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RESEARCH SPOTLIGHT

by Bradley R. West, ND

Assessment of Rancidity in Fatty Acids

The decomposition or degradation of fatty acids is often called rancidity and entails two main reactions: hydrolysis and oxidation. Hydrolysis, an enzymatic-type oxidation reaction, occurs with exposure to moisture in an oxygen-free environment, while oxidation occurs in the presence of oxygen and/or UV light. Also called lipid peroxidation, this deterioration of unsaturated fatty acids is a free-radical chain reaction. This oxidative rancidity causes most fats to break down and degrade into several other measurable by-products. There are a few other factors that can contribute to rancidity, such as microbial or water infiltrates, trace minerals, inorganic salts, light, and heat. As temperature rises the rate of decomposition increases, with time being the ultimate catalyst.

Rancidity is a natural process, and all oils will eventually go rancid. In order to ensure an oil is as pure as possible, the shelf life and quality of manufacturing can be easily tested for reassurance. While human olfactory is actually quite capable of detecting even small amounts of a rancid fat, there are two common analytical tools used and considered objective: peroxide value (PV) and anisidine value (AV). PV is a primary measure of oxidation that measures actual oxidation, or the quantity of peroxide oxygen present in an oil at that moment. Fish oils with a PV higher than 5 are not considered acceptable. AV is a secondary oxidative by-product measure that shows oxidation history, or how much peroxide material has already degraded. AV specifically measures aldehydes, which are the primary source of a rancid smell and taste, and is considered by most to be a better indicator of overall freshness than PV. However, both are quite useful, and the evaluation of an oil is best when both are considered. TOTOX is the name given to the combining of these values, and it is calculated by adding AV to PV x 2 or AV+2PV. TOTOX is a dynamic measure since PV and AV can vary dramatically, and an acceptable value is one that totals less than 26.

Since polyunsaturated fats are more susceptible to oxidation than saturated fats, due to their more unstable double bond configuration and longer chains, it is necessary and valuable to use these measurements when considering the freshness and efficacy of an edible oil.

Koon, RC. Understanding Rancidity of Nutritional Lipids. *Insider* 2009 (8).

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