REPLACEMENT SYNTETHIC ANTIOXIDANTS WITH YERBA MATE EXTRACT POWDER IN SALAMI

Matiucci, M. A.[1*], da Silva, N. M.[1], Dalagna, V. C.[1], dos Santos, P. D. S.[1], Santos, O. O.[1], da Costa, S. C.[1], Fernandes, P. G. M.[1], Feihrmann, A. C.[1*]

[1]Universidade Estadual de Maringá, Maringá – PR, Brasil.

*Corresponding author email: andresafeihrmann@gmail.com

I. INTRODUCTION

The use of salts such as nitrite and nitrate in food has been questioned due to the generation of N-nitroso, which are compounds with carcinogenic effects [1]. These salts are intentionally added in the production of most cured meats, such as various types of salami, in order to stabilize color, impart aroma, delay oxidative processes and inhibit the growth of Clostridium botulinum [2]. Natural antioxidants have been studied as substitutes for synthetic antioxidants [3]. Yerba mate (*Ilex paraguariensis*) may be a viable alternative against oxidative processes in meat foods, since it contains phenolic compounds and flavonoids, such as chlorogenic acid and rutin, as well as inhibiting microbial growth [4]. The aim of this study was to use yerba mate extract in salami to assess its capacity as a lipid and protein antioxidant.

II. MATERIALS AND METHODS

SALAMI PRODUCTION

Three salami treatments were developed using pork shoulder meat and pork backfat: Control treatment (Con) - without the addition of nitrite and sodium nitrate; Traditional treatment (Trad) - with the addition of nitrite and sodium nitrate; and treatment with the inclusion of yerba mate extract (ErM), as studied by Pini et al. All the treatments contained starter culture (Flora Italia LC. - CHR HANSEN), salt, sugar, sodium erythorbate and spices. The salami was filled and then fermented and matured (25-18 ºC, RH 85-70%) for 15 days. The shelf life of the products was then assessed for 75 days at 25 ºC.

ANALYSIS OF WATER ACTIVITY (a_w), LIPID AND PROTEIN OXIDATION

Water activity (aw) was analyzed using an Aqualab 4TE (METER Group Inc., Pullman, USA).
Lipid oxidation was determined as described by Raharjo et al [6]. While the concentration of carbonyl groups in the salami was determined using 2,4-dinitrophenylhydrazine, as described by Levine et al.
All the experiments were replicated twice at different times and the analyses were carried out in triplicate.

III. RESULTS AND DISCUSSION

The a_w values showed a significant difference ($p<0.05$) between the treatments only after 45 days of shelf-life; however, the values were typical for salami (average of 0.85) and have been reported by other authors [1].
Regarding lipid oxidation, it can be seen in Figure 1A that the Trad and ErM treatments were different from the control (without nitrite and nitrate) ($p<0.05$) throughout the storage period. On day 75, the treatment with yerba mate was the same as Trad (average 0.55 mg MDA / kg product), so it can be said that the addition of 0.09% yerba mate powder extract was as effective as the addition of nitrite and nitrate.

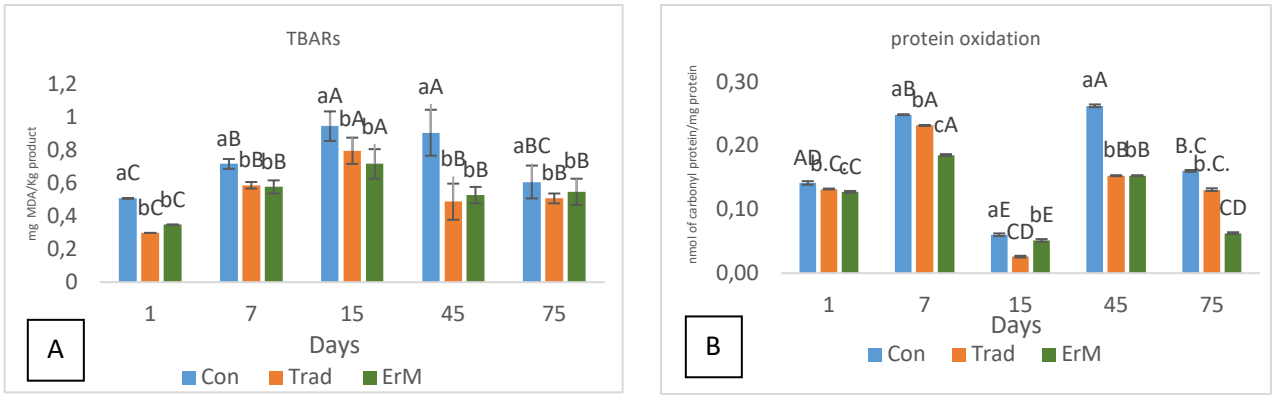

Figure 1: A - Lipid oxidation of salami; B - Protein oxidation of salami. Con – Control Treatment; Trad – Traditional Treatment; ErM – Treatment with the inclusion of Yerba Mate extract. Different lowercase letters differentiate treatments on the same day using the Tukey test ($p<0.05$). Different capital letters differ days in the same treatment using the Tukey test ($p<0.05$).

Figure 1B shows the results of the salami's protein oxidation during the storage period. The values varied, but on most days the Con treatment showed higher levels of protein oxidation, reaching its peak at 45 days of shelf-life. The Trad and ErM treatments behaved similarly, although the oxidation of the ErM treatment was significantly lower than the other treatments. Its oxidation peak at 7 days showed a content of 0.186 nmol of carbonylated protein/mg. At 45 days of storage, the Trad and ErM treatments showed no difference (0.154 nmol of carbonylated protein/mg), and this value was 41.67% lower than the average presented by the Con treatment for the same period.

IV. CONCLUSION

It is concluded that it is possible to replace yerba mate extract in salami, however, additional analyses, such as microbiological ones, should be carried out to test the safety of the products.

ACKNOWLEDGEMENTS

The authors thank CAPES and CNPQ.

REFERENCES

1. Totaro MP, Difonzo, G, Pasqualone, A, Summo, C. Physicochemical properties and sensory features of ripened, industrially prepared sausages, enriched with olive leaf extract to replace nitrite and nitrate. LWT. 2024 196:115852.
2. Damodaran S, Parkin KL. Química de alimentos de Fennema. Artmed editora. 2018.
3. Jiang J, Xiong YL. Natural antioxidants as food and feed additives to promote health benefits and quality of meat products: A review. Meat Sci. 2016 Oct;120:107–17.
4. da Silveira TFF, Meinhart AD, de Souza TCL, Cunha ECE, de Moraes MR, Godoy HT. Chlorogenic acids and flavonoid extraction during the preparation of yerba mate based beverages. Food Research International. 2017 Dec;102:348–54.
5. Pini F, Aquilani C, Giovannetti L, Viti C, Pugliese C. Characterization of the microbial community composition in Italian Cinta Senese sausages dry-fermented with natural extracts as alternatives to sodium nitrite. Food Microbiol. 2020 Aug;89:103417.
6. Raharjo Sri, Sofos JN, Schmidt GR. Improved speed, specificity, and limit of determination of an aqueous acid extraction thiobarbituric acid-C18 method for measuring lipid peroxidation in beef. J Agric Food Chem. 1992 Nov 1;40(11):2182–5.
7. Levine RL, Garland D, Oliver CN, Amici A, Climent I, Lenz AG, et al. Determination of carbonyl content in oxidatively modified proteins. In 1990. p. 464–78.