

## Role of a Natural Preservative in the Secondary Shelf-life of Ready-to-Use Meat Pâté

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### INTRODUCTION & AIM

Recent concerns over the health risks of some artificial additives have fostered interest in natural bioactive compounds, especially those derived from food industry by-products. Virgin Olive Oil (VOO) and its by-products — such as olive leaves, pomace, and vegetation water (OVW) — are rich in polyphenols with known antioxidant and antimicrobial properties. This trend supports reformulating traditional foods to improve quality, extend secondary shelf-life (SSL), and reduce food loss and waste.

Reusing OVW offers a sustainable and innovative solution as a natural preservative.



#### AIM:

This study evaluated the effectiveness of a phenolic extract (OVWPE) from olive vegetation waters (OVW) as a natural preservative to extend the secondary shelf life (SSL) of Ready-to-Use Meat Pâté under conditions simulating post-opening at deli-counters.

### MATERIALS & METHODS

#### Experimental design:

Three different formulations of Meat Pâté were prepared using the traditional recipe:

- (i) Control - without antioxidants - CTRL;
- (ii) Enriched by OVWPE - 250 mg of polyphenols/kg meat - MP1;
- (iii) Enriched by OVWPE - 500 mg of polyphenols/kg meat - MP2.

#### Experimental Secondary Shelf life (SSL) conditions:

Once opened, each Meat Pâté sample was stored by simulating the SSL under the deli-counter sales conditions (light and air exposure) and an aliquot was removed every 3 hours for 11 days. Daily analyses were conducted.



#### Analytical determinations:

- Extraction and determination of polyphenols and  $\alpha$ -tocopherol [1];
- Antioxidant activity (DPPH• assay) [2];
- Evaluation of volatile compounds (HS-SPME-GC/MS) [3];
- Fatty acid composition (FA) [4]
- Sensory analysis [1];
- Statistical analysis.

#### References:

- [1] Sordini et al., *Antioxidants* (2024).
- [2] Brand-Williams et al., *LWT* (1995), 28, 25–30.
- [3] Xiao et al., *Food Chem.* (2014), 151, 31–39.
- [4] AOCS *Official Methods* (1998) Cd 8–53.

### RESULTS & DISCUSSION

#### Retention of Bioactives:

The evolution of the total phenols from OVW (mg/kg) of Meat Pâté after 11 days of storage from the opening shows (Fig. 1):

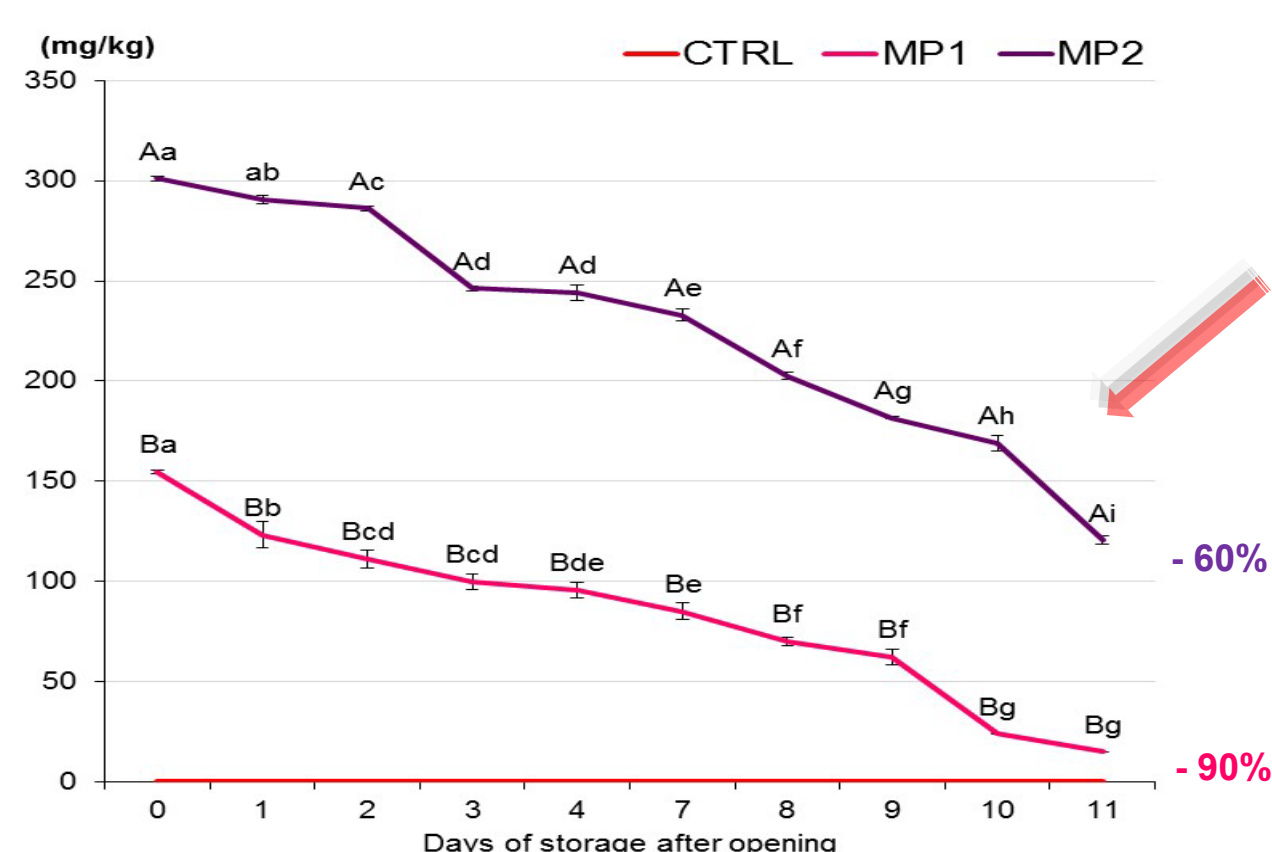


Fig. 1. Evolution of total phenols from OVW (mg/kg)\* of Meat Pâté during SSL (0-11 days).

- ❖ MP1 and MP2 effectively retained olive phenols, with MP2 showing a dose-dependent improvement per EU health claim standards (Reg. EC No. 432/2012).

#### Lipid Oxidation:

- ❖ OVWPE slowed the formation of  $C_6$ - $C_9$  aldehydes (hexenal, (E)-2-heptenal, nonanal) responsible for rancid off-flavours, especially in MP2 (Fig. 4).

#### Antioxidant activity:

Fig. 2 displays the evolution of  $\alpha$ -tocopherol content (mg/kg) in the oil phase of meat pâté during SSL.

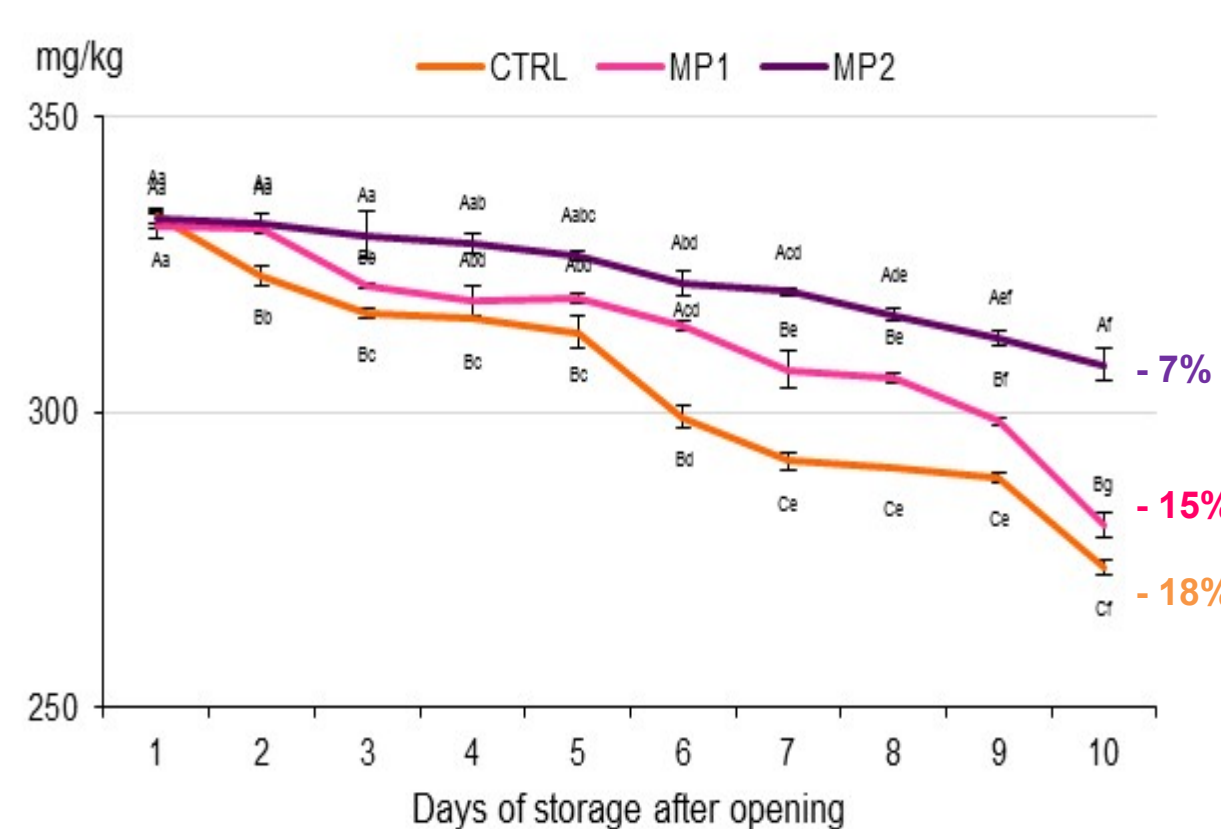


Fig. 2. Evolution of  $\alpha$ -tocopherol (mg/kg)\* of Meat Pâté during SSL (0-11 days).

Evolution of lipid oxidation of Meat Pâté was monitored by  $C_6$ - $C_9$  aldehydes content (Fig. 4):

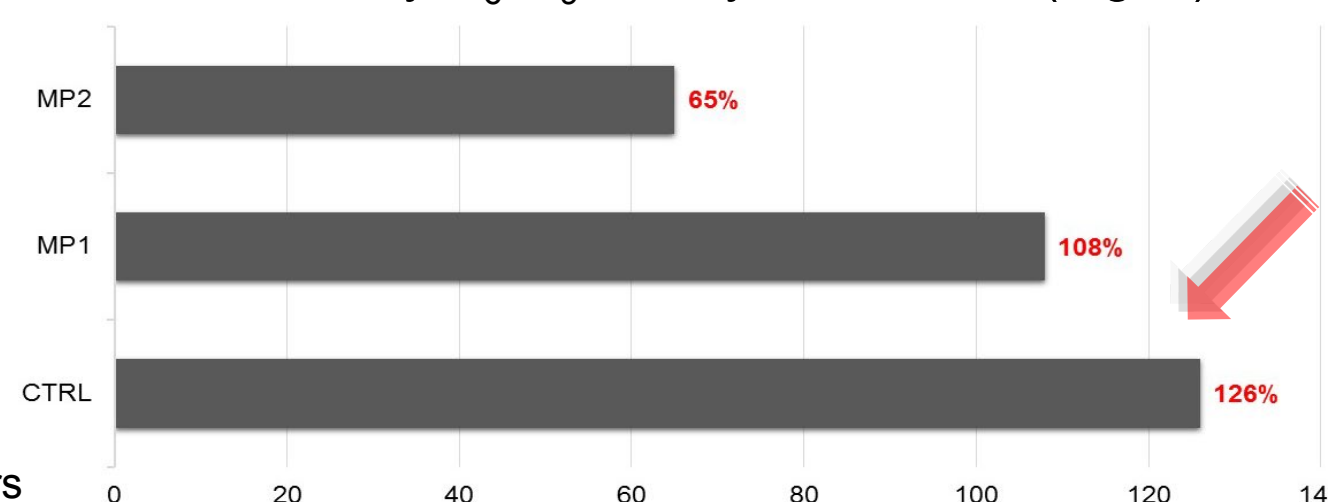


Fig. 4. Variation % (11days vs 0day) of  $C_6$ - $C_9$  aldehydes\* (expressed as the sum of hexenal, (E)-2-heptenal and nonanal).

- ❖ OVWPE protected  $\alpha$ -tocopherol over time (Fig. 2) and improved overall antioxidant activity (Fig. 3), proportional to concentration.
- ❖ No significant changes were detected during SSL in the FA composition among the meat pâté samples (data not shown).

#### Sensory analyses

- ❖ No adverse effect on pleasantness from adding OVWPE; several attributes improved (Fig. 5).



Results of the antioxidant activity evaluated by DPPH• ( $\mu$ mol TE/g f.w.) (Fig. 3):

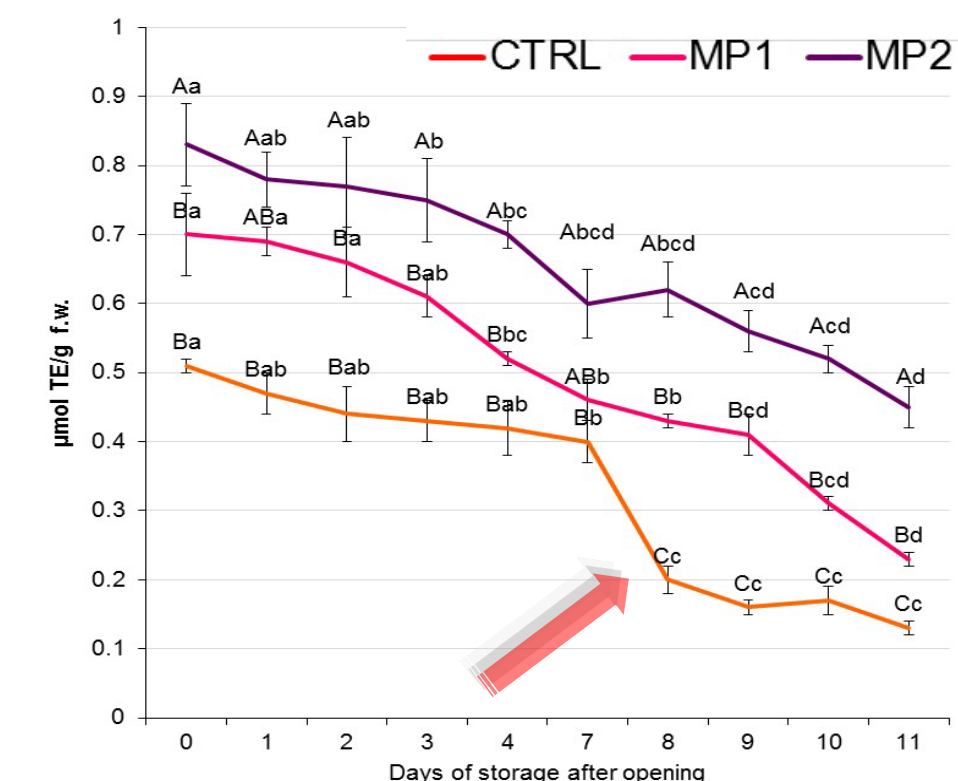


Fig. 3. Antioxidant activity ( $\mu$ mol TE/g f.w.)\* of Meat Pâté during SSL (0-11 days).

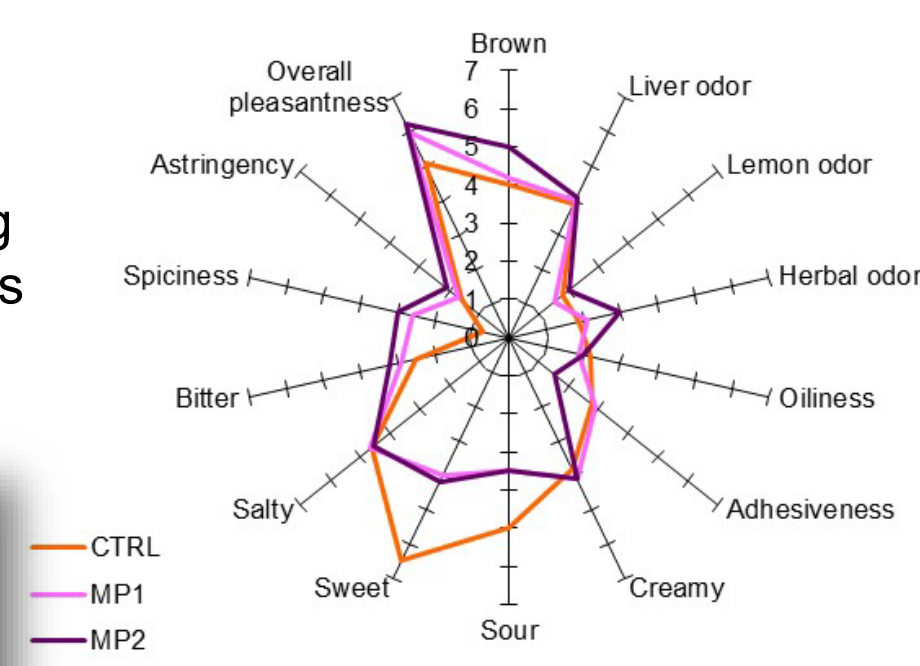


Fig. 5. Sensory profile\* of Meat Pâté upon opening the packaging (0 day).  
\*Sensory evaluation was carried out by 10 expert panelists.

### CONCLUSION

- ✓ The use of OVWPE also represents a sustainable approach for extending the SSL of Ready-to-Use Meat Pâté and adding value to an agri-food chain by-product.
- ✓ OVWPE could be a promising 'clean label' ingredient to address the growing consumer awareness of safety and health-promoting quality aspects in food choices.