

ANALYSIS OF FOAL MEAT SHELF LIFE UNDER VACUUM AND MAP PACKAGING CONDITIONS

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I. OBJECTIVES

Horsemeat is characterized by low fat and cholesterol content, higher amounts of iron and vitamins of B group, as well as a favorable dietetic fatty acid profile and balanced protein profile. For this reason, horsemeat could be an alternative to conventional red meat, and it could play an important role. One of the main concerns of the meat industry is preserving food to extend its shelf life while ensuring its safety and quality. The aim of this preliminary study was to evaluate the effect of packaging under vacuum or modified atmosphere packaging (MAP) during 21 d at 4°C on main quality attributes (color, microbial spoilage, lipid oxidation, and odor) of fresh foal meat.

II. MATERIALS AND METHODS

Five foals of Galician breed reared in an extensive system were slaughtered at 15 mo of age. Steaks of *longissimus dorsi* were stored in polystyrene tray and packaged with a gas mixture of 80% O₂/20% CO₂ (MAP group) and under vacuum conditions (VAC group) at 4°C. Instrumental colorimeter parameters (luminosity [*L**], redness index [*a**], and percentage of metmyoglobin), microbial spoilage (counts of CFU mesophiles and enterobacteria), and lipid oxidation expressed as thiobarbituric acid reactive substances values were measured at 0, 7, 14 and 21 d of storage. Additionally, an acceptance test with 12 trained panelists for discoloration and odor was carried out using a 5-point hedonic scale (1 = excellent and 5 = not acceptable). An analysis of variance was performed using the IBM SPSS Statistics 23.0 program (IBM Corp., Armonk, NY) and considering storage time and type of packaging as fixed effects. The least-squares means were separated using Duncan's post hoc test for a significance level $P < 0.05$.

III. RESULTS

Regarding instrumental color, there were significant differences between VAC and MAP packaging after 14 d of storage. Long-term storage strongly affected metmyoglobin and redness index of MAP samples which increased (159%) and decreased (259%) from 0 to 21 d. Concerning lipid oxidation, foal steaks from the VAC group did not show significant ($P > 0.05$) changes during storage time, displaying values below 2 mg malondialdehyde/kg meat considered for several authors as rancidity threshold. On the contrary, the thiobarbituric acid reactive substances values of the MAP group increased significantly ($P < 0.001$) from 0.12 to 10.56 mg malondialdehyde/kg meat during storage time. With respect to microbial spoilage, there was no significant ($P > 0.05$) difference between the 2 types of packaging (VAC vs. MAP). As expected, the number of counts significantly raised as storage time increased in all cases. This increment was slower for enterobacteria than for mesophilic microorganisms, reaching average final values of 3.6 and 6.6 log CFU/g at 21 d storage, respectively. Finally, sensory attributes of the acceptance test (discoloration at surface and odor) for the VAC group obtained scores within the acceptability range (<3); meanwhile, MAP samples exceed this score for discoloration at surface and odor at seventh day of storage.

IV. CONCLUSION

From the findings of this preliminary study, we can conclude that VAC is preferable to MAP packaging maintaining the color, avoiding the discoloration at the surface, and improving the odor acceptance and lipid rancidity.

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