

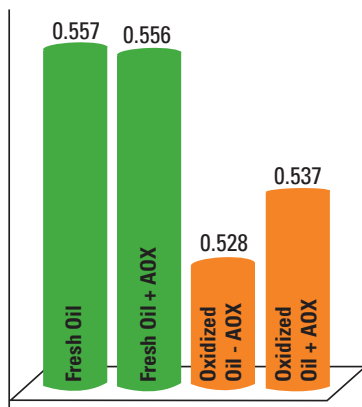
Take Control of Oxidation with an Antioxidant System

For decades, producers have desired to supplement diets with high quality fats and oils to increase feed energy and manage the cost of energy. The biggest obstacle to maintaining quality fats and oils is preventing rancidity. The main cause of rancidity is lipid oxidation; it's simply defined as the destruction of unsaturated fatty acids in the presence of oxygen. In order to control rancidity and lipid oxidation, a complete antioxidant system should be used.

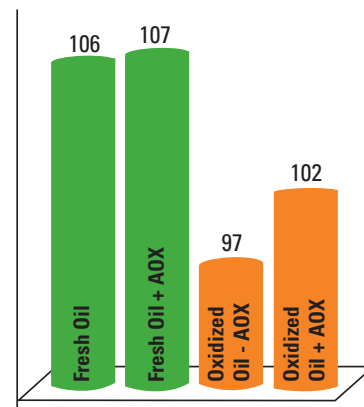
Oxidation is initiated by exposure to oxygen, enzymes, metal ions, heat and light. During oxidation, oxygen is absorbed and free radicals are produced - accelerating the unsaturated fatty acid conversion to byproducts such as peroxides and secondary oxidatives. This process can have a major impact not only on fat quality, but on the performance of animals.

Multiple studies conducted in swine and poultry demonstrate the negative impact of feeding oxidized fats and oils on performance parameters such as average daily gain, feed intake, gain to feed ratio, and final body weights.

Gain to feed ratio (g:g) for Ross 308 broilers (day 1-39) fed diets containing oxidized oil¹



Average daily gain (g) for finishing barrows fed diets containing oxidized corn oil²



How can producers control lipid oxidation? There are three important keys to building a system to control lipid oxidation:

- First, a blend of antioxidants needs to be included to prevent free radicals from destroying fat molecules. Each antioxidant will react differently depending on the product being treated and the conditions present. By choosing the right combination, a synergistic blend can be included to protect the specific product being treated;
- Second, a metal chelator needs to be included to bind metal ions, which may form free radicals;
- Finally, a surfactant or oil based carrier is included to increase the interaction of the antioxidants and free radicals which are respectively hydrophilic and hydrophobic by nature.

By using an antioxidant system composed of these three elements, oxidation can be controlled, and the optimal quality of fats and oils is preserved. To learn more about targeting specific applications with antioxidant systems or our other animal nutrition and health solutions, email Kemin at keminag@kemin.com.

¹Tavarez M.A., et. Al. Effect of antioxidant inclusion and oil quality on broiler performance, meat quality, and lipid oxidation. Poultry Science 90:922-930, 2011.

²Boyer, D.D., et. Al. Effects of oxidized corn oil and a synthetic antioxidant blend on performance, oxidative status of tissues, and fresh meat quality in finishing barrows. J. Anim. Sci. 90:5159-5169, 2012.



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WHO IS KEMIN?

For more than 50 years, Kemin has grown into a global company providing innovative ingredients to the animal health and nutrition, pet health and nutrition, personal health, nutrition and beauty industries. Kemin is dedicated to exceeding customer expectations as a partner in the use of molecular science to improve the lives of people and animals around the globe.

Kemin spent the past three years investing human and financial capital necessary to certify its Des Moines manufacturing facility for the Food Safety System Certification (FSSC) 22000:2010. FSSC 22000:2010 is recognized by the Global Food Safety Initiative (GFSI) as a rigorous food safety management system, certified by approved third-party organizations. The certification covers the manufacturing of food ingredients used in further processing and is designed to deliver greater confidence in food, fewer health risks, lower auditing costs, improved protection for brands and improved supply chain management. Although GFSI recognized certifications are considered a quality standard for the food industry, this recognition is unique for a feed ingredient manufacturer.



**Worldwide Headquarters
Des Moines, IA - USA**



“Consumer safety is paramount,” shares Dr. Chris Nelson, president and CEO of Kemin Industries. “This certification gives our customers peace of mind that Kemin delivers on its promise to provide quality, safe ingredients. It also validates our role as a market leader in food safety.”

With proven scientific knowledge, dedication to quality and safety, reliable technology and personalized service, Kemin is your total solution provider and a trusted advisor - helpful, honest and proven.

WHAT IS TOTAL NUTRITION™?

Through TOTAL NUTRITION™, Kemin offers a range of nutritional solutions for raising healthy animals. Kemin understands you

need to raise healthy livestock that gives consumers the nutritional and health benefits they are looking for, while also returning profit. We focus our products and services to help you achieve safe, healthy and efficient solutions.



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