

Effect of micellized natural (D- α -tocopherol) vs. synthetic (DL- α -tocopheryl acetate) vitamin E supplementation given to turkeys on oxidative status and breast meat quality characteristics¹

A. I. Rey,^{*,2} J. Segura,^{*} A. Olivares,^{*} A. Cerisuelo,[†] C. Piñeiro,[‡] and C. J. López-Bote^{*}

^{*}*Dpto. Producción Animal, Facultad de Veterinaria, Universidad Complutense de Madrid, Avda. Puerta de Hierro s/n., 28040 Madrid, Spain;* [†]*Instituto Valenciano de Investigaciones Agrarias, Centro de Investigación y Tecnología Animal. Polígono Industrial La Esperanza, 100. Apartado 187. 12400 Segorbe, Spain;* and [‡]*PigChamp Pro Europa, Carretera de San Rafael, 68, 40006 Segovia*

ABSTRACT This study evaluates the effect of vitamin E supplementation source (micellized natural vs. the synthetic form) and dosage (40, 80, or 120 mg/kg) on α -tocopherol concentration in plasma and muscle, antioxidant capacity, and breast meat quality in turkeys. Three hundred female turkeys were randomly selected at an average live weight $63.2 \text{ g} \pm 0.5$ and distributed into 7 groups. One group (control) was fed a standard diet without vitamin E supplementation and the other 6 were given mixed diets supplemented with the natural (d- α -tocopherol) or synthetic (dl- α -tocopheryl acetate) form of vitamin E in 3 dosages (40, 80, or 120 mg/kg). Following 11 wk feeding, results showed that performance parameters were not modified either by source or dosage of vitamin E supplementation to the turkeys. Plasma and muscle α -tocopherol at d 9 of refrigerated storage were higher when turkeys were supplemented with the natural form at higher doses. Losses in the concentration of α -tocopherol in meat between the beginning and the end of the 9 d refrigerated

storage were greater in the groups supplemented with the synthetic form of vitamin E compared to those receiving the natural supplementation. The relationship between plasma α -tocopherol and the Trolox equivalent antioxidant capacity followed a different trend depending on the vitamin E source. Intramuscular fat was not significantly affected by the vitamin E source supplementation; however the slope of the linear regression equation was lower for the natural form than for the synthetic form. Turkeys given the natural form had higher C18:1n-9 but lower C15:1, C17:1, C20:5n-3, and C22:6n-3 in breast muscle. Meat samples from turkeys supplemented with natural vitamin E had higher deoxyhemoglobin at d 3, 6, and 9 and lower metmyoglobin at d 9 of refrigerated storage than those receiving the synthetic form. Dietary supplementation with medium doses (80 mg/kg) micellized d- α -tocopherol is an interesting feeding strategy for ensuring antioxidant status and improving meat quality.

Key words: natural α -tocopherol, oxidative status, color stability, fatty acid, turkey meat quality

2015 Poultry Science 00:1–11
<http://dx.doi.org/10.3382/ps/pev091>

INTRODUCTION

In recent years consumer demand for turkey meat has increased because of its low fat content and pleasant sensory attributes. At the same time, there is growing interest in dietary strategies to improve meat quality, mainly those related to meat shelf-life (Govaris et al., 2004; Hooda et al., 2009) and nutrient fortification (Sarraga et al., 2008; Zdunczyk and Jankowski, 2013).

One of the main mechanisms of quality deterioration, which leads to formation of undesirable compounds and loss of sensory and nutritional value, is lipid oxidation (Buckley et al., 1995). As a result, dietary supplementation of vitamin E is widely used because it is an effective antioxidant for protecting meat against oxidative deterioration (Buckley et al., 1995; Wen et al., 1997) and improves its nutritional value for consumers.

Most of the commercially available vitamin E supplements used in diet formulation contain α -tocopherol in its acetate form. This synthetic form (all-rac- α -tocopherol) consists of all 8 possible stereoisomers, whereas natural vitamin E (d- α -tocopherol) contains 100% RRR- α -tocopherol stereoisomer, which has been reported as being absorbed more efficiently (Brigelius-Flohé and Traber, 1999). Despite the higher bioavailability of the natural form of vitamin E, most studies on oxidative status and bird meat quality have focused

© 2015 Poultry Science Association Inc.

Received September 3, 2014.

Accepted February 3, 2015.

¹This study was supported by projects CDTI IDI-20090944, S2009/AGR-1704: Newgan and S2013/ABI-2913: Medgan. We would like to thank Prebia Feed Extracts (Talavera de la Reina, Toledo, Spain) for providing the natural vitamin E and Centro de Investigación y Tecnología Animal, Segorbe, Castellón, for the farm installations supply.

²Corresponding author: anarey@vet.ucm.es