Addition of antioxidants controls and delays lipid oxidation, but does not affect growth performance and oxidative status of pigs fed oxidized oils

Hung YT, Hanson AR, Urriola PE, Johnston LJ, Kerr BJ, Shurson GC

Key points:

- The addition of synthetic antioxidants can improve lipid stability, but does not completely prevent further oxidation in both fresh (unoxidized) and oxidized lipids.
- The addition of synthetic antioxidants did not affect growth performance of pigs fed oxidized oil, but improved signs of oxidative stress.

Nutritionally speaking, supplementation of lipids (fats+oils) in swine diets is mainly done to increase the energy value of the diet as well as provide essential fatty acids, improve feed efficiency, palatability, absorption of fat-soluble vitamins, and reduce feed dustiness. It is worth mentioning that lipids used in swine diets come from various sources, with corn oil being one of the most common lipid sources in the feed industry. More than 2 million tons of corn oil are produced annually in the U.S. ethanol industry. However, distilled corn oils are susceptible to lipid oxidation (the deterioration in lipid quality, leading to oxidative stress) due to containing a high amount of unsaturated fatty acids. Thus, it is highly likely that the oxidation has occurred in corn oil during processing and storage before being used in feed.

Kerr et al. (2015) emphasized the importance of knowing the impact of lipid oxidation on lipid quality and nutritional value. Furthermore, Hung et al. (2017) conducted a meta-analysis study and presented that feeding diets containing oxidized lipids to pigs resulted in 6% reduction in average daily gain, 5% reduction in feed intake, and 2% reduction in gain efficiency compared with feeding unoxidized lipids. Therefore, it is imperative to find practical ways to preserve nutritional value of lipids, prevent oxidation of lipids, and minimize negative effects of lipid oxidation on swine health and growth performance. The study by Hung et al. (2019) aimed to investigate the effects of adding antioxidants (tert-Butylhydroquinone) to unoxidized and oxidized corn oil on growth performance and oxidative status of nursery pigs.

A total of 208 weaned pigs were fed diets included 6% unoxidized corn oil or oxidized corn oil with or without 60 ppm of tert-Butylhydroquinone (TBHQ) for 35 days. Weight gain and feed intake were collected for computing growth performance data. Serum and liver samples were collected for determining oxidative status.

Results showed no difference on growth performance among treatments. Pigs fed oxidized oil increased hepatosomatic index by 5% while reduced serum vitamin E levels by 13% compared with pigs fed unoxidized oil. These results suggest that the addition of antioxidants reduce further lipid oxidation, but does not affect growth performance and oxidative status of pigs fed oxidized oil.

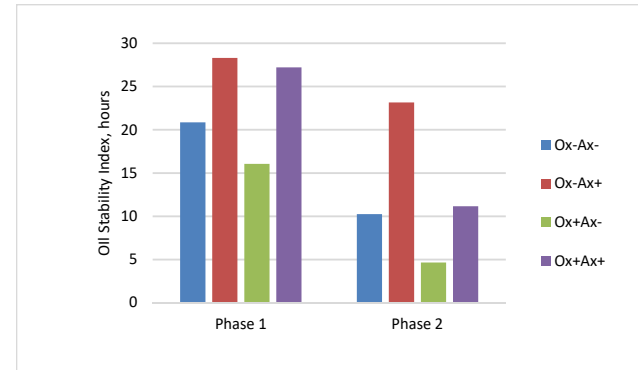

Figure 1. Impact of adding antioxidants (Ax) on oil stability index of unoxidized (Ox-) and oxidized (Ox+) corn oil

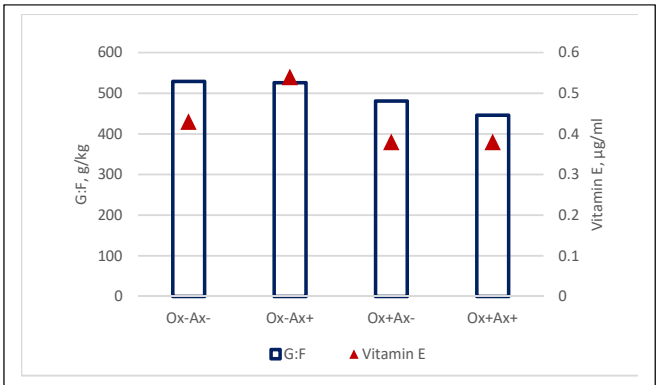

Figure 2. Effects of feeding corn oil and antioxidants on gain efficiency and serum vitamin E

References

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