

The impact of dietary oregano essential oil supplementation on fatty acid composition and lipid stability in eggs stored at room temperature

A. M. Johnson, J. Charre-Perales, A. Todd, M. Arguelles-Ramos & A. A. B. Ali
Animal and Veterinary Sciences Department, Clemson University, SC, USA

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Introduction

Eggs are a valuable source of essential fatty acids (FAs), which can be modified through dietary interventions to help reduce health risks such as cardiovascular disease and type 2 diabetes.

Essential oregano oil (EEO) has gained attention for its benefits. Its antioxidant properties stabilize lipids and reduce fatty acid degradation during storage, preserving egg quality. EEO is also a practical, cost-effective, and easy to administer feed additive, making it appealing for poultry. While most research has focused on optimizing FA composition, less attention has been given to how room temperature storage (*common in areas where egg refrigeration is not regulated*) impacts on egg quality.

Study Objective

Explore the effects of Ecodiar® Powder (EEO) on the fatty acid profile and chemical quality of eggs stored at various lengths of time at room temperature.



Materials & Methods

A total of 270 Hy-Line Brown laying hens (17 wks old) were randomly assigned to 2 dietary treatments (TRTs), each with 5 replicate pens (27 birds/pen):

- **Control (CON):** Basal diet.
- **Experimental (EEO):** Basal diet supplemented with 275 g/ton of Ecodiar® Powder.

Hens were reared according to standard protocols outlined in the breed management guidelines (Hy-Line, 2022). The basal diet was formulated to meet or exceed nutritional requirements, and both groups were fed the experimental diets 17 to 33 wks of age.

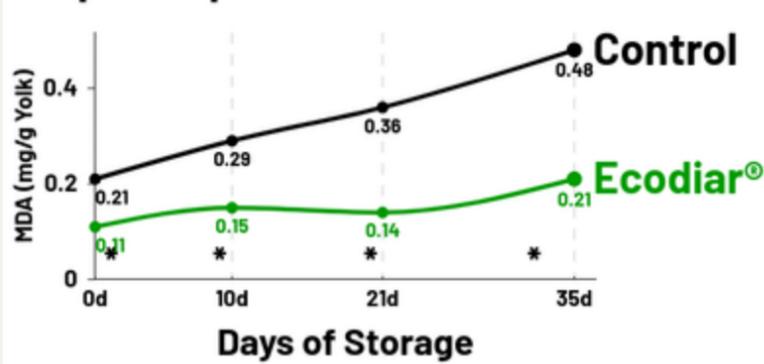
Egg Quality During Storage Assessment:

- **Egg collection:** At 33 wks (average hen body weight: 1.89 kg, egg production: 98%), 250 eggs (25/pen) were collected, labeled, and candled for cracks and cleanliness.
- **Storage Conditions:** A total of 20 eggs/pen were stored at room temperature (20°C or 68°F) for 0, 10, 21, and 35 days. At each time point, 5 eggs/pen were analyzed to evaluate lipid oxidation and fatty acid stability between TRTs during the storage period.
- **Fatty Acid Profile and Lipid Stability:** Malondialdehyde (MDA) levels, total saturated (Σ SFA), monounsaturated (MUFA), and polyunsaturated (PUFA) omega-3 and omega-6 fatty acids (n-3, n-6) were measured.

Statistical Analysis: Data were analyzed using GLMM in R, with Tukey's HSD for pairwise comparisons. Significance was set at $p \leq 0.05$.

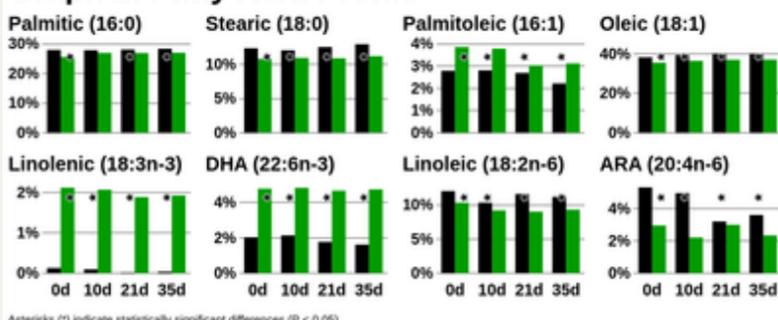
Results

Graph 1. Lipid Peroxidation



Graph 1. Ecodiar® supplementation resulted in significantly lower MDA levels, highlighting its effect in reducing lipid peroxidation and enhancing the oxidative stability of eggs during room temperature storage.

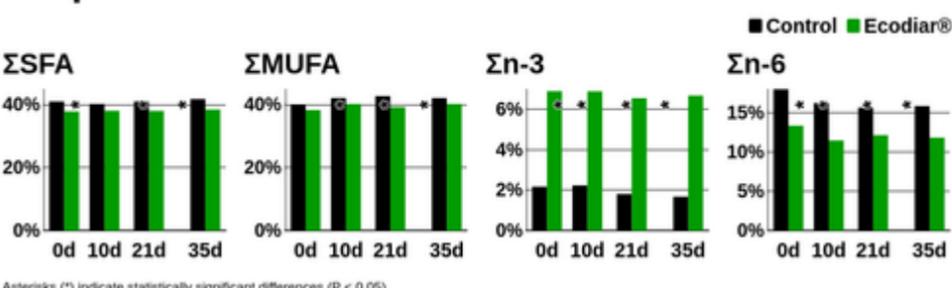
Graph 2. Fatty Acid Profile



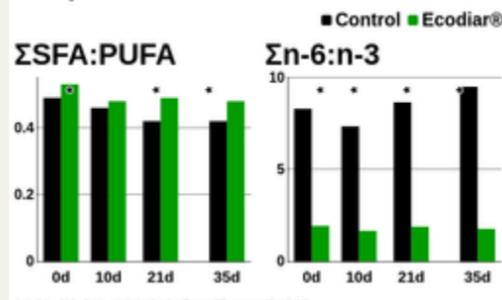
Graph 2. Ecodiar® supplementation resulted in eggs with lower levels of Palmitic and Stearic Acid (SFA) and higher concentrations of beneficial Omega-3 FAs (Linolenic acid and DHA).

Graph 3-4. Eggs from birds supplemented with Ecodiar® increased PUFA, enhancing their nutritional profile and improving the ratio between Omega 6 to Omega 3.

Graph 3. Total FA



Graph 4. Ratios



Conclusions

Ecodiar® diet inclusion showed to be a promising approach to improve egg quality by enhancing the fatty acid profile and helping maintain quality during storage.

The healthier *SFA:PUFA* and *Omg-6:Omg-3* ratios position Ecodiar® as a natural, easy-to-administer solution for producing "designer eggs" with improved nutritional traits potentially aiding in reducing cholesterol levels, inflammation, and the risk of heart disease.

