ProTain™ OT

Making a difference in stabilizing feed ingredients

Feed additives that give key benefits

- Highly efficient protection against oxidation
- Prolonged shelf life
- Preventing loss of fat-soluble vitamins A, D, E and K
- Preserved pigment quality
- Maintained product palatability

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Highly effective antioxidants

Oxidation of feed ingredients is a common problem in the feed industry. The negative effects of oxidation can be summarized as:

- Breakdown/degradation of fat-soluble vitamins A, D, E and K
- Breakdown/degradation of oils, fats and pigments
- Loss of palatability
- Loss of energy/nutritional value
- Development of toxic metabolites

Feeding oxidized feed to animals can result in decreased animal health and performance. Therefore it is crucial to prevent oxidation of feed ingredients and feed.

Bottom line loss

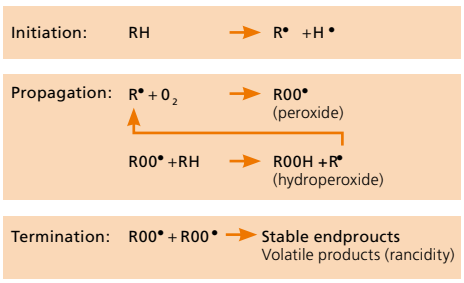
Oxidation of feed ingredients leads to loss of quality and nutritional value, resulting in financial losses. In the following table the financial losses of rapeseed oil degradation are calculated:

Energy reduction (%)	Energy value rapeseed oil (kcal/kg)	Financial loss * (euro/ton)
0.0	9000	0
0.5	8955	4.93
1.0	8910	9.85
1.5	8865	14.78
2.0	8820	19.70

Energy loss of rapeseed oil and corresponding financial losses.
* Financial loss is based on rapeseed oil of Dutch origin of 985 euro/ton FOB mill (source: Feedinfo, European Feed Raw Material Prices, 12 January 2012.

The oxidation process

Oxidation is the irreversible chemical chain reaction in which oxygen reacts with feed and feed ingredients. Once the process has started it cannot be stopped, only delayed. The oxidation process can be divided in three phases and is shown in the diagram below.



ProTain™ OT antioxidant additives

ProTain™ OT products are based on the following principles:

- Highly efficient synergistic combinations of antioxidants to neutralize the free radicals that are responsible for the propagation reactions
- Chelators to minimize the catalyzing effect of metal ions in the initiation phase
- Surfactants to ensure excellent dispersion of the antioxidants
- Nanometer-size particles to give a high surface to volume ratio to boost the effectiveness of antioxidation reactions.

The main benefits of these solid and liquid feed additives are:

- Prolonged product shelf-life through ingredient stabilization
- Protection of nutritional value
- Maintained organoleptic quality

Measuring oxidation

There are multiple methods to test the oxidation level of raw materials/end products. They can be divided in predictive and indicative testing methods.

Predictive testing

The Oxipres is an accelerated test which is designed to evaluate the susceptibility to oxidation of oils, fats and lipid containing products, such as compound feed and meat and bone meal. The measurement is based on the consumption of oxygen under standardized conditions around 100˚C and pressure (5 bar). Oxidation occurs when oxygen is consumed and pressure drops. From this pressure drop an induction point can be calculated.

Indicative testing

Peroxide value is a measurement for the peroxide and hydro-peroxide concentrations in lipids and lipid rich products. Peroxide value can also be followed over time to check the stability of feed and feed ingredients. Levels of peroxide value in feed and feed raw materials should not exceed 20 meq/kg, and should preferably even be below 5 meq/kg.

The Oxipres test, the peroxide value and measuring the antioxidant level in stabilized products are practical tools that enable us to recommend, as a service to our customers, the antioxidant type and dosage rate for each particular product to be stabilized.

ProTain™ OT applications

ProTain™ is typically used to prevent the oxidation of:

- Premixes
- Feed
- Pet food
- Vegetable oils
- Vegetable protein meals
- Fish oil/meal
- Animal fat
- Vitamins
- Pigments

For maximum protection ProTain™ OT should be applied as soon as possible in the production process at the correct dose level. Contact your Perstorp sales manager to find out the right ProTain™ product and dosage for your application.

Other ProTain™ products

ProTain™ NA	Product range based on natural antioxidants
ProTain™ FG	Range of food grade quality



Your Winning Formula

The Perstorp Group is the world leader in several sectors of the specialty chemicals market. Few chemical companies in the world can rival its 130 years of success. Today we have a rich performance culture distilled from our long history and extensive knowledge in the chemical industry. That culture and knowledge base enables us to produce Winning Formulas for a wide variety of industries and applications.

Our products are used in the aerospace, marine, coatings, chemicals, plastics, engineering and construction industries. They can also be found in automotive, agricultural feed, food, packaging, textile, paper and electronics applications.

Our production plants are strategically located in Europe, North America and Asia and are supplemented by sales offices in all major markets. We can offer you speedy regional support and a flexible attitude to suit your business needs.

If you want a partner for feed additives who can offer you focused innovation to enhance your product or application, which is delivered reliably and responsibly, look no further. We have a winning formula waiting for you.