

Oxidative stability of meat from Pura Raza Gallega horse breed in two package systems during refrigerated storage

Jose M. Lorenzo, Paulo E.S. Munekata, Laura Purrinos, Roberto Bermudez,
Noemi Echegaray, Ruben Dominguez, Mirian Pateiro, Daniel Franco

Centro Tecnológico de la Carne de Galicia, Spain

Objectives: Foal meat is considered highly nutritious due to its low content of fat content and high proportion of unsaturated fatty acids, especially in Europe and Asia [1]. Its consumption has been slightly growing, which has been pushing for strategies to promote the raising of autochthonous breeds and systems to improve its preservation [2]. Packaging systems play a major role in the preservation of quality of fresh meat during refrigerated storage by affecting the progression of oxidative reactions and extending the shelf life, particularly for vacuum and modified atmosphere packaging (MAP) [3]. Thus, this study aimed to evaluate the effect of vacuum and MAP in the oxidative stability of meat from grazing *Pura Raza Gallega*.

Materials and Methods: *Longissimus thoracis et lumborum* muscle from Spanish autochthonous breed *Pura Raza Gallega* (raised in extensive conditions) were sliced into steaks and vacuum-packaged or placed on polystyrene trays covered with polystyrene film with modified atmosphere (80% O₂ + 20% CO₂). All samples were storage at 4 °C and sampled at days 0, 7, 14, and 21. The formation of metamyoglobin and the lipid oxidation (tiobarbituric acid reactive substance assay - TBARS) were evaluated following the protocols using spectrophotometric methods [4]. Data were examined using ANOVA analysis using the General Linear Model (packaging type and storage time as fixed effects and replications as random effect). Duncan's test was used for the determination of the differences between least squares means (P<0.05).

Results and Discussion: The package system and storage time were significant factors for both metamyoglobin content and TBARS of foal meat. A significant increase (P<0.05) in the content of metmyoglobin was observed in MAP samples (20.1, 34.6, 61.2, and 59.2% for days 0, 7, 14, and 21) whereas no significant increase was obtained from vacuum-packaged samples (between 18.0 and 20.1%). A study carried out with beef in different packaging system (vacuum vs. MAP (80% O₂ + 20% CO₂)) indicated that vacuum packaging was more efficient than MAP to prevent metmyoglobin formation during 10 days at 4 °C [5]. The results from TBARS analysis indicated a similar pattern regarding the effect of package system during storage. Vacuum packaging prevented lipid oxidation (0.10-0.34 mg MDA/kg sample throughout storage) whereas MAP did not show the same protective effect after 7, 14, and 21 days (2.6, 8.1, and 11.0 mg MDA/kg sample, respectively). The protection against lipid oxidation was observed in experiment with *Galician Mountain* foal meat in vacuum packaging was more efficient to prevent lipid oxidation than MAP systems at 2 °C for 14 days [1]. A related study with foal (Hispano-Breton × Galician Mountain) meat indicated that vacuum packaging was the most appropriate strategy to prevent myoglobin and lipid oxidation during refrigerated storage [3].

Conclusions: Packaging system play a critical role in the preservation of foal meat from autochthonous breed *Pura Raza Gallega* slaughter after 15 months against myoglobin and lipid oxidation. Therefore, vacuum packaging is an adequate choice. Acknowledgements: The authors are grateful to INIA (grant number: RTA2017-00081-C04) for financial support for the study. Authors are members of the HealthyMeat network, funded by CYTED (ref. 119RT0568). Thanks to GAIN (Axencia Galega de Innovación) for supporting this research (grant number IN607A2019/01). Paulo E. S. Munekata acknowledges postdoctoral fellowship support from the Ministry of Science and Innovation (MCIN, Spain) "Juan de la Cierva" program (IJC2020-043358-I).

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Key words: Meat quality, Autochthonous breed, Metmyoglobin, TBARS, Shelf life