

Inhibition of H₂S and NH₃ Formation in Food Systems

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1 | INTRODUCTION

Synthetic food preservatives are effective, but raise toxicological concerns, prompting the food industry to seek natural alternatives.

Prunus spinosa (blackthorn) fruits are rich in polyphenolic compounds with documented antioxidant activity.

Their potential to inhibit the formation of **toxic spoilage metabolites (H₂S and NH₃)** remains underexplored.

Spoilage of protein-rich foods releases **hydrogen sulfide (H₂S)** and **ammonia (NH₃)** key toxic indicators of protein degradation. Reducing the formation of these compounds could contribute to improved food safety and extended shelf life.

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2 | OBJECTIVES

- Evaluate the capacity of *P. spinosa* fruit extracts, obtained by supercritical CO₂ extraction from five Romanian locations to delay oxidative deterioration in food matrices.
- Assess the capacity of *Prunus spinosa* fruits extract to suppress **H₂S and NH₃ accumulation** in meat products.
- Investigate the potential of these natural extracts as **safer alternatives for improving food quality**

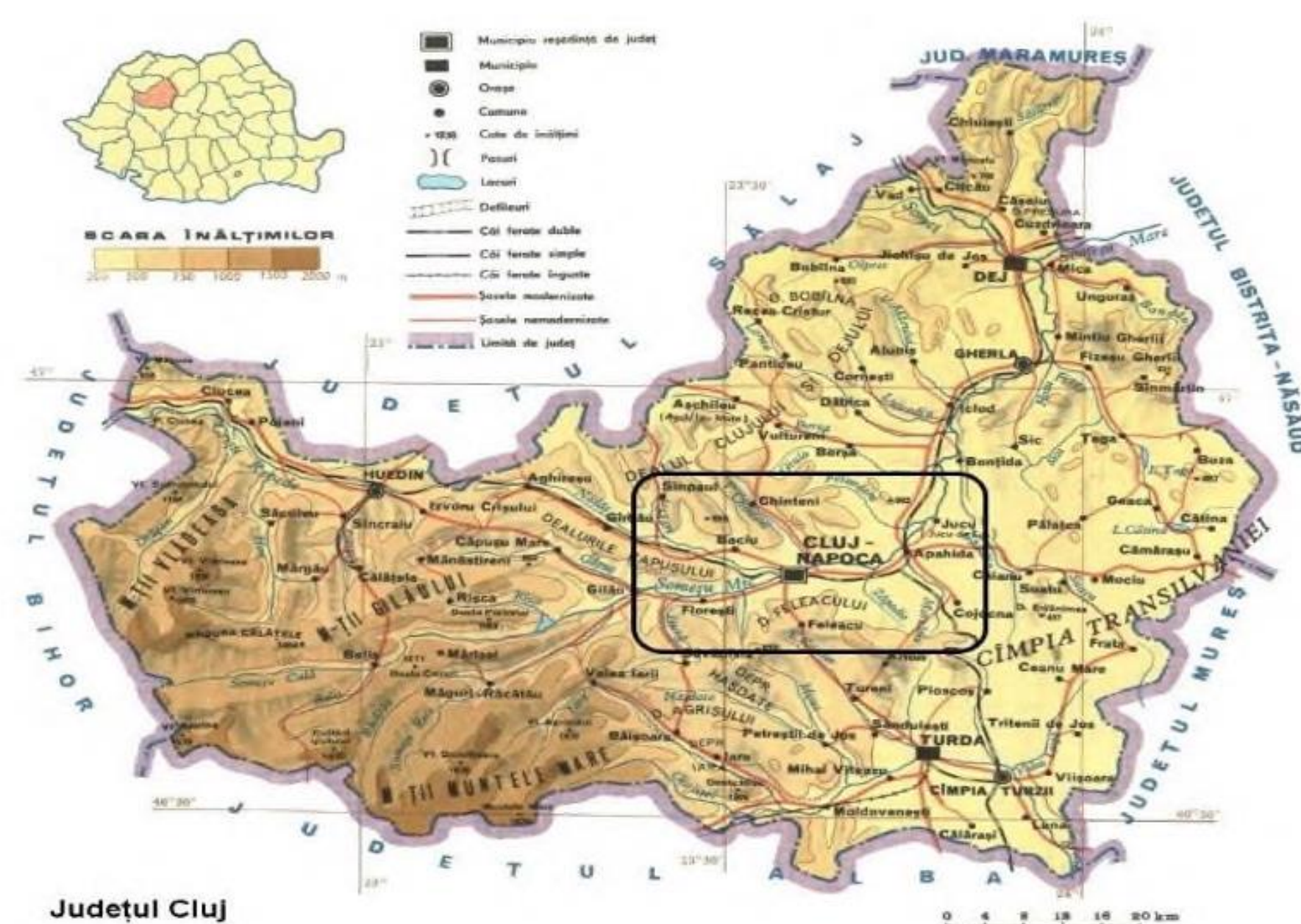


Fig.1 Sampling area

3 | EXTRACT ORIGIN

Five geographical locations, Romania:

- Chinteni
- Pata
- Borhanci
- Făget
- Florești

Extraction method: supercritical CO₂

This approach enabled the preparation of *P. spinosa* fruits extracts from geographically distinct Romanian location for subsequent evaluation.

4 | MATERIALS & METHODS

Meat trial - spoilage gas inhibition

- Minced pork: **75% lean / 25% fat**
- Sample size: 5 g, with and without extract
- Storage: **aerobic, room temperature, 48 h**
- Analyses:**
 - Sensory attributes
 - pH and moisture content
 - H₂S and NH₃ concentrations**

The experiment was designed to evaluate the ability of *P. spinosa* fruit extracts to reduce spoilage-related changes and inhibit the formation of H₂S and NH₃ during meat storage.



Fig. 2. Meat samples subjected to extract treatment

5 | EXPERIMENTAL DESIGN

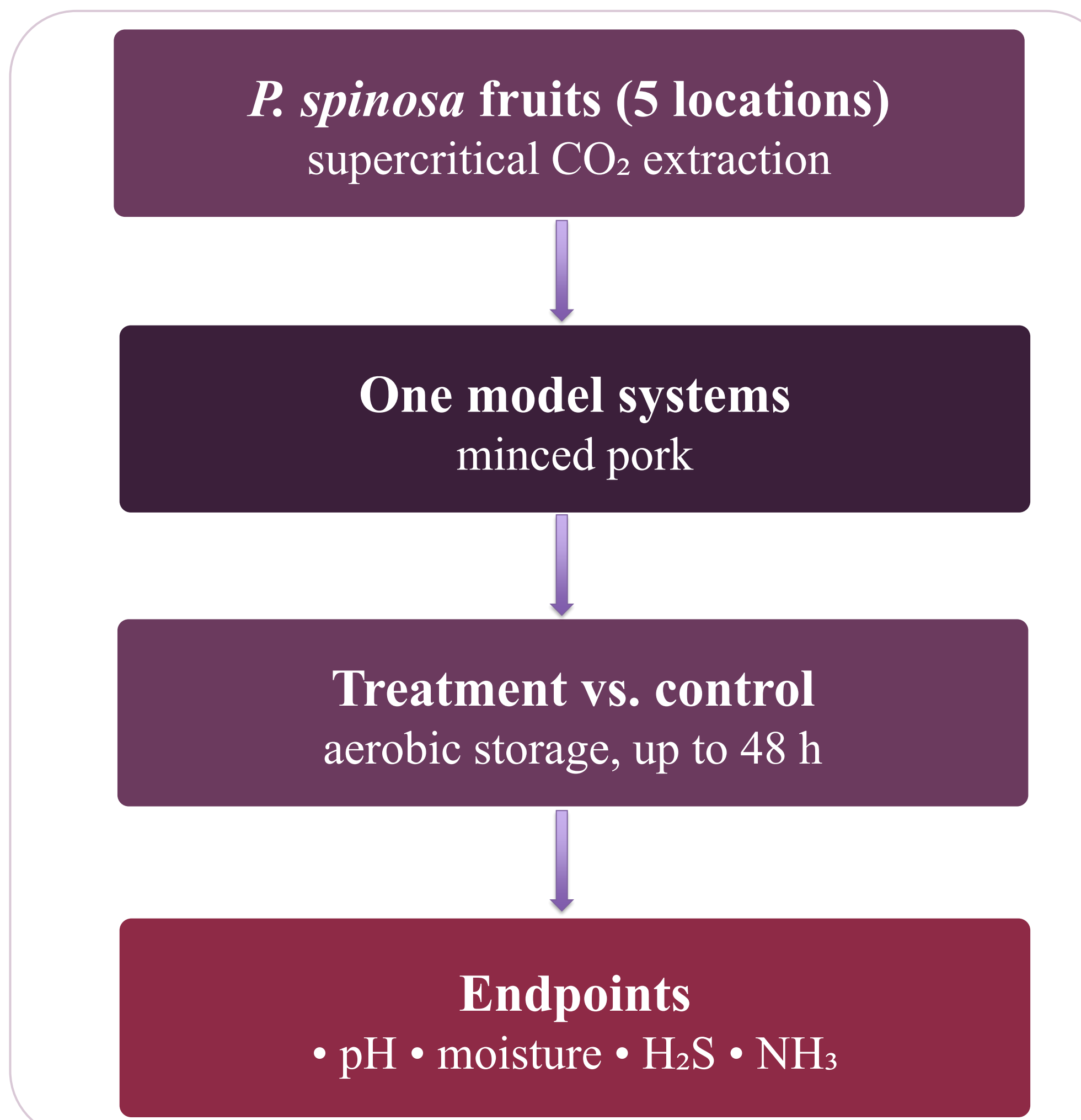


Fig. 3. *Prunus spinosa* fruits and the extract obtained by extraction technique using CO₂

6 | RESULTS

H₂S and NH₃ in minced pork (48 h)

Gas (ppm)	Control	Extract-treated
H ₂ S	5 ppm	Non-detectable
NH ₃	3 ppm	Non-detectable

→ **All five extracts (Chinteni, Pata, Borhanci, Făget, Florești) completely prevented formation** of both toxic gases.

→ Extract-treated samples showed **superior moisture retention and more stable pH values** compared with the untreated control.

→ These findings **indicate a consistent protective effect** of *P. spinosa* extracts against key spoilage-related changes during aerobic storage of minced pork.

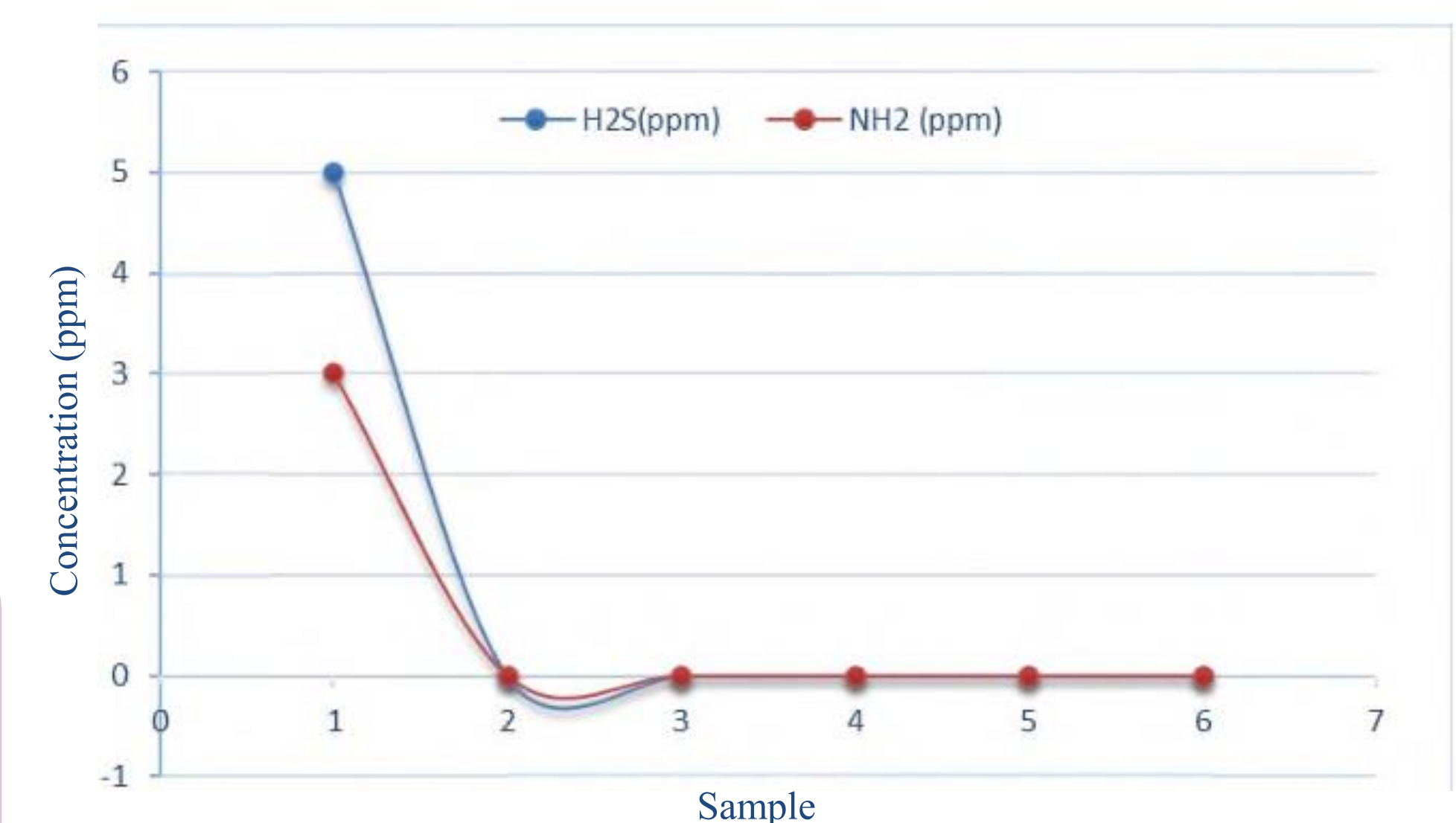
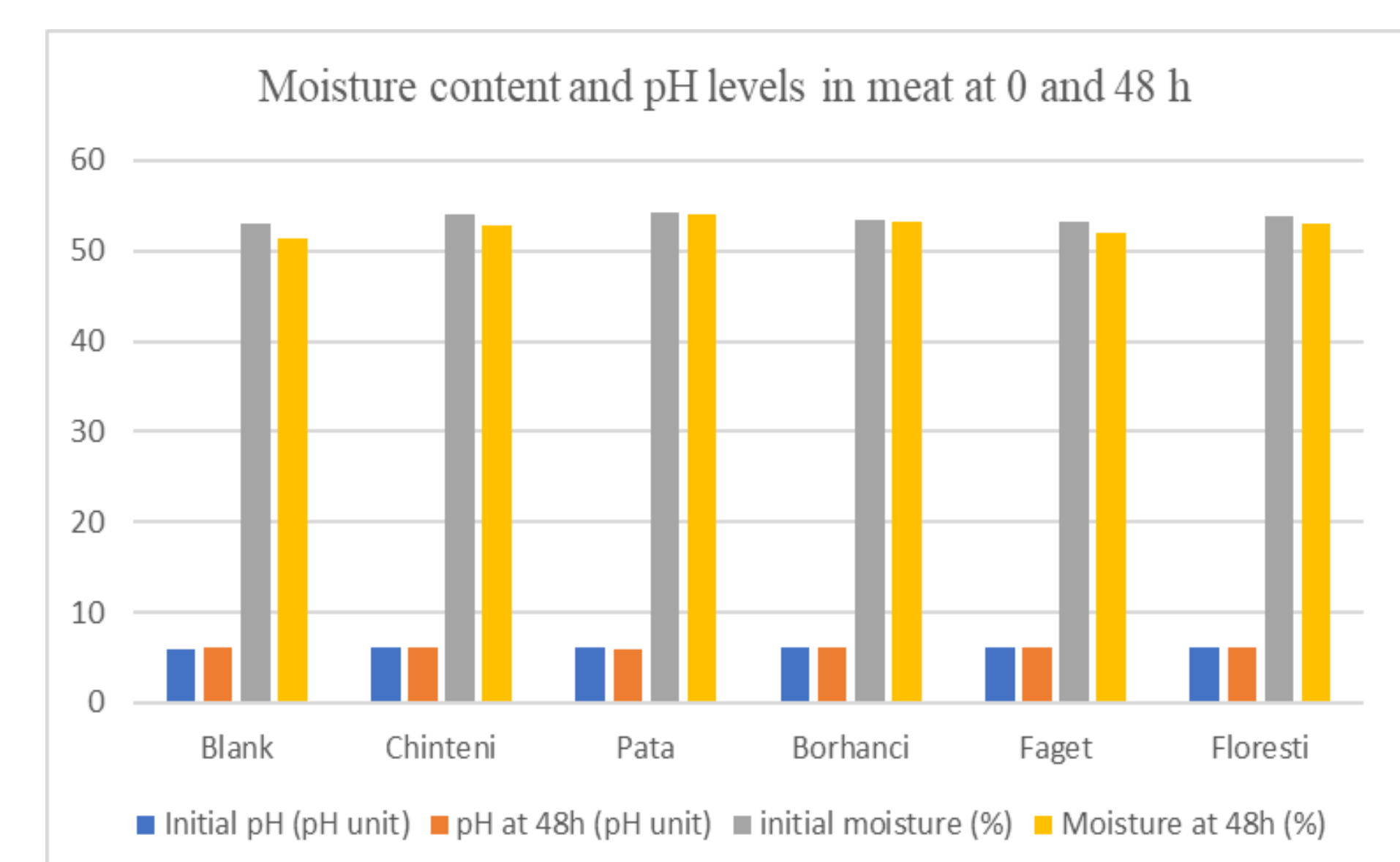


Fig. 4. Comparative evaluation of hydrogen sulfide and ammonia concentrations in meat samples



7 | CONCLUSIONS

- P. spinosa* fruit extracts **effectively inhibit oxidative processes** in fruits and vegetables.
- Strongly inhibit H₂S and NH₃ accumulation**, key indicators of protein degradation, in pork meat during aerobic storage.
- Blackthorn extracts show **promising potential as natural food additives** for extend shelf-life while mitigating the formation of hazardous spoilage metabolites.
- A **safer alternative to synthetic preservatives** for the food industry.

KEY CONCLUSION: Blackthorn fruit extracts significantly reduced H₂S and NH₃ accumulation in meat, highlighting their potential as a safe, natural alternative to synthetic preservatives.

Acknowledgements

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