CONTROL OXIDATION WITH A KEMIN ANTIOXIDANT SYSTEM

To protect your fat from the negative effects associated with lipid oxidation, an antioxidant system should be used. An antioxidant system should contain a combination of the following:

- Synergistic blend of antioxidants to absorb free radicals before they destroy fatty acids.
- Metal chelators to bind metal ions, which may promote free radical oxidation.
- Oil-based carriers to better mix with fat molecules.

RENDOX®
ANTIOXIDANT SYSTEMS

When treating ingredients, identifying the correct antioxidant for your application can be the difference between success and failure. The RENDOX® line of liquid antioxidants is formulated specifically for treating commonly used rendered fats and oils.

BENEFITS:

- Maintains optimal nutritional value and palatability of the ingredient.
- Low ethoxyquin inclusion and products formulated without ethoxyquin.
- Complete system containing antioxidants and chelators in an oil carrier.

KEMIN ANTIOXIDANT SYSTEMS

Product	Animal fats	Vegetable oils	Blends	Ethoxyquin (EQ) inclusion		Active Ingredients
				Low EQ	No EQ	
RENDOX® AET	X			X		Ethoxyquin, BHA and BHT
RENDOX® AT 20	X				X	BHA and BHT
RENDOX® CQ		X			X	TBHQ* and Citric Acid
RENDOX® AC	X			X		BHA and Citric Acid
RENDOX® EQ	X		X			Ethoxyquin
RENDOX® RG			X			TBHQ* and Ethoxyquin
RENDOX® CP (Canada)		X			X	Propyl Gallate and Citric Acid

KEMIN®

Kemin offers a range of nutritional solutions for raising healthy animals. We understand your need to raise healthy livestock that gives consumers the nutritional and health benefits they are looking for, while also returning a profit. Our products and services help you with:

- Nutrition
- Feed Quality
- Gut Health
- Pathogen Control

KEMIN.COM/AG
1-800-752-2864

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DO YOU KNOW WHAT'S HAPPENING IN YOUR FAT TANK?

A FAT QUALITY CASE STUDY

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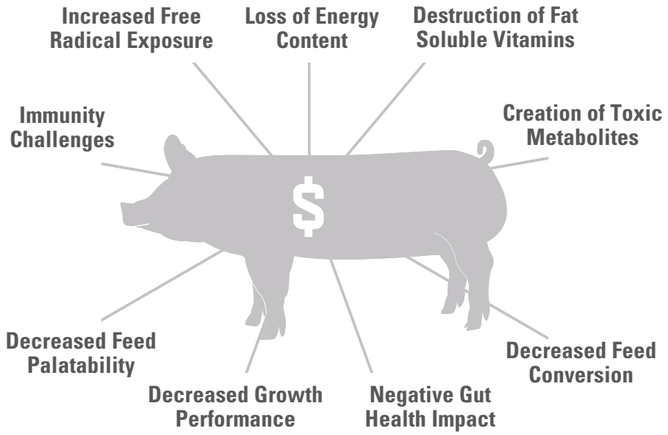
LIPID OXIDATION

The oxidation of fats and oils is an irreversible, naturally occurring process where fatty acids are attacked by free radicals and oxygen is absorbed. This process results in a conversion of the fatty acids into harmful byproducts including peroxides and aldehydes. Oxidation dramatically affects the quality of fats and oils, which has shown to have direct impact on animal health and performance, ultimately negatively affecting your business's financial bottom line.

POOR FAT QUALITY IS COSTING YOU:



THE FAT TANK

Purchasing quality fat is the first step in limiting the potential impacts of oxidation. However, high quality fat can easily be negatively impacted due to handling and storage conditions. Time of storage, application of heat and the mixing of different lipid sources all have direct implications to the production of peroxidation compounds.

Management practices implemented often focus on the amount of time fat is exposed and susceptible to oxidation. Unfortunately, this practice does not take into account the layer of fat residue, which coats the inside of the tank, or the sludge buildup at the bottom of the tank. These residues contain high amounts of free radicals which, once mixed with new fat, disperse and immediately promote oxidation of the new fat.

Treating fat with a Kemin antioxidant system will prolong the fat quality, ensuring you receive the maximum value from your fat.

CASE STUDY

STABILIZING FAT TANK QUALITY

BACKGROUND:

Previous fat quality testing indicated the customer feed mill was receiving high quality, pet-food grade, non-antioxidant treated poultry fat.

Customer's fat tank was not being cleaned, causing concern that the quality of the fat leaving the tank was not the same as the quality of the incoming fat.

Kemin Customer Laboratory Services (CLS) field study was conducted to determine:

1. Quality of fat coming out of the tank.
2. Correct antioxidant system treatment level, if needed.

Project Scope:

The fat tank at the customer site was sampled 3 times per week (Mon, Wed and Fri) for 3 sampling periods.

- **Sample Period 1:** Prior to implementation of the antioxidant treatment.
- **Sample Period 2:** 2 weeks post implementation.
- **Sample Period 3:** 4 weeks post implementation.

ANALYSIS TESTS CONDUCTED:

OXIDATIVE STABILITY INDEX (OSI)	A test illustrating the potential for oxidation in a liquid fat. Results are reported in hours to induction (onset of oxidation), a higher value is more desirable.
PEROXIDE VALUES (PV)	Peroxides are the initial compounds produced by oxidation and are early indicators of active oxidation.
SECONDARY OXIDATIVES	Testing for aldehydes, such as hexanal and 2,4-decadienal. These compounds are produced later in the oxidative process, following peroxides.

OXIDATION ANALYTICAL TESTING RESULTS:

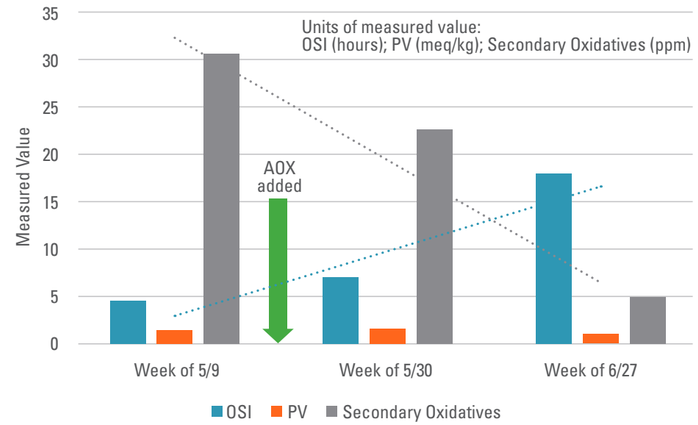


Figure 1. Change in oxidative status of poultry fat before/after implementation of an antioxidant system (n=3 for each designated time period).[1]

As the results of the field demonstration indicate, once high quality poultry fat was added to the untreated fat tank, blending of the fats allowed for the poor quality, free radical loaded fat to immediately impact oxidation. The first series of samples confirm low OSI times and high levels of secondary oxidatives. After implementation of the antioxidant treatment system OSI begins to increase, indicating improved stabilization of the fat. In addition, secondary oxidative levels begin to decrease, signifying interruption of the oxidative process.

Stabilizing the quality of the previously untreated fat tank takes time. Even as new fat is added, OSI times and secondary oxidative levels continue to improve.

Reference:
1. Kemin Internal Document, 16-00090.

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