

# Extending beef meat shelf life: an approach using active food packaging with pomegranate extract and peels

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## INTRODUCTION

- Active food packaging is an important tool to delay foods' natural degradation and spoilage.
- These specific types of packaging have in their matrix active compounds that migrate gradually to the food' surface.
- 50% of pomegranate are by-products, making this fruit a major source of by-products with high antioxidant and antimicrobial activity.



## OBJECTIVE

Evaluate the potential effects of a polylactic acid (PLA) based active packaging incorporated with pomegranate peels and an ethanolic extract from pomegranate peels in the shelf-life extension of fresh meat.

## MATERIALS & METHODS

- Two PLA-based active packaging incorporating 3% (w/w) of pomegranate peels (PLA/3PP) and 3% (w/w) of pomegranate peels extract (PLA/3PPE) were used to pack beef meat (Figure 1).
- The samples were stored at 4 °C, for a maximum of 11 days. The meats' lipid oxidation and microbial contamination was evaluated at the end of 1, 4, 6, 8 and 11 storage days.
- Lipid oxidation was measured by the Thiobarbituric Acid Reactive Substances assay (TBARS)[1].
- Meat's total microorganisms count at 30 °C was performed using the automated method TEMPO<sup>®</sup> Aerobic Count-AFNOR BIO 12/35-05/13.

## RESULTS & DISCUSSION



Figure 1. Beef meat packaged with the control (PLA) [A] and active (PLA/3PPE [B]; PLA/3PP [C]) films.

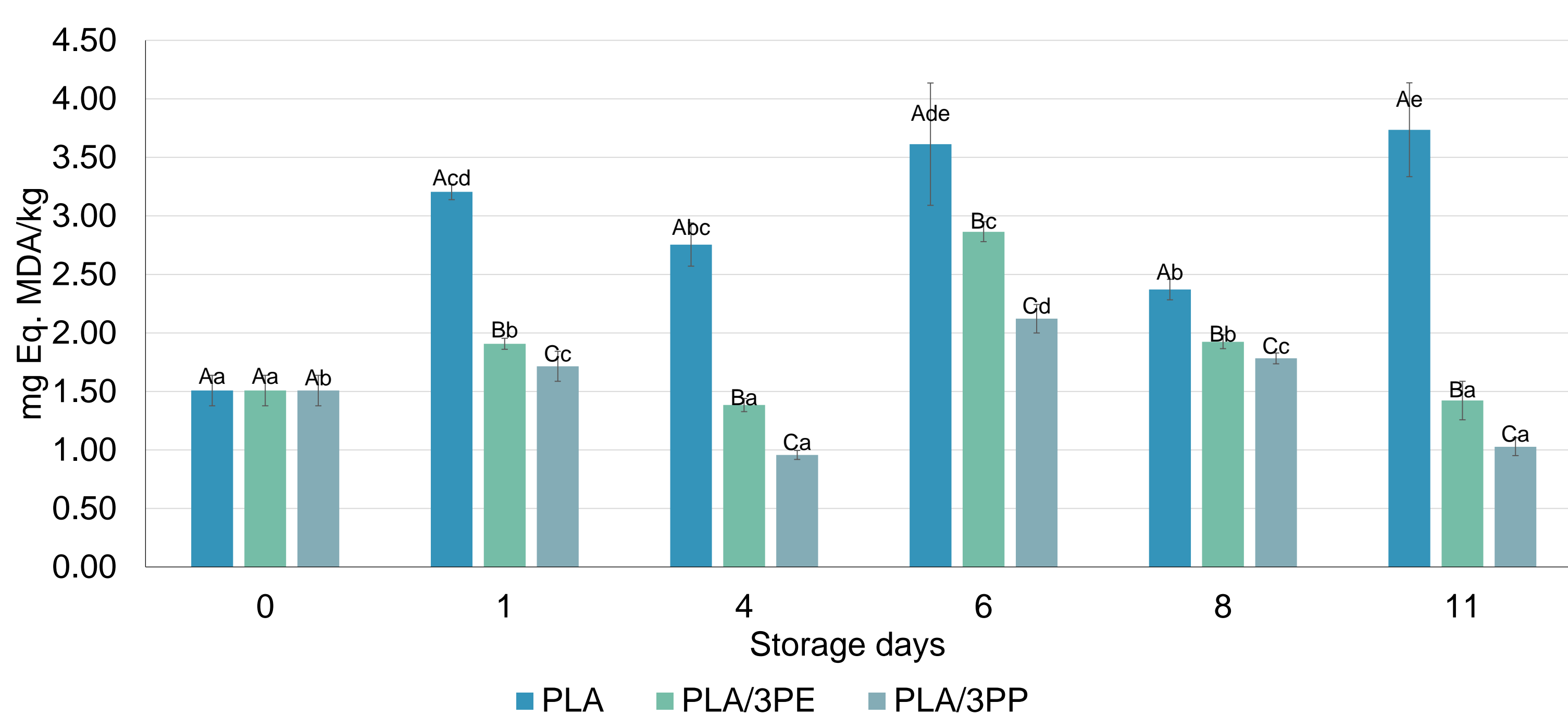
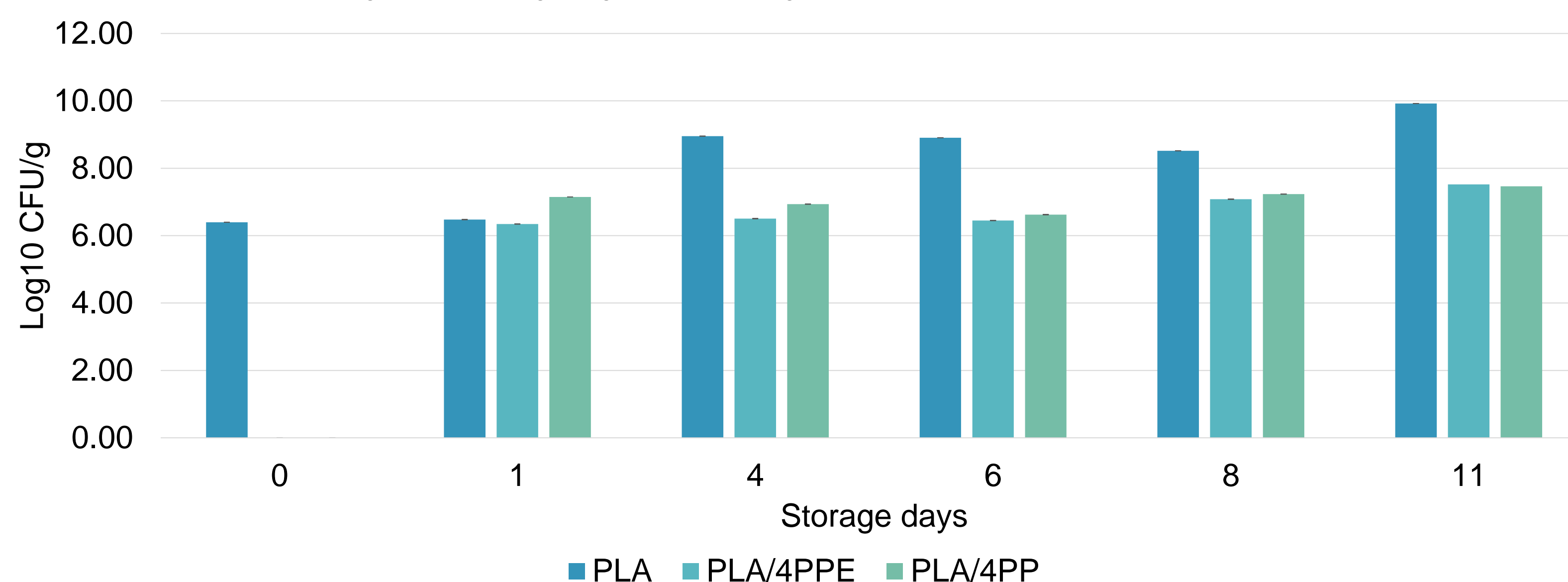


Figure 2. Results of the TBARS assay of the beef-meat packaged with the control (PLA) and the active (PLA/3PPE and PLA/3PP) films. The uppercase letters compare the same packaging through different storage days. The lowercase letters compare the results in the same storage day. Different letters, for either lowercase/uppercase comparison, represent results with significant differences.

Table 1. Results of the total microorganism count regarding the meat packaged with the control (PLA) and the active (PLA/3PPE and PLA/3PP) films.



Regarding the lipid oxidation of the meat packaged with the PLA films (Figure 2), both active PLA films were significant effective in delaying meats' lipid oxidation, in comparison to PLA. Between the two active films, PLA/3PP was more effective than the PLA/3PPE.

The meat packaged with the PLA showed significant growth of microorganisms at the 4<sup>th</sup> storage day and again at the 11<sup>th</sup> storage day, as opposed to the meat packaged with the active PLA (PLA/3PPE and PLA/3PP) (Table 1). The microbiological growth in the meat packaged with the PLA presented a significant growth at the 4<sup>th</sup> and 8<sup>th</sup> storage day. The same was not observed in the meat packaged with the active PLA, indicating that the active PLA-based films possess some antimicrobial activity. The results of the present study are in agreement with the scientific literature, since the antimicrobial activity of the pomegranate by-products and its extracts is reported against both Gram positive and Gram negative bacteria [2-5].

The results of this study support the hypothesis that both the PE and PP are viable additives to be applied to meat and meat products, by delaying its lipid oxidation and to assure meat and meat products safety.

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