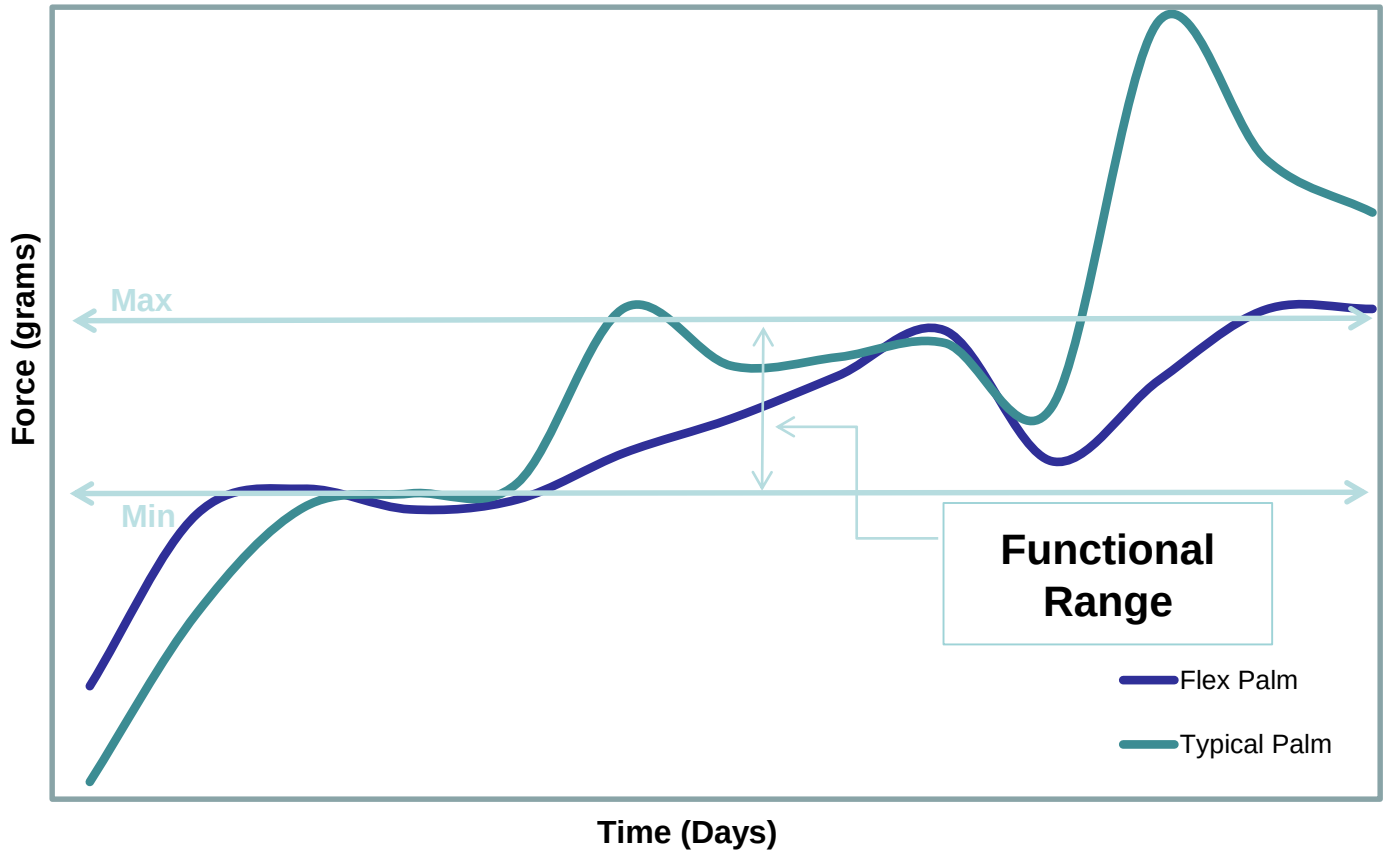


Typical Palm



Generation 2: Flex Palm Firmness Comparison

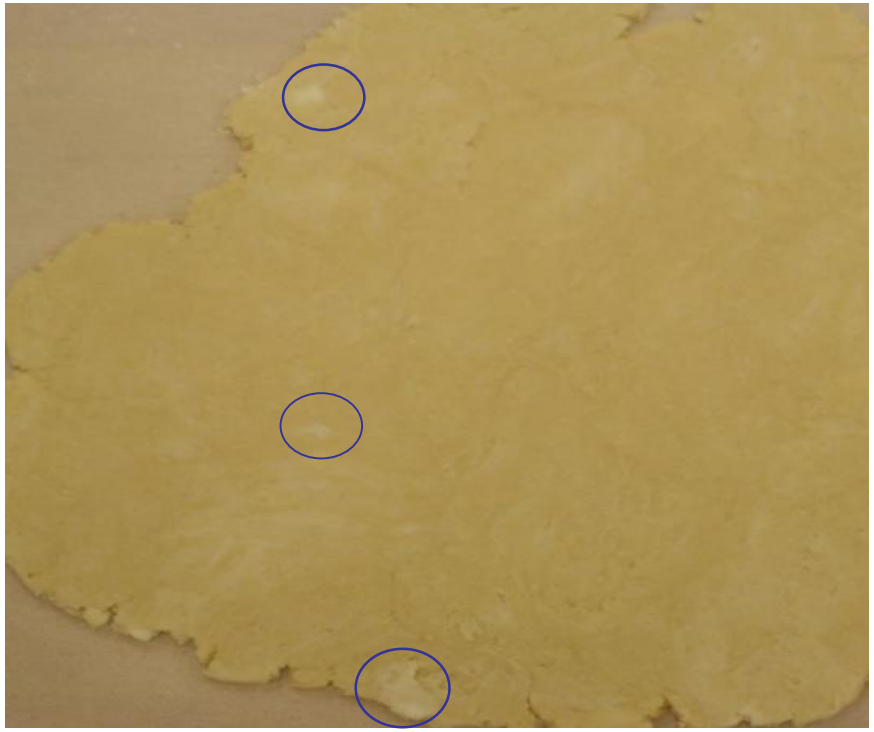
Firmness Comparison: Flex Palm vs. Typical



Flex Palm Sets Sooner and Stays Stable Longer

Generation 2: Flex Palm
Pie Crust Dough

Typical Palm



Shortening lumps visible in finished dough

Flex Palm

More homogeneous distribution of shortening

Generation 3: Stratas Innovations

Stratas Foods has developed next generation technologies to replace PHO

Generation 3 approach

APEX branded shortening systems

- APEX is our new, upcoming version of Flex technology to be commercialized very soon.
- Samples will be available in around 2 months
- This new development blends the physical processing technology of Flex (functional crystallization) with fatty acid formulation work, to hit the “sweet spot”
- APEX delivers FULL PHO FUNCTIONALITY but without the PHO

Who is Stratas Foods?

- Formed in October 2008
- 50/50 joint venture between ADM and ACH
- Separate, free standing company
- Strong support from both parent companies
- One of the largest packaged oil companies in North America
  - Production facilities in Illinois, California and Georgia along with distribution centers across the U.S. and Canada
- Over 200 years of combined experience

Stratas Product Overview

Source Oils

- Soybean Oil
  - Traditional, High-Oleic, and Low-Lin
- Canola Oil – Traditional & High-Oleic
- Corn Oil
- Cottonseed Oil
- High-Oleic Sunflower
- Mid-Oleic Sunflower
- Peanut
- Palm Olein
- Palm Stearine
- Palm Kernel
- Coconut

Oil Processing Capabilities

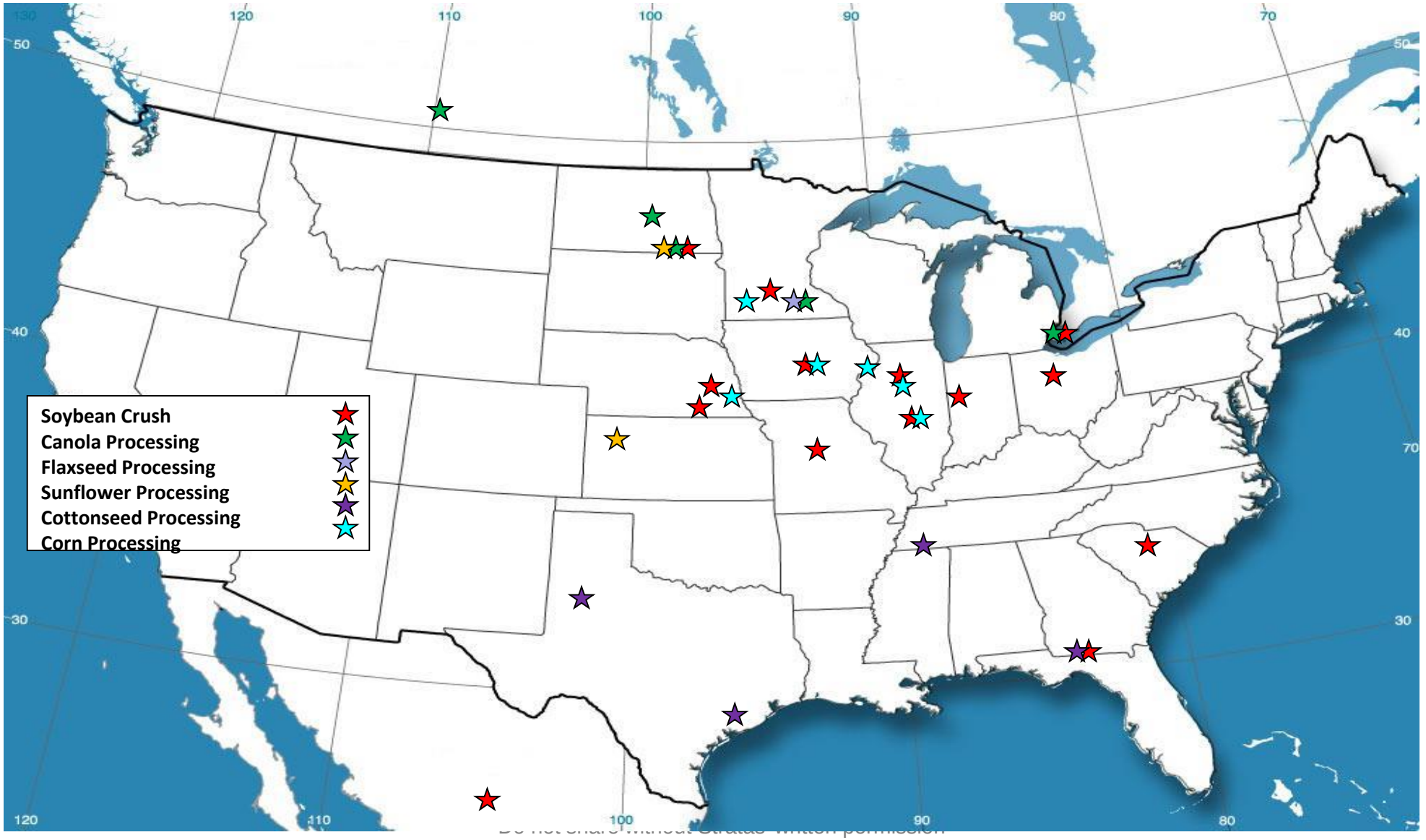
- Refining, bleaching, and deodorizing
- Hydrogenation
- *Enzymatic* Interesterification
- Fractionation
- Winterization
- Blending

Value Added

- Votation
- Functional Crystallization
- Fat Flakes and Beads
- Margarines
- Buttery Oils

Stratas Supply Chain

Connected to ADM North American Processing



Thank you for your kind attention!

- Fats are a necessary part of the human diet and provide many benefits in the tortilla industry
- FDA has finalized the action in which Partially Hydrogenated (PHO) fats are no longer considered to be **GRAS** (Generally Recognized As Safe) for any use in human food.
  - Fully hydrogenated fats not affected by FDA mandate
- Palm, soy IE, and high oleic oil blends serve as excellent PHO replacements in tortilla recipes
- Stratas offers Flex palm and Flex IE as superior PHO replacements
- Visit the Stratas Foods website and talk to a Stratas sales member that can help you identify the PHO replacement in your tortilla recipe today!