HOW PRE-TREATMENT REFRIGERATION AND FROZEN STORAGE OF THE RAW MATERIAL INFLUENCE SOME QUALITY PARAMETERS OF THE SOUS-VIDE COOKED CHICKEN BREAST AND PORK

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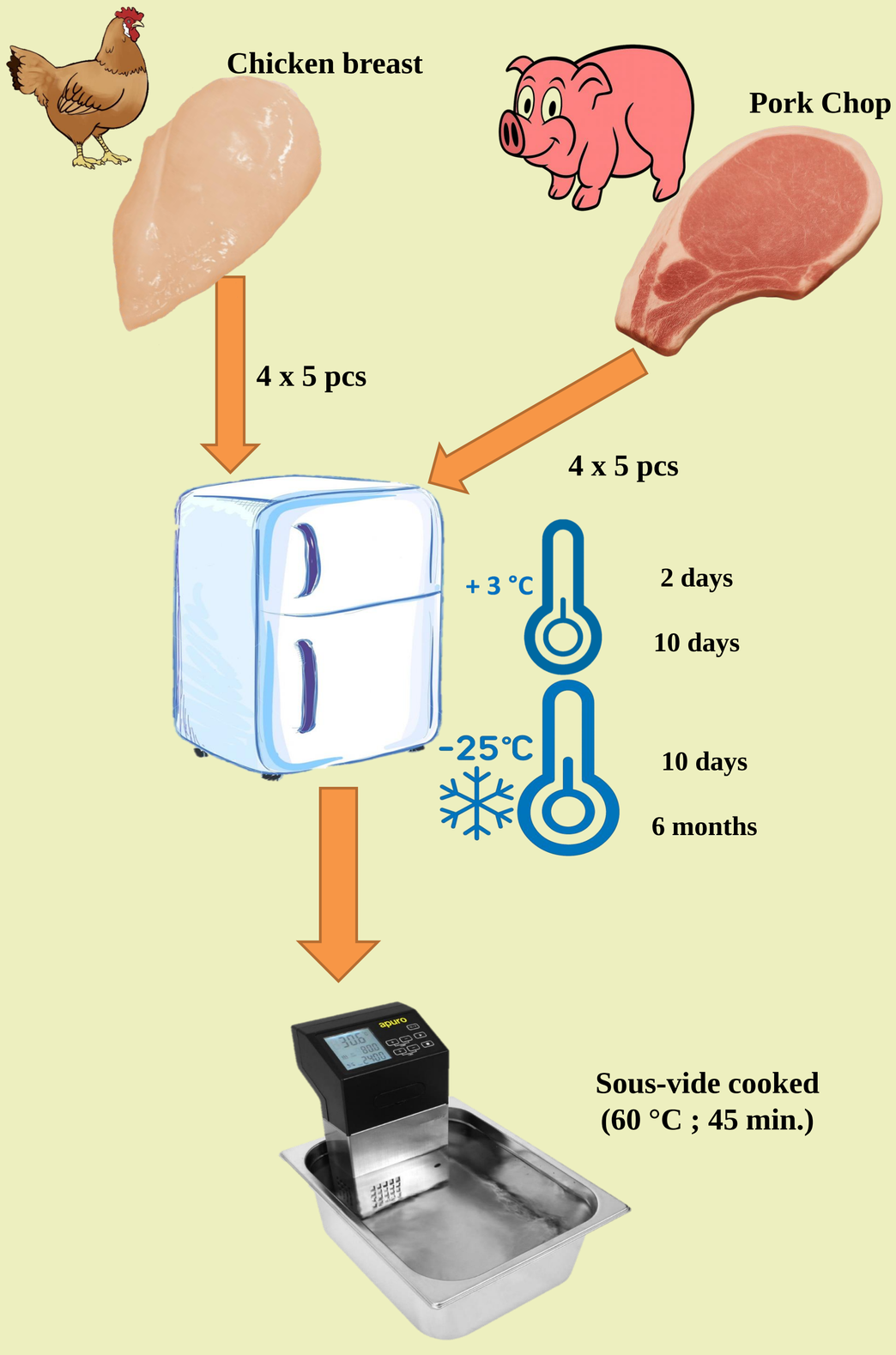
INTRODUCTION

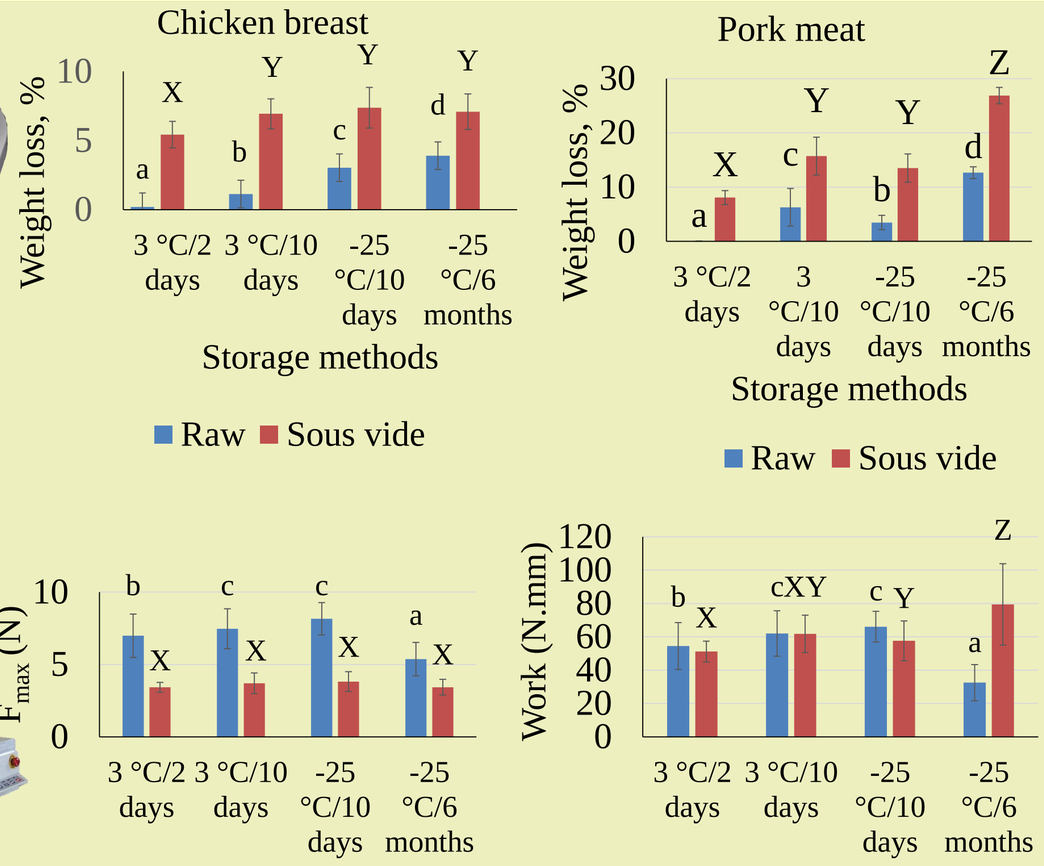
Global demand for animal-based food is rising, especially pork and poultry. Chicken is popular for its high protein and low-fat content, and pork is known by its rich flavor and juicy, tender texture. Consistency in meat tenderness and sensory quality remains a challenge, prompting the adoption of minimal processing technologies like sous-vide. Sous-vide cooking enhances meat texture and nutrition while preserving freshness. Pretreatments such as refrigeration and freezing are commonly used before sous-vide but may affect meat quality. This study investigates how these storage methods influence weight loss, texture, and lipid oxidation in sous-vide cooked chicken breast and pork.

MATERIALS AND METHODS

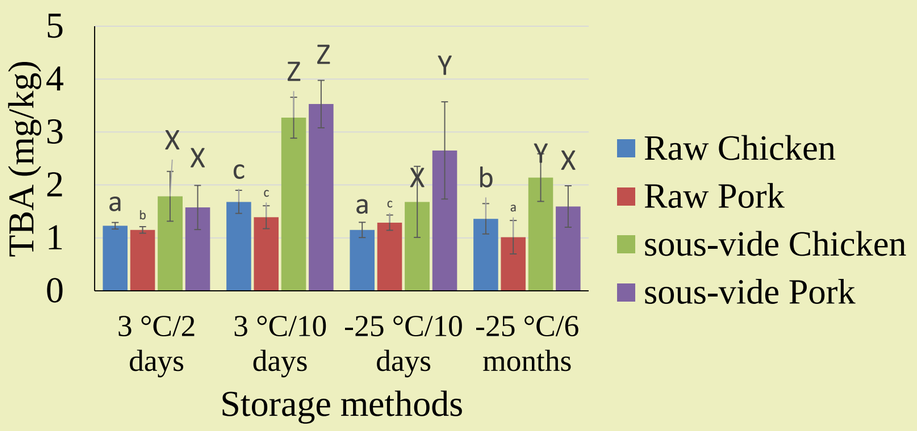


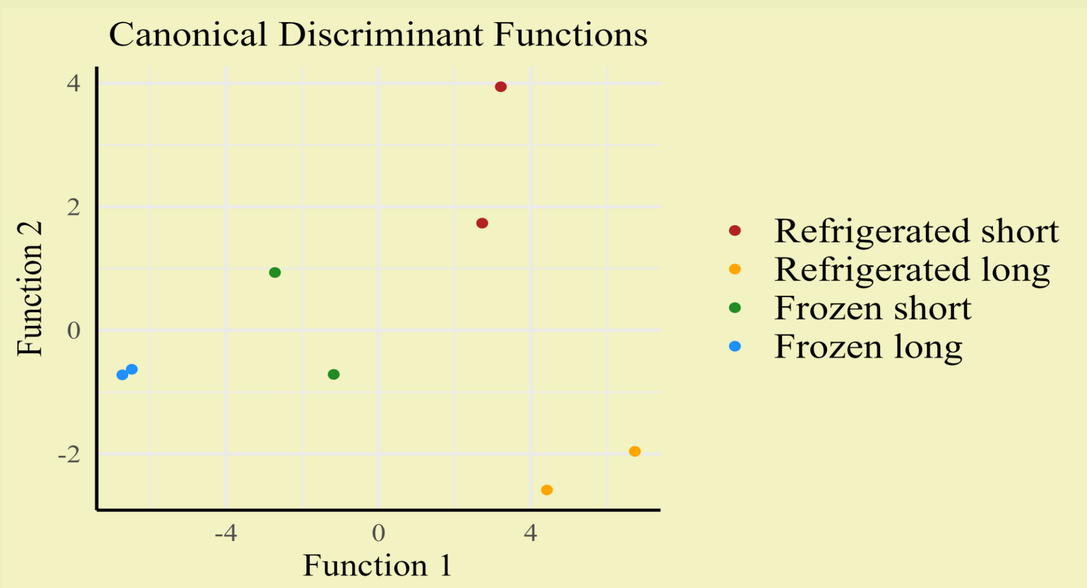
In our study we examined the color (CIELab: L*, a*, b*), the texture (P2/n needle on an SMS Texture Analyser XT plus device; F_{max} and work was determined by measuring the maximal force at the 30 mm puncture test, the weight loss (%), and TBA as quality parameters of the chicken breast and pork meat and were determined before and after the sous vide treatment. ANOVA and CDA was used to process the data.

RESULTS



	Chicken breast			Pork		
Raw	L*	a*	b*	L*	a*	b*
Refrigerated short	48.29±5.48^{a}	3.73±0.91^{c}	2.70±2.13^{a}	45.54±3.96^{b}	5.63±1.80^{b}	5.77±1.92^{c}
Refrigerated long	51.52±2.85^{b}	3.10±0.79^{b}	2.70±1.61^{a}	43.06±3.67^{a}	4.99±0.97^{a}	3.41±1.08^{b}
Frozen short	48.22±3.01^{a}	3.70±1.01^{c}	2.84±1.48^{a}	42.27±2.03^{a}	5.32±1.21^{b}	3.37±0.71^{b}
Frozen long	50.07±7.13^{b}	2.67±1.00^{a}	2.71±1.59^{a}	46.75±4.17^{b}	8.51±1.19^{c}	1.01±1.14^{a}
Sous-vide						
Refrigerated short	79.99±1.30^{X}	3.99±0.96^{Y}	8.94±0.59^{X}	72.08±2.40^{Y}	7.86±1.73^{Y}	12.72±0.53^{Z}
Refrigerated long	81.17±0.80^{X}	3.66±0.38^{X}	9.10±1.11^{X}	67.70±4.15^{X}	7.26±1.21^{Y}	9.43±0.78^{YZ}
Frozen short	80.02±1.11^{X}	3.86±0.89^{XY}	10.03±1.17^{XY}	72.72±8.66^{YZ}	8.01±1.32^{Y}	8.95±0.70^{Y}
Frozen long	80.07±1.93^{X}	3.51±0.92^{X}	11.24±0.94^{Y}	75.96±1.33^{Z}	6.93±0.73^{X}	7.28±0.29^{X}





DISCUSION AND CONCLUSIONS

Weight loss was strongly influenced by the pre–sous vide storage period. During storage weight loss increased progressively from 2 days under refrigeration to 6 months of freezing for both chicken breast and pork meat. After sous vide cooking (post-treatment), weight loss increased significantly in both meat types. Specifically, weight loss after sous vide ranged from 5.43% (2 days at 3 °C) to 7.09% (6 months frozen) for chicken breast, and from 8.06% (2 days at 3 °C) to 26.88% (6 months frozen) for pork samples. In both types of meat, long-term frozen storage resulted in higher Lightness (L*) values compared to short-term storage. The redness (a*) decreased as longer storage period and freezing was applied before heat treatment. Texture analysis revealed that short-term freezing (-25 °C/10 days) led to the highest Fmax in both pork and chicken, while long-term freezing (-25 °C/6 months) significantly reduced pork toughness and increased work in chicken, indicating distinct structural responses to storage duration. TBA values of the raw meat samples slightly increased during the storage period at both temperatures, in contrast to the sous-vide cooked samples where the TBA numbers showed high values at the meat samples kept for longer periods at 3°C and at -25°C in both chicken and pork.

CDA revealed a distinct separation between frozen and refrigerated samples, highlighting storage method as a key differentiator. Among refrigerated samples, storage duration at +3 °C had a stronger influence, suggesting that time-dependent changes are more pronounced under refrigerated conditions.

This study confirms that pre-treatment storage conditions have a measurable impact on the final product, and maintaining freshness is crucial for quality.

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