



## Protecting Against Oxidation.....Naturally

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*April 2001*

It has long been known that oilseeds such as soybeans and canola can be stored for 3-4 years and then crushed to yield oil free from measurable oxidation. It has also long been known that cold pressed vegetable oil has a longer shelf life than refined vegetable oil. In fact, some cold pressed oils can be stored for years without measurable oxidation. Plants and their seeds have a remarkable built-in defense system against oxidation.

Oxidation is a very complex process. Oxidation is started by the reaction of oxygen with the oil molecule to form a chemical radical. Unless it is stopped, the radical will transfer itself from molecule to molecule in a chain reaction. In the wake of the radical all of the molecules affected by it are altered and become less stable. The result of oxidation and radical reactions in oil is rancid oil.

Antioxidants stop the chain reactions of radicals. As there are many possible radicals formed, the antioxidants must be effective against all of the radical pathways. Synthetic antioxidants are very effective in blocking specific radical reactions. These antioxidants were selected for their ability to block one or two of the major oxidation pathways. Synthetic antioxidants do substantially increase the shelf life of refined vegetable oils. However synthetics are far less effective than antioxidant systems that occur naturally in plants since plant-derived antioxidants block both the major and minor oxidation pathways.

Oilseeds have evolved natural antioxidant systems that protect the oil in the seed. "Systems" is the important word here. Antioxidant systems that are found in seeds and unrefined oils may contain 30-40 different antioxidant molecules. Take Vitamin E for example. Vitamin E in vegetable oil is a complex of 10 different antioxidant molecules. The plant has three antioxidant systems related to the Vitamin E family; the plastoquinones, the ubiquinones and the tocotrienols. In addition, phaeophytins, sterols, sterol ferulates, carotenoids and phospholipids are all antioxidants and all occur in unrefined vegetable oil. In essence the plant uses an array of molecules to suppress oxidation. The results of the natural system are dramatic.

Several of the antioxidant families in the plant antioxidant system are intensely colored pigments. As such they are undesirable in vegetable oils refined and sold for their light color. Refining vegetable oil removes these pigments along with many of the other antioxidants mentioned above, and results in a co-product stream with an elevated concentration of these pigments and other antioxidants. **Feed Energy Company** acquires this co-product stream from vegetable oil refiners and through many intricate processes, recovers intensely pigmented (almost opaque) oils. **The anti-oxidant properties of Feed Energy's vegetable oil are phenomenal.** The 20 hour AOM, a test of oil stability, of neat Feed Energy vegetable oil is negligible. There is no known synthetic antioxidant that can come close to imparting this remarkable stability to soybean oil.

**Feed Energy** vegetable oils contain essentially 50:1 concentrates of the antioxidant systems present in cold pressed soybean oil and subsequently have enough antioxidants to protect the oils themselves as well as substantial volumes of other ingredients in a blended formulation or a finished feed. Including Feed Energy vegetable oil products in feed blends seems a sensible approach if the goal is to get a natural antioxidant array working to protect ingredients or finished feed products.

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