

PE8.03 Study of tocopherols and colour preservation in dry-cured ham slices from Iberian pigs fed either free-range or acorns in confinement. 10.00

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The aims of this research were to study changes on tocopherols concentration and colour with the conservation time in ham slices from Iberian pigs fed either in free-range or in confinement with acorns. Slices of approximately 2 mm of thickness of dry-cured hams were cut and on days 1, 7, 14 and 41 colour changes (CIELAB a* and b* coordinates) and tocopherols concentration were measured. γ -Tocopherol was higher ($P<0.05$) in the ham slices from pigs fed free-range than in those fed acorns in confinement until day 7. Both tocopherols (α and γ) decreased significantly ($P<0.05$) in ham slices with the preservation time in a similar form. The decrease was not affected significantly by the dietary treatment; it was more marked during the first 7 days and remained stable since day 14 to 41. Colour (a* and b*) decreased with the preservation time ($P<0.05$) and changes were more marked ($P<0.05$) in those pigs fed acorns in confinement than in those fed free-range. Consequently, the quality characteristics of dry-cured ham slices from Iberian pigs fed free-range persist for longer time.

Index terms Colour changes, Dry-cured hams, Tocopherols

I. INTRODUCTION

Free-range feeding is characterized by the ingestion of antioxidants such as tocopherols associated to the consumption of acorns and grass and by a high physical activity that has been described to induce positive changes in the colour of meat products (Geverink et al., 1998) and fatty acid metabolism (Daza et al., 2009).

Slices from meat products rapidly suffer rancidity and colour deterioration (Andersen and Rasmussen, 1992), so the intake of dietary antioxidants that could maintain its quality characteristics is especially interesting.

Isabel et al. (1999) reported the persistence of α -tocopherol along processing and lower loss of colour in those slices from pig supplemented with α -tocopherol. Other authors have also described the presence of γ -tocopherol in hams from Iberian pigs fed free-range (Ventanas et al., 2007), which is associated with lower oxidation rates (Rey et al., 1997). However, there is not to our knowledge any information on the evolution of α and γ -tocopherols with the preservation time of ham slices and how the feeding regimen can alter its concentration and some quality characteristics.

The objective of this research was to study the changes of the tocopherols concentration and colour with the conservation time in ham slices from Iberian pigs fed either in free-range or in confinement with acorns.

II. MATERIAL AND METHODS

Sixteen Iberian barrows (El Dehesón del Encinar, Junta de Comunidades de Castilla-La Mancha, Oropesa, Toledo, Spain) of approximately ten months with an average initial live weight of 107 kg (\pm s.e.m.: 6.1 kg) were randomly distributed in 2 groups of 8 pigs each. One group was fed under free-range conditions with acorns and grass during 117 days. The other group was located in individual cages and fed in confinement during the same period (117 days) with acorns from *Quercus ilex* and *Q. suber* collected in a Mediterranean forest located in Oropesa (Toledo, Spain). The average daily amount of acorns given to pigs was 4.04 kg. Pigs were slaughtered at an average weight of 154.0 ± 6.1 kg. The right thigh of eighteen pigs (six per treatment) was obtained and processed in the traditional way for approximately 3 years to obtain a dry cured ham.

Slices of approximately 2 mm of thickness from each cured ham were cut, placed on plastic trays, wrapped in an oxygen-permeable PVC film and kept at 4 °C. On days 1, 7, 14 and 41 colour changes (CIELAB a* and b* coordinates) were measured using a Minolta

chromameter (CR-300, Camera Co., Osaka, Japon). At the same time, samples of the *Biceps femoris* from ham slices were collected and tocopherol analysis carried out by a modification of the method described by Rey et al. (2006).

Data were analysed by a repeated measurement test (SAS, V.9) to study the effects of the treatment, time of self-preservation and interaction. Means were analysed by a Duncan test.

III. RESULTS AND DISCUSSION

γ -Tocopherol was higher ($P<0.05$) in the ham slices from pigs fed free-range than in those fed acorns in confinement (Fig. 1) until day 7. Rey et al. (2006) did not find differences in the γ -tocopherol accumulation of pigs fed acorns in confinement or free-range, but in that study the analysed tissues were fresh muscle and fat. Differences in α -tocopherol were not statistically significant, even though those pigs fed free-range had grass intake which is characterized by its high concentration of α -tocopherol. The grass intake is lower than acorns. Moreover, lower differences in the accumulation of α -tocopherol were also observed by Rey et al. (2006) and were attributed to the preferential accumulation of γ -tocopherol in muscle membranes.

Both tocopherols decreased significantly ($P<0.05$) in ham slices with the preservation time in a similar form (Fig 1 and 2). The decrease was not affected significantly by the dietary treatment and was more marked during the first 7 days. These results were expected as tocopherols are potent antioxidants and when the surfaces of the slices are exposed to air, oxidation rapidly starts. However, it is interesting to observe that the concentration of these compounds was stable from 14 days until a period of 41 days.

Colour changes are presented in figures 3 and 4. Colour (a^* and b^* values) decreased with the preservation time ($P<0.05$) and were more marked ($P<0.05$) in those pigs fed acorns in confinement than in those fed free-range as confirmed in fig. 5. Exercise and tocopherol supplementation has been related with positive effects on the colour preservation of meat (Dunne et al., 2005). Moreover, grass intake could afford other compounds such as carotenoids that can

affect on colour and are related with antioxidant properties at low concentrations (Ruiz et al., 1998).

IV. CONCLUSIONS

Free-range feeding produced higher concentration of γ -tocopherol in the *Biceps femoris* muscle of dry-cured ham slices than those fed in confinement with acorns. However, α -tocopherol was not significantly affected.

Both tocopherols decreased significantly with the conservation time of the ham slices in a similar form.

Exercised pigs did not have significant loss of tocopherols concentration in the ham slices. However, loss of colour was lower in those pigs fed free-range than in those fed acorns in confinement. Consequently, the quality characteristics of dry-cured ham slices from Iberian pigs fed free-range persist for a longer time.

ACKNOWLEDGEMENTS

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Figure 1. Evolution of γ -tocopherol with days of conservation (4°C) in dry-cured ham slices

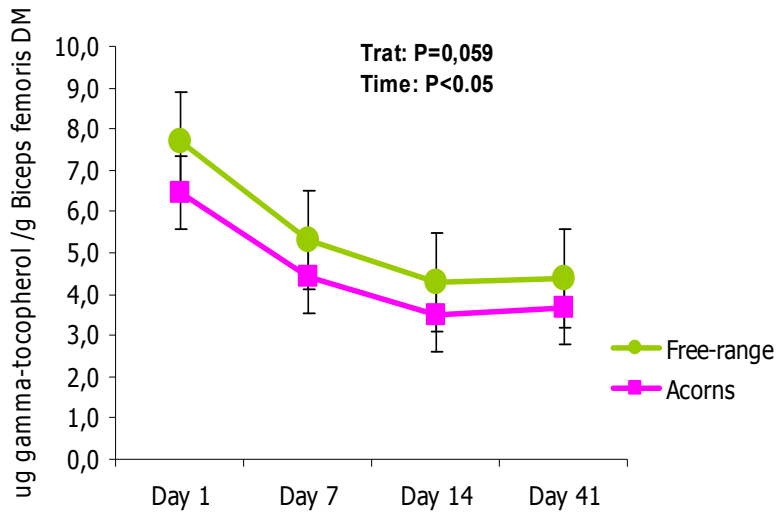


Figure 2. Evolution of α -tocopherol with days of conservation (4°C) in dry-cured ham slices

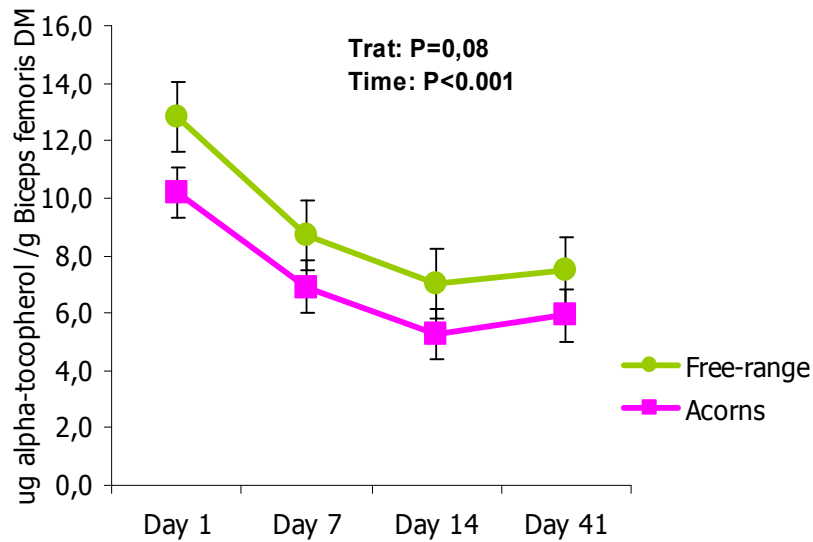


Figure 3. Colour (a* value) changes with conservation time (4°C) in dry-cured ham slices

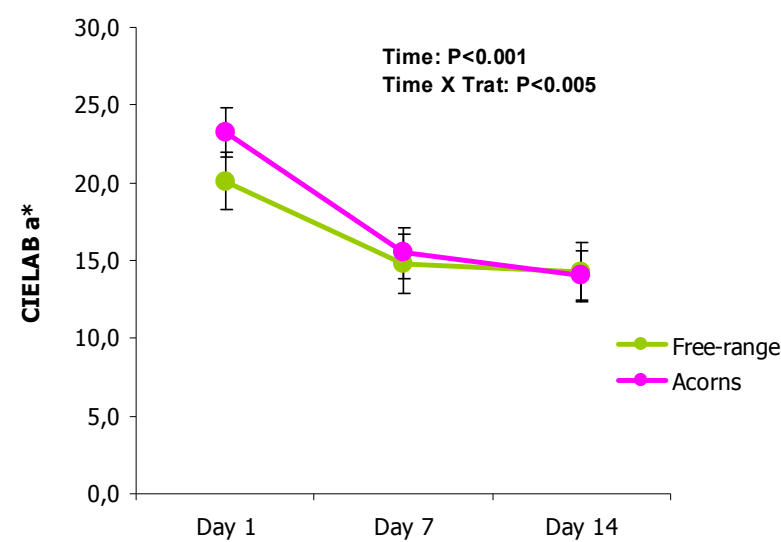


Figure 4. Colour (b* value) changes with conservation time dry-cured ham slices

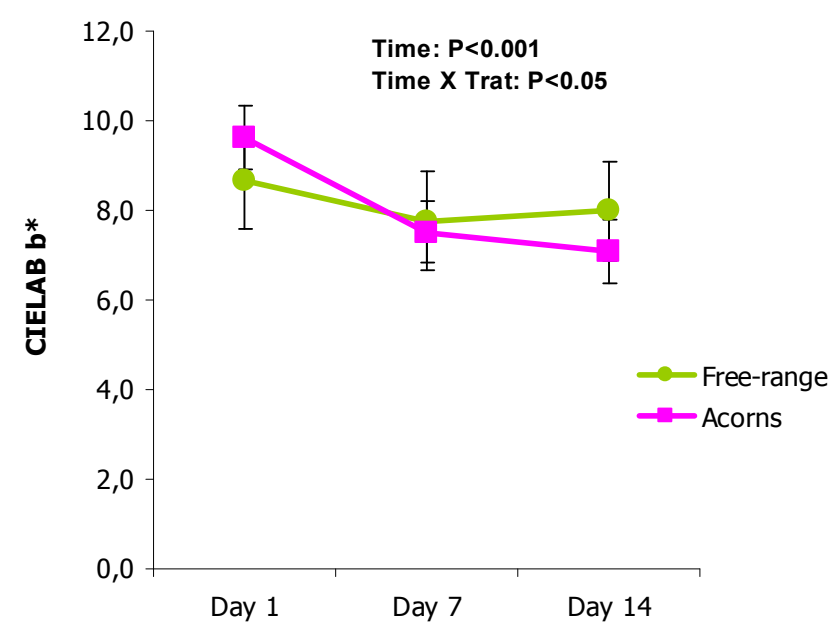


Figure 5. Colour loss between 1 and 14 days according to the dietary treatment

