

Polyphenols-tannins complexes in chicken meat: evaluation of their impact on lipid oxidation, colour, cooking yield and sensory profile

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INTRODUCTION

During the last decades, over 300 million tonnes of **meat products** have been consumed and demanded worldwide each year¹. However, meat and meat products are extremely susceptible to **lipid oxidation**, causing meat quality deterioration. Indeed, this process leads to loss of nutrients, **unpleasant colour changing**, rancidity, off-flavour and off-odour formation, gas production, **sensory alteration**, texture deterioration, and **toxic compounds** formation, responsible for human health problems². To counteract this phenomenon, research is focused on the use of **natural green alternatives** to synthetic antioxidant compounds, with possible beneficial effects on the human body. In this context, the enrichment of chicken patties with **polyphenols** and **tannins**, which present *in vivo* and *in vitro*³ very effective antioxidant, antimicrobial, cardioprotective, and anti-inflammatory activities, can be a good strategy to **increase meat shelf life** and protect its **quality**.

MATERIALS AND METHODS

Chicken patties receipt:

95.5% (w/w) of chicken thigh meat

3% (w/w) of deionized water

1.5% (w/w) of salt

+ % of extracts

C - : patty with no extracts

C + : patty with synthetic ascorbic acid 0.1% (w/w)

PT1: patty with polyphenols-tannins blend 0.02% (w/w)

PT2: patty with polyphenols-tannins blend 0.02% (w/w)

RE: patty with rosemary extract 0.2% (w/w)

ANALYSES:

TBARS⁴

Colour

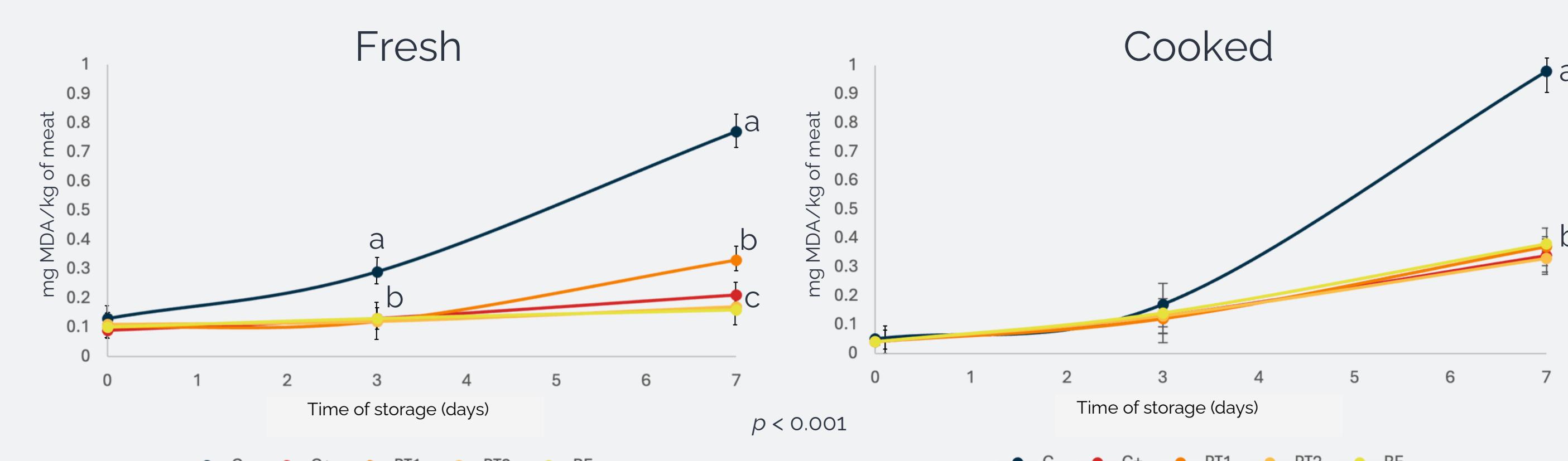
Cooking yield

Sensory analysis

5 different samples of chicken patties were obtained by manually mixing the ingredients, then formed (n=3) and placed in a polyethylene terephthalate (PET) container with a poly-coated (PE paper) paper foil. Patties were stored at 4°C in darkness for 7 days of storage and analyzed after 4 hours (Day 0), 3 days and at the end of the experiment.

RESULTS

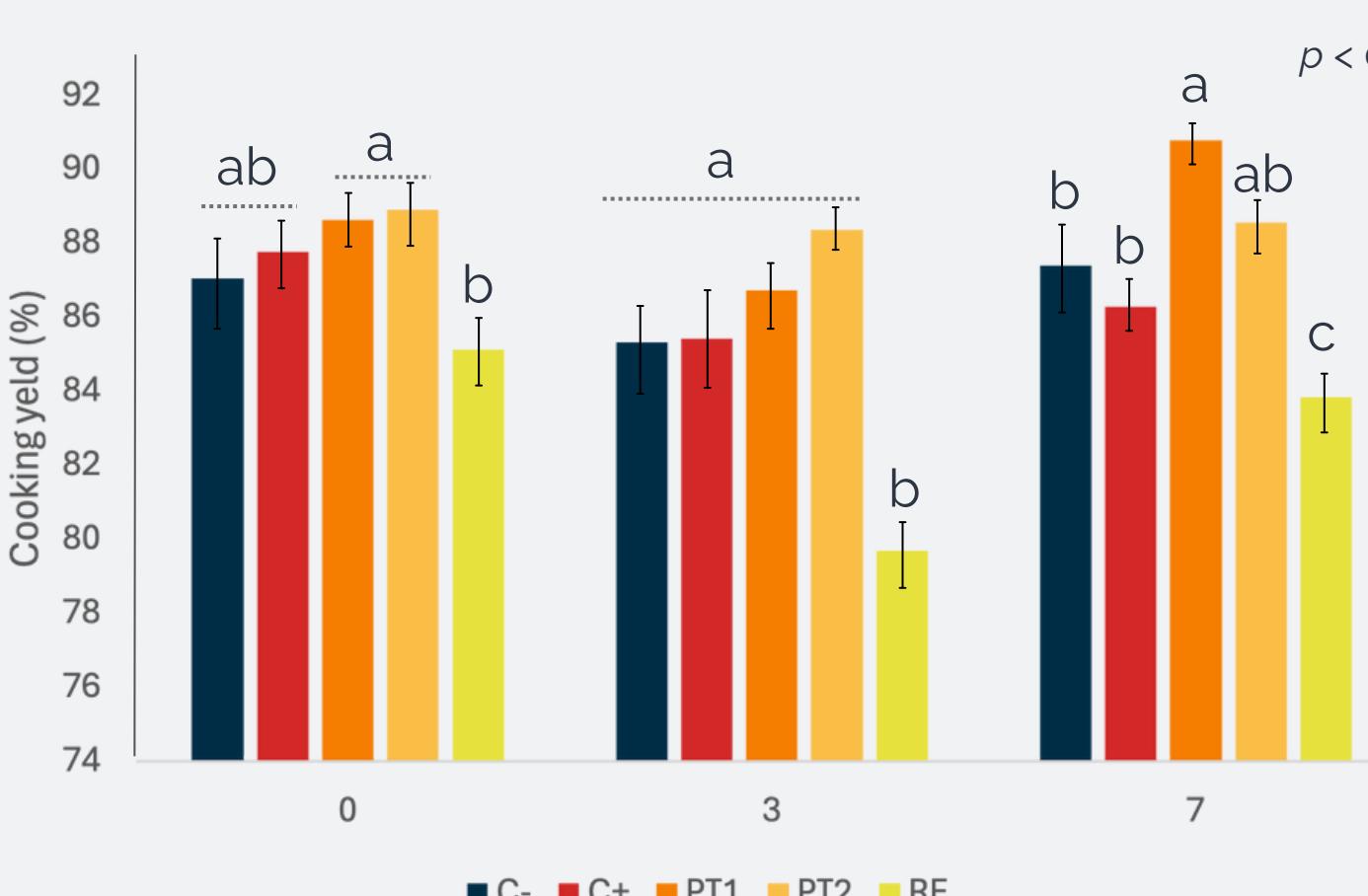
TBARS



COLOUR

The **L*** and **b*** values were **not influenced** by the addition of any extract, suggesting that lightness and yellowness were not sensitive to the treatments. In contrast, the **a*** value was better **preserved** by **polyphenols-tannins blends** and **ascorbic acid** during the refrigeration period. Again, after cooking, PT2 and **ascorbic acid** were able to protect the colour. This indicates that these antioxidants helped **protect** the small fraction of **myoglobin** from oxidation, thereby maintaining the characteristic colour of chicken meat.

COOKING YIELD



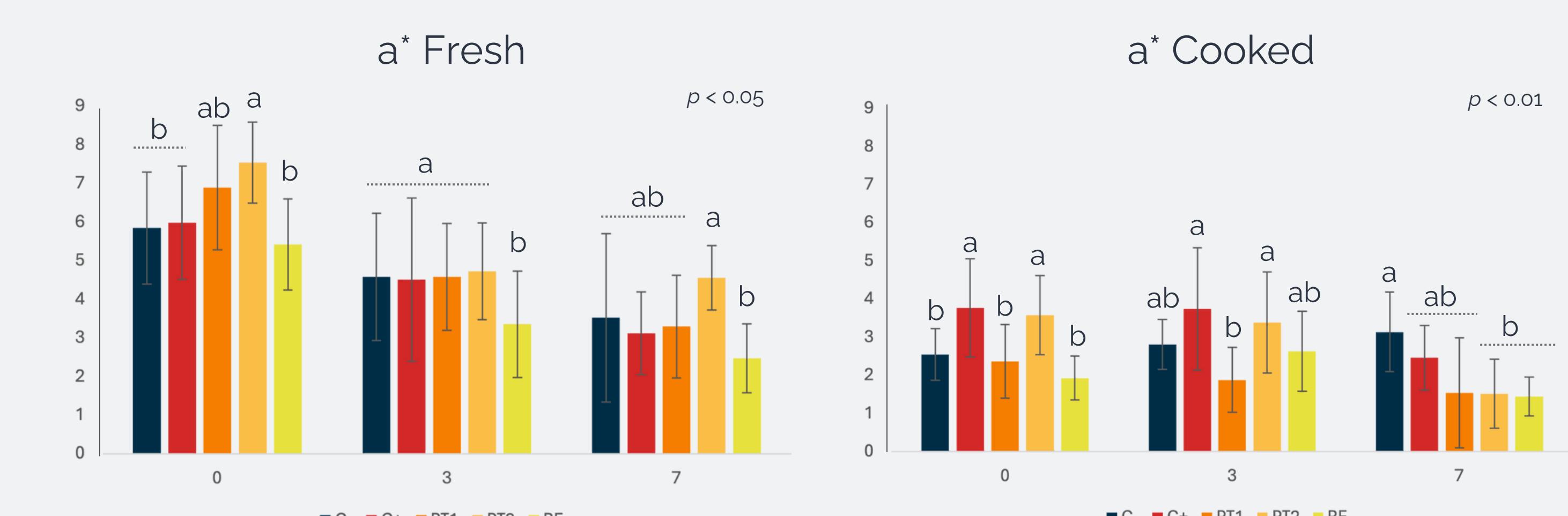
The presence of both polyphenols-tannins blends (PT1 and PT2) and ascorbic acid did **not affect** the **cooking yield**. Conversely, RE determined an increase in the water loss of chicken patties. The same trend was observed for the entire storage period of chicken patties.

CONCLUSIONS

- All the tested compounds exhibited very **effective antioxidant activity**, both in fresh and in cooked chicken patties, presenting the best results in samples enriched with polyphenols-tannins blends.
- Polyphenols-tannins blends and ascorbic acid provided better **a* colour protection** with respect to RE during the entire storage period and after patties were cooked.
- The presence of natural compounds determined **higher palatability** of chicken patties with respect to the control, without any enrichment.

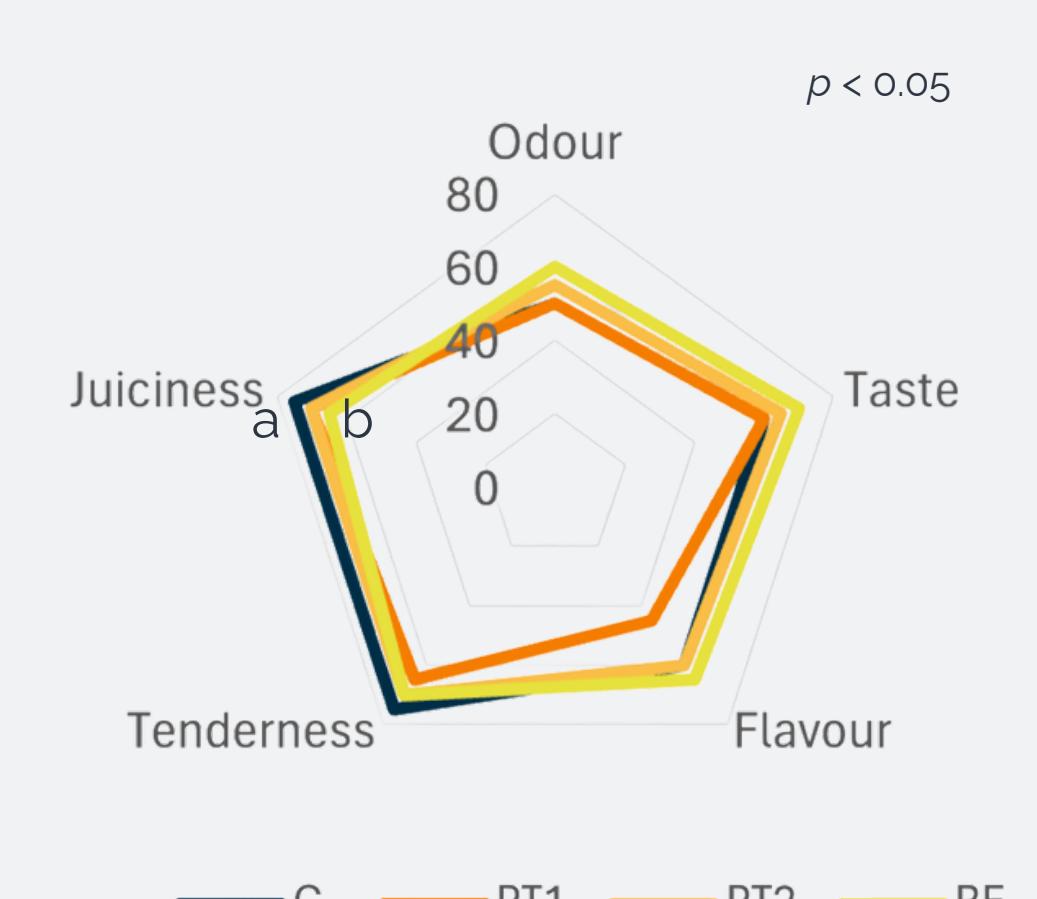
◆ All the tested compounds exerted an effective antioxidant activity counteracting lipid oxidation, **reducing** secondary **oxidation products** both in fresh and cooked meat during their entire storage period.

◆ Both **polyphenols-tannins blends** exhibited **higher antioxidant activity** than synthetic ascorbic acid and rosemary extract, as they showed similar TBARS content at a concentration of 0.02% (w/w), compared to 0.1% and 0.2% (w/w) of the other two, respectively.



SENSORY ANALYSIS

In the sensory analysis, panelists evaluated the samples enriched with natural compounds as less juicy than the control, but **more palatable** due to the presence of **aromatic/herbaceous notes**, which enhanced the flavorfulness of the patties. Moreover, panelists considered the **tenderness** and **juiciness** levels of all samples to be **acceptable**.



REFERENCES

¹Parlasca, M. C., & Qaim, M. (2024). *Annual Reviews*, 14, 17-41.

²Cantele et al. (2024). *Antioxidants*, 13(8), 930.

³Molino et al. (2023). *Food Research International*, 173, 113329.