

DORADO ENVIRONMENTAL, INC.

Training Slides - Oil Chemistry



General Rules of Frying

- The optimal temperature to fry is 350 degrees Fahrenheit
 - The critical aspect is to keep it balanced, not above or low
 - Frying is about the right amount of oil to food
 - 6 parts of oil to 1 part of food
- Keys to Proper Frying:
 - Filter the oil regularly
 - Correct food preparation
 - Correct oil for the purpose

Why Fry?

- Food can be prepared as it is ordered, waste is minimal
- Frying seals and sears the food, locking in the flavor
- Fast method of cooking and generally can be done under 5 minutes
- Flavor is specific and the texture is unique

Temperature Control

- The correct frying temperature is 350 F.
 - Standby can and should be lowered, 180-240 F
- Heat kills Oil
 - Too high, it degrades the oil quickly
 - Too low, you end up using more oil than necessary to cook
- Temperature loss is a function of oil volume and food volume

Temperature Control Cont'd

- Too High

- Burnt food
- Partially cooked inside
- Burnt oil
- Smoking/foaming oil
- High amount of discard oil

- Too Low

- Greasy food due to saturation
- Higher oil use
- Uncooked Food
- Loss of Frying
- Capacity

Oil and Fat Definitions

- Two key groups:
 - Edible
 - Inedible
- Edible oil from plant or animal origin
- Fat – Solid or semi solid
- Oil - Liquid

Basic Oil Processing Technology

- Hydrogenation
 - A “hardening process” which is performed on “longer life oils”. Involves taking the weakness out of the acid chain by adding Hydrogen. Product results in a more stable oil.
- Blending
 - Mixing different quality oils to arrive at an exact formula
- Silicone Addition (DMPS)
 - Dimethyl Polysiloxane
 - Important additive to reduce foaming by protecting the oil with a thin layer across the surface, therefore, reducing the oxidation process

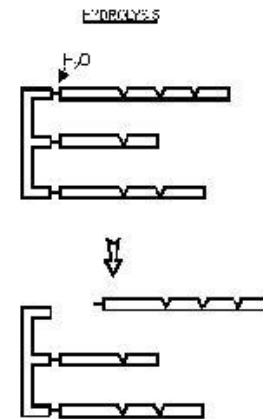
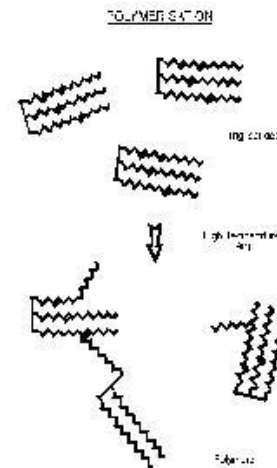
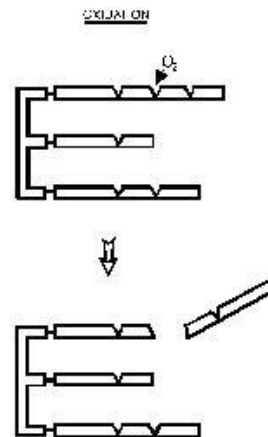
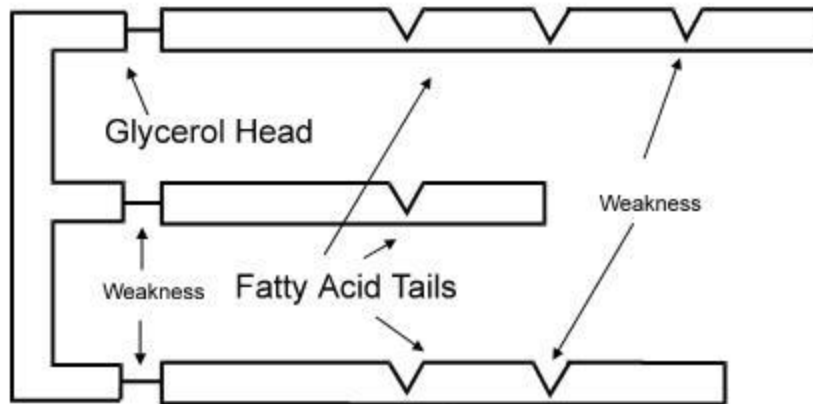
Grades of Oil

- The goal is to transition a client onto a higher quality oil, mostly because it will assist in the life cycle extension, also a \$ margin opportunity
- Without DMPS, oil quality is generally poor
- Longer life with some of the commercial additives

Chemical Structure

- Fats and oils are a mixture of triglycerides
- Saturated fatty acids are solid
- Polyunsaturated fatty acids are liquid

Chemical Structure



What Happens when Oil Degrades?

- Darkening of oil
 - Leads to further, quicker degrading
 - Foaming
 - Gumming up
 - Greasy Foods
 - Possible odor

Causes of Oil Breakdown

- Oxidation
 - Significant reaction in triglyceride degrading caused by the reaction of oxygen with the hot oil
 - High temperature can double the rate of oxidation
 - Prolonged contact with air at idling
 - Food debris
 - Food Additives
- Hydrolysis
 - Creation of free fatty acids by hydrolysis of the triglyceride with moisture
 - Excess moisture and High Temperatures
- Polymerization
 - Reaction of a fat with itself, small molecules of fat combine to form large molecules. Will occur at various points on the chain.
 - Accelerated action when frying is done at too high of heat, >375F
 - Poor quality of oil also adds to the problem

How to Spot the Breakdown?

- Other than color, you can spot the breakdown through the causes by:
 - Oxidation
 - Oil Darkens/Develops an odor and poor flavor
 - Hydrolysis
 - Smoking (Blue Haze) and an off flavor
 - Polymerization
 - Oil Thickens and Darkens
 - Oil foams up and or appears gummy

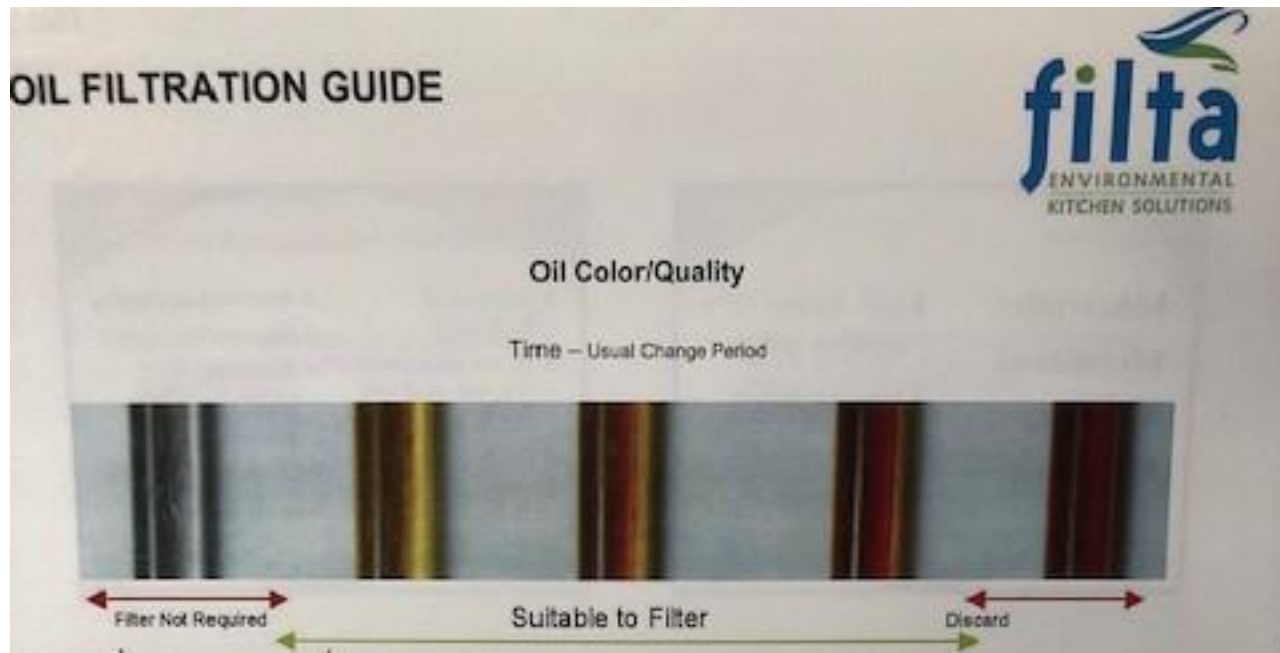
How we Help?

- Removal of Particulate that leads to the inevitable breakdown
- FFA treatment (FFAs are the building blocks of fat sources in living organisms. When these acids, key in the triglyceride creation, are free floating, they appear as lipids breakdown products and need to be cleared)
 - One technique is straining the oil
 - Proper filtration needs to be performed before the oil is too far gone

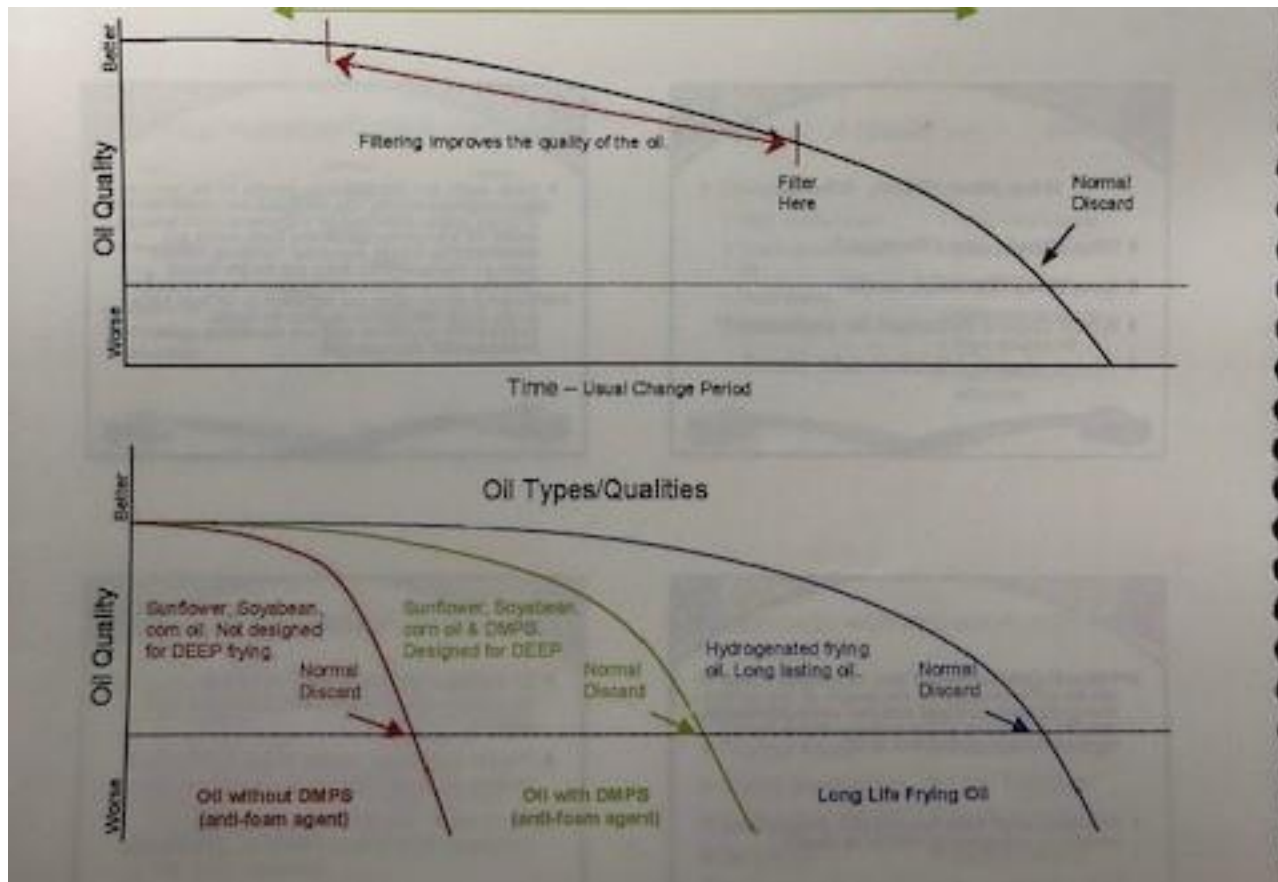
How we help cont'd

- Most of the damage that occurs in oil is via minute food particles less than 50 microns. This is due to the fact that hundreds of thousands of food particles have a much greater surface area than a few large particles.
- Most filter systems work by straining the oil and taking out food particles over 250 microns. This helps, but obviously misses a lot.
- Systems that are out there that filter sub 250, do not filter at temperature, which makes it more difficult to capture the fine particles
- FiltaFry filters to what level? **2-3 Microns**

Oil Filtration Guide



Oil Life Chart



Additional Links

- Good Frying Practices are the Key, click on the link to find some [third party evidence](#).
- Any questions?