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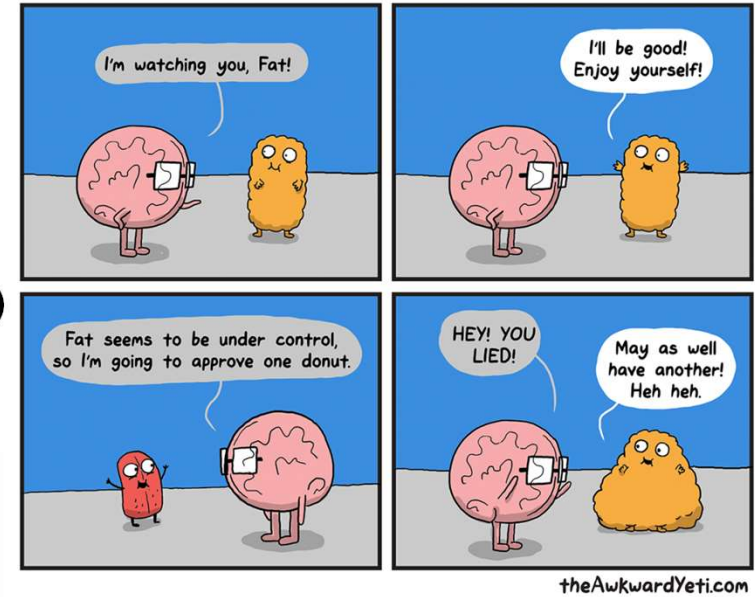
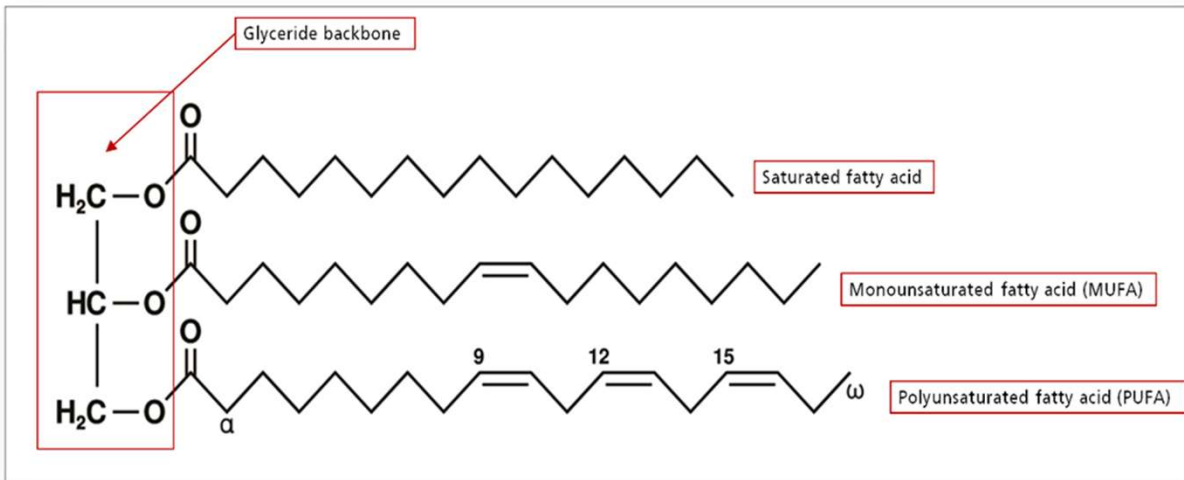
Choosing Which Shortening to Use in Your Tortillas

Outline

- Types of Fats and Oils
- Implications of Solid Fat Content
- What options are available and how do they differ
- Emulsifiers, in or out?

What is fat?

- Triglyceride
 - Glycerol backbone with three fatty acids
- The types (saturated, monounsaturated, polyunsaturated) properties of the fat



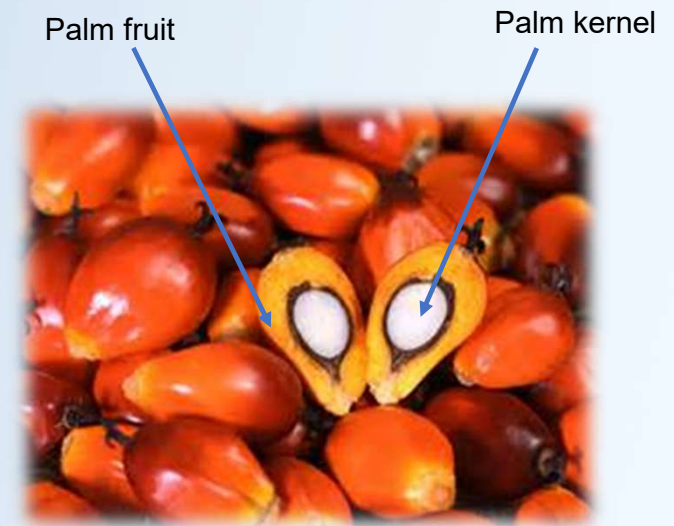
Types of Fats – Liquid Oils

- Liquid oils are liquid and room temperature
 - Generally low in saturated fat, high in unsaturated fat
 - Common types include soybean, canola, corn, olive, sunflower, cottonseed
 - Most commonly used for grilling, sautéing, deep frying, salad oil



Types of Fats – Hard Fats

- Refers to fats that are solid at room temperature
 - Generally, are high in saturated fat low in unsaturated fat
 - Animal fats – Lard, Tallow, Butter, etc...
 - Tropical fats – Palm oil, palm kernel oil, coconut oil, cocoa butter
 - Hydrogenated fats
 - Interesterified fats
 - Commonly used for frying, baking, confectionary, shortening and margarine manufacturing



Types of Fats



Canola

- Always liquid



Cottonseed

- Some solids when cold



Coconut

- Hard when cold and solid at room temperature, liquid when warm



Palm

- Hard and solid even when warm

Main Characteristics of Fat

- Nutritional properties

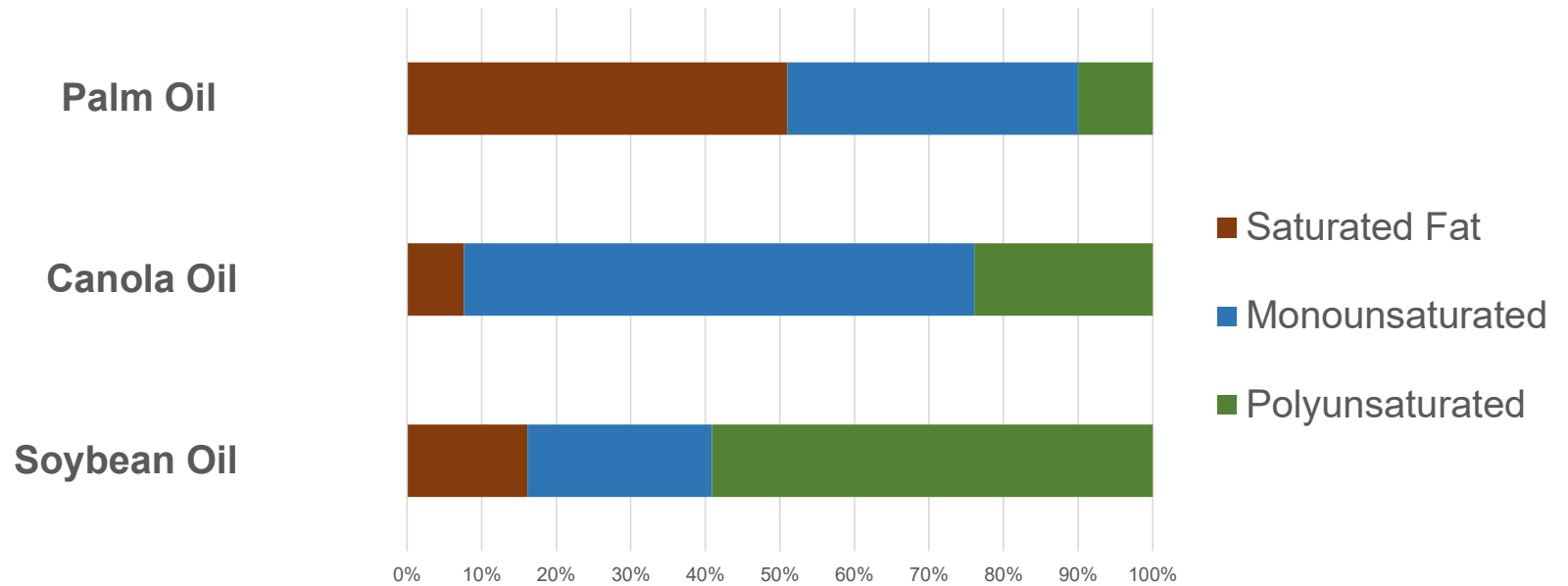
- Oxidative Stability

- Solid Fat Content

- Crystallinity and Texture



Nutritional Properties

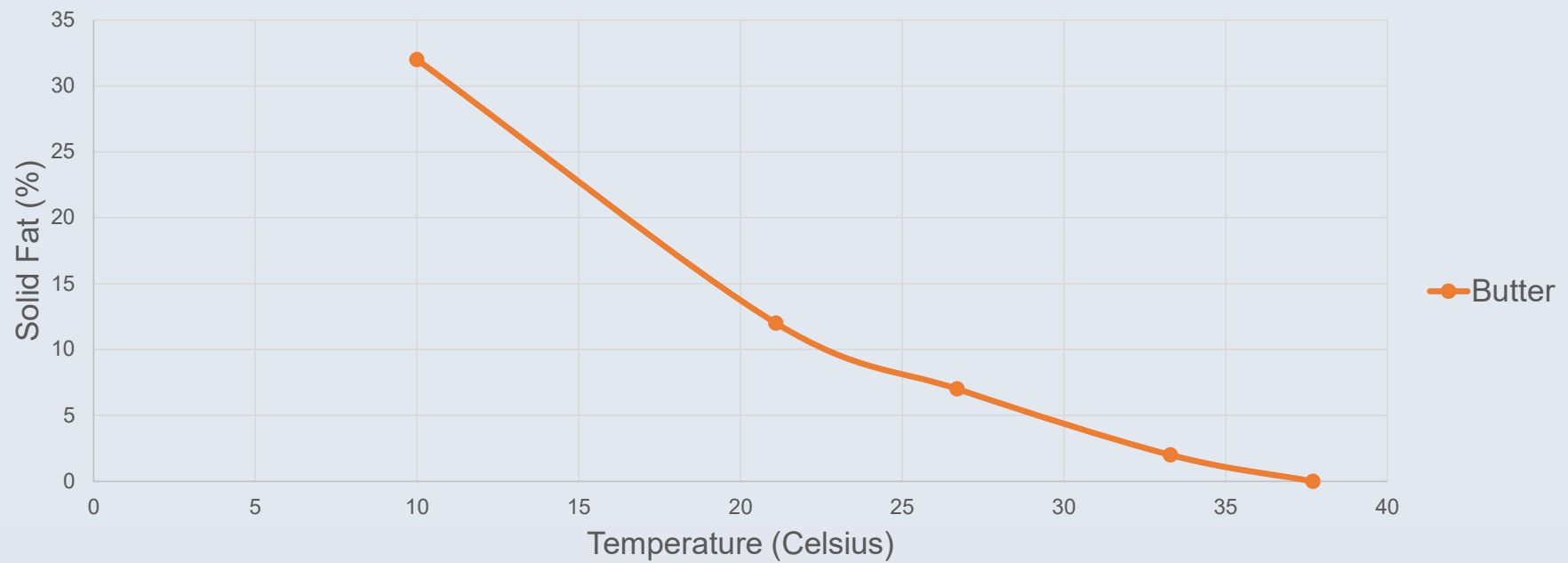


Properties of Fat – Solid Fat Content (SFC)

- SFC is a measure of the number of solids that are present in a fat matrix at a given temperature.
- Traditional temperatures chosen to represent practical situations
 - 50 F (10 C) - Refrigerator
 - 70 F (21.1 C) – Room temperature
 - 80 F (26.7 C) – Elevated room temperature
 - 92 F (33.3 C) – Temperature in the mouth
 - 104 F (40 C) – High temperature

Properties of Fat – Solid Fat Content

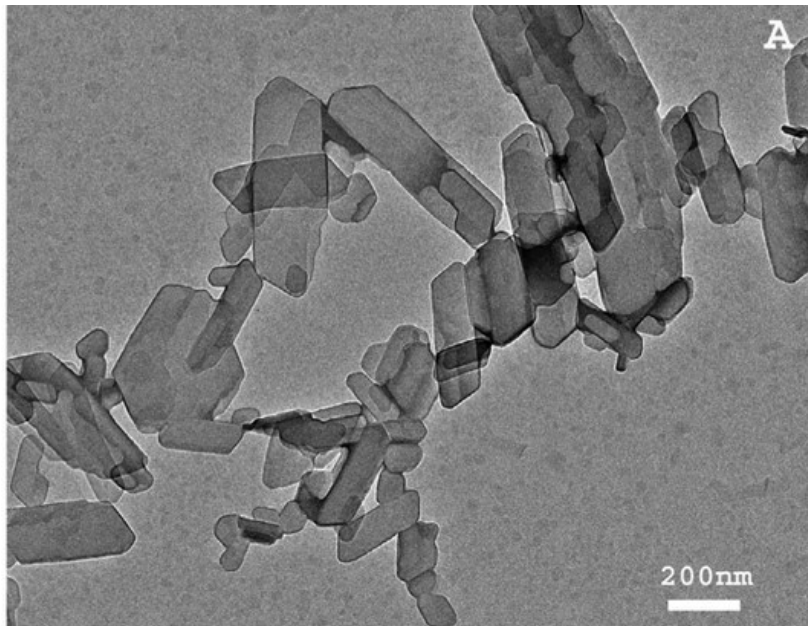
Solid Fat Index of Common Types of Fats



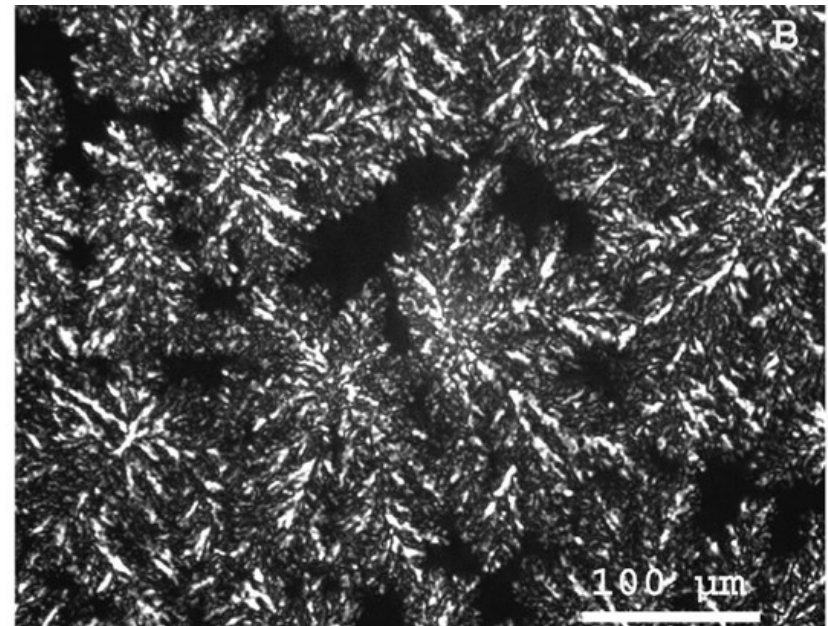
Properties of Fat - Crystallinity

- When fat is solid it assumes a crystalline structure

Undesired crystals



Desireable needle-like crystals



Shortening

- Semi-solid at room temperature
- Replacement for lard
- Crystalline fat matrix – no water
- 10-15% gas injected (usually nitrogen)
 - Changes texture and structure
 - Gives white appearance
- Highly structuring



Role of Shortening in Tortillas

- Disrupts gluten network
- Softens
- Improves dough handling
- Reduces stickiness
- Slows staling
- Improves shelf life



Desirable Qualities in a Shortening

Quality

- Smooth
 - Homogeneous
 - No lumps
- Plastic
 - Easily deforms
 - Holds shape
- Mixing Characteristics
 - Easily incorporates into mixture
 - Does not shed liquid oil
 - Maintains opaqueness
 - No remaining lumps

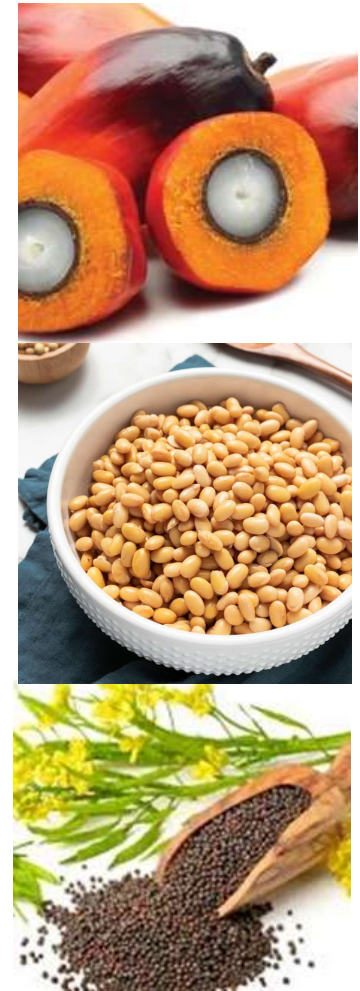
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Driven by:

- Formula
 - Solid Fat Content
 - Emulsifier Inclusion
- Processing
 - Crystallization Parameters
- Handling
 - Tempering
 - Storage temperatures

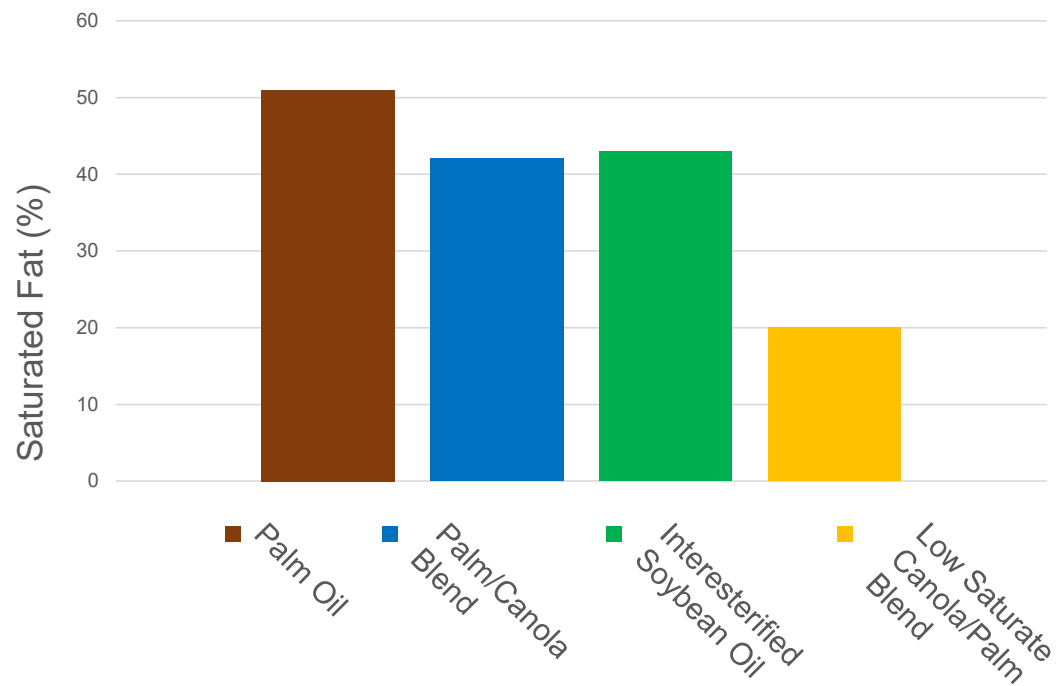
Three Shortening Types

- Palm Oil
 - 100% Refined, bleached, and deodorized oil from the fruit of palm tree
- Interesterified Soybean Oil
 - Liquid soybean oil and fully hydrogenated soybean oil which has been interesterified
- Palm/Canola Blend
 - Mixture of fractions of palm oil with liquid canola oil

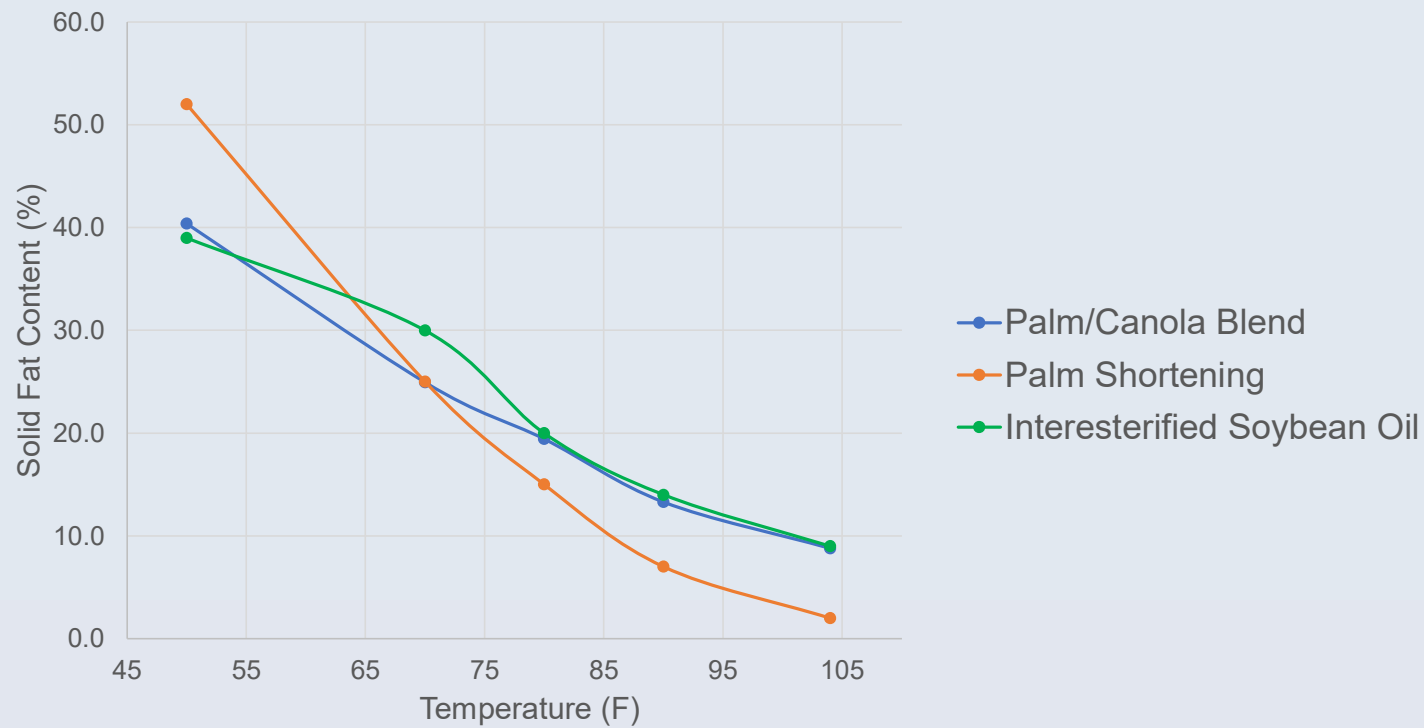


Nutrition of Different Shortenings

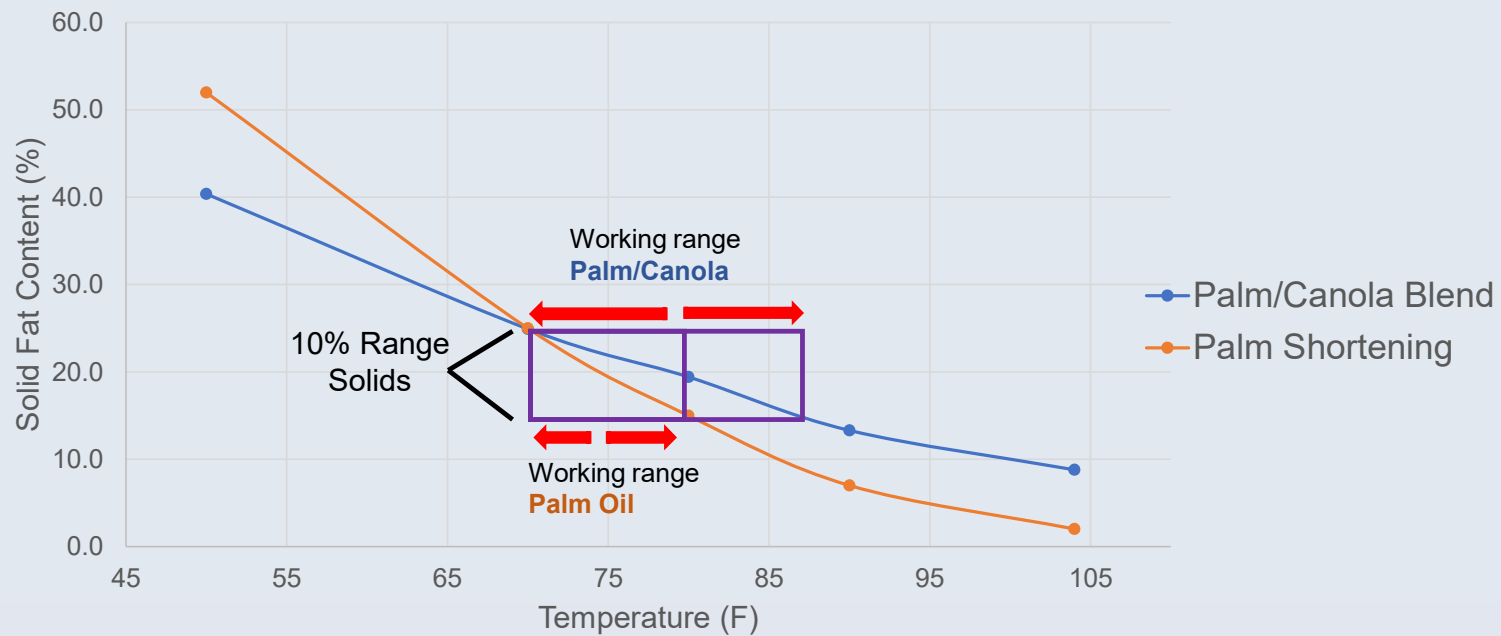
- Main nutritional concern is saturated fats
- Most health organizations call for limiting saturated fat in our diets
- Many countries have implemented regulations requiring labeling of high levels of saturated fat



Solid Fat Content – Common Tortilla Shortenings

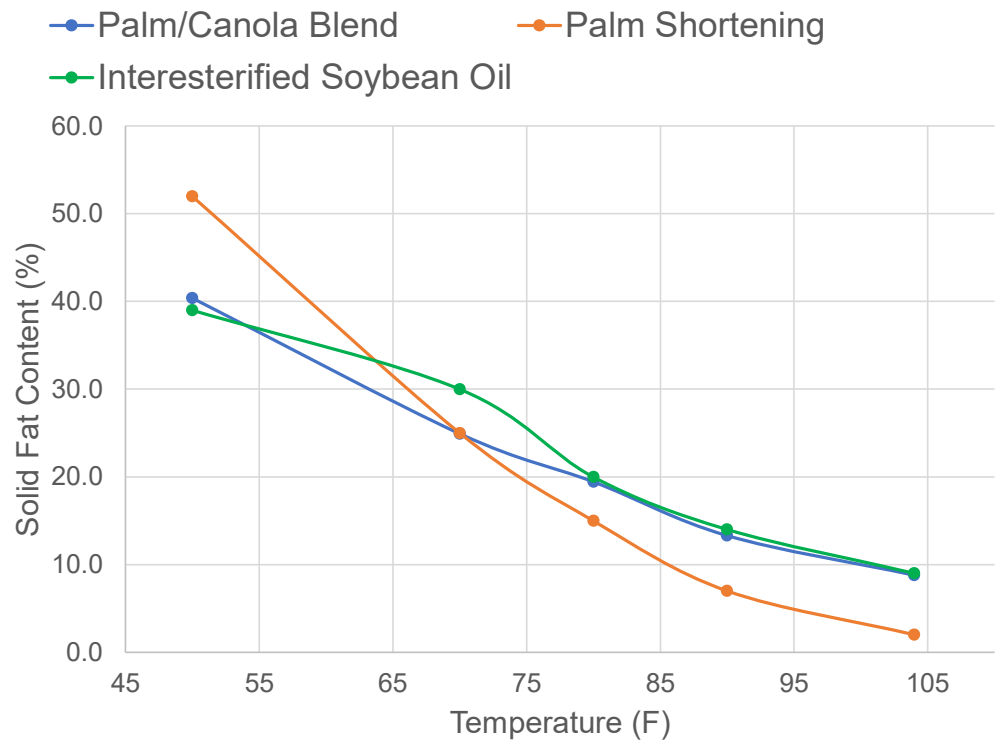


Solid Fat Content – Common Tortilla Shortenings



Storage

- **What if it's too hot?**
 - Melting of some of the fat crystals
 - Too soft to use
- **What if it's too cold?**
 - Product too hard to use
- **What if it's too hot, and then too cold?**
 - Effect of temperature cycling
 - Change to crystals
- **What if it's just right?**
 - Stable fat matrix

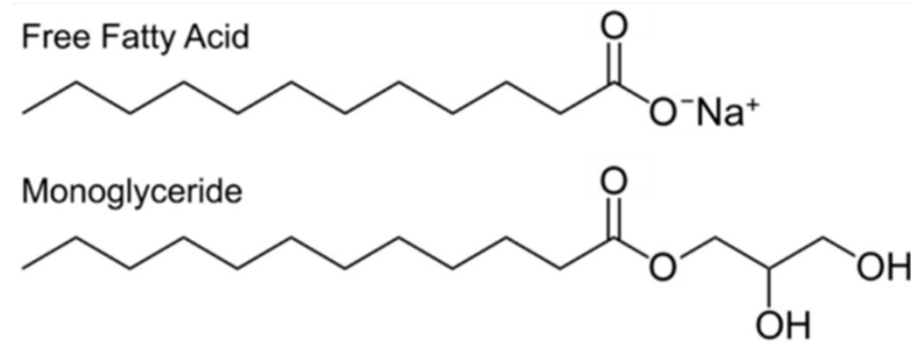


Shortening Pros and Cons

	Palm Oil	Interesterified Soybean Oil	Palm/Canola Blend
Availability	Readily available	Supply has sometimes been inconsistent	Readily available
Working Range	Steep SFC curve, narrow working range	Wide working range	Wide working range
Nutrition	High in saturated fat	Low in saturated fat	Low in saturated fat
Customizability	One product available	A few products available	Large range of products

Emulsifiers

- Emulsifiers are surface active agents that stabilize two different immiscible phases, such as oil, water, and air
- Are typically molecules that have a hydrophilic part (water loving) and a lipophilic part (fat loving)
- Coat surface of the starch and/or insert into starch helix
 - Reduce starch granule swelling
 - Reduce staling
- Emulsifier types
 - **Mono and diglycerides**
 - Polysorbates
 - Sodium Steroyl lactylate
 - Esters of acetic acid, citric acid, lactic acid, diacteyl tartaric acid, polyglycerol



Emulsifiers

- Shelf Life
 - Anti-staling
- Flexibility
 - Rollability
 - Foldability
- Anti-stick
 - Reduce tearing



Emulsifiers – Options for Addition

Loose Emulsifier Addition	Emulsified Shortening
Customizable	Customizable to a degree
Greater choice of shortening	Few available options
Basic shortening	Improved shortening
Less homogeneous	Homogenous distribution
Extra ingredient, extra addition step	Easy to add, less addition steps
Premix opportunity	Other dough conditioners added separately
May be cost effective?	Cost Effective
<i>Performance?</i>	<i>Performance?</i>

Summary

- When selecting a shortening solid fat content is key to overall performance
- Nutritional composition varies substantially in different shortenings
- Emulsifiers are a key ingredient for improving multiple aspects of tortillas
- A formulated tortilla shortening gives multiple benefits, but has to work in the production process



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Thank You