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DEVELOPMENT OF HEALTHIER TURKEY BURGERS WITH MONTANERA IBERIAN PORK FAT: IMPACT OF HIGH-PRESSURE PROCESSING ON QUALITY ATTRIBUTES

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I. INTRODUCTION

The aim of these experiment was to develop new formulations of turkey burgers made with Montaner Iberian pork backfat (IF) as an alternative to reduce total fat and salt content, in line with WHO nutritional guidelines, and to evaluate the impact of high-pressure processing on their sensory and textural properties, in order to assess their viability as a healthy and high-quality meat product.

II. MATERIALS AND METHODS

Four batches of turkey patties were elaborated with different percentages of Iberian pork fat and salt, as traditional formulation. A total of 80 patties per batch were produced. The four planned batches were as follows: control patty –**NS/NF**– (1.2% salt and 12% Iberian fat), reduced salt patty –**LS/NF**– (0.8% salt and 12% Iberian fat), reduced fat patty –**NS/LF**– (1.2% salt and 0% Iberian fat), and reduced fat and salt patty –**LS/LF**– (0.8% salt and 0% Iberian fat).Subsequently, 40 burgers from each batch were treated with high-pressure processing (600 MPa for 6 minutes), resulting in four additional HPP-pretreated batches. In total, eight batches were elaborated. From each batch, 20 patties were used for instrumental color and texture analysis, while the remaining samples were used for sensory evaluation.

Color was measured based on the CIELAB color space parameters using a Minolta CR-400 colorimeter (Minolta Camera, Osaka, Japan) ((1)). Texture analysis using Kramer Shear Force (KSF) was performed using a TA-XT.plus Texture Analyzer (Texture Technologies Corp.Scarsdale, NY) with a mini-Kramer shear cell attached to a 30 kg load cell (crosshead speed 80 mm/s). Results were expressed as maximum load per gram of sample (N/g).(2). A trained sensory panel evaluated the perceived intensity of six attributes (appareance, odour, flavour, texture, saltiness and overall acceptability) using a 10-point hedonic scale from ‘‘dislike extremely’’ to ‘‘like extremely’(2)’. One-way ANOVA test was used to study the effect of the formulation and HPP treatment Statistical significance was set at $P \leq 0.05$. Values were expressed as mean ± standard error. Statistical analyses were performed using SPSS Statistics (v.27, IBM SPSS Inc., Chicago, IL).

III. RESULTS AND DISCUSSION

As presented in **Table 1**. Modifications in salt and fat content significantly affected to instrumental color. Lower values were observed for L*, a*, and b* in the LF samples. However, the reduction in salt content did not significantly affect these parameters.

HPP had a significant impact on almost all analyzed parameters. An increase in lightness was observed, a phenomenon previously reported by other authors ((3)). Similarly, the tendency towards redness was reduced in all formulations, likely due to protein denaturation caused by HPP, which results in a paler, whitish appearance (4). As for the b* parameter, results were inconsistent and seemed to depend on fat content, with NF samples being more affected by HPP than LF samples.

Instrumental texture values were also influenced by HPP, showing significantly higher values in samples with normal salt content (NS). This may be attributed to the role of salt in modifying hydrophobic and electrostatic interactions that stabilize muscle proteins ((3)).

Based on the results from the sensory panel in the hedonic test (Figure 1), no significant differences were found in saltiness acceptability among samples. However, significant differences were observed in texture and overall acceptability, with a correlation of 0.93 between these two attributes. These differences in texture perception align with the instrumental texture measurements. Samples not treated with HPP, regardless of formulation, were rated higher in texture acceptability, while HPP-treated samples received lower scores. This trend was also reflected in the overall acceptability scores. Therefore, lower instrumental texture values corresponded with lower sensory

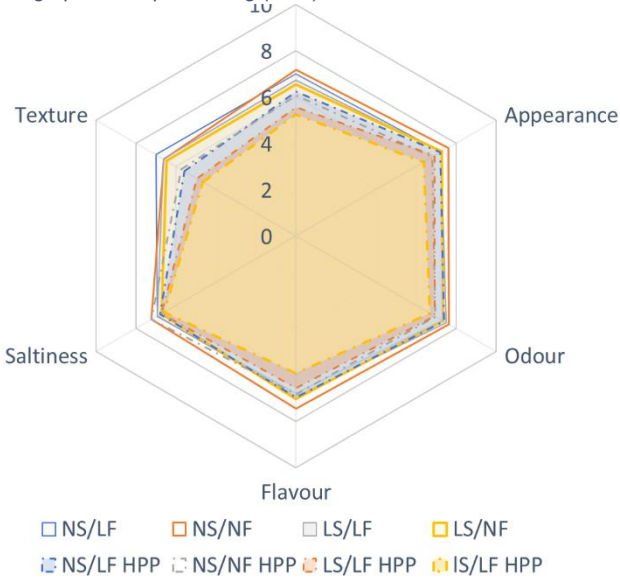
scores for both texture and overall acceptability. Nevertheless, no significant differences were found among NS samples, regardless of whether they were HPP-treated or not.

Table 1 – Instrumental texture (Kramer shear force) and color parameters (L*, a b*) of turkey burger formulations with different levels of Iberian pork fat and salt, wit and without high-pressure processing (HPP).

	Salt Content	Fat Content	Control	HHP	Sig Tt
Kramer Shear Forec (N/g)	NS	LF	189.90±19.73	250.87±42.79	0.020
		NF	197.63±58.21	253.90±15.27	0.070
	S	LF	201.14±37.03	237.63±58.59	0.273
		NF	198.89±41.51	257.33±64.03	0.125
	formulation sig		0.975	0.703	
L*	NS	LF	43.71±1.46c	70.91±0.86b	0.000
		NF	57.21±0.70a	72.90±0.52[a]	0.000
	LS	LF	46.46±2.10b	73.15±1.07[a]	0.000
		NF	55.80±1.45a	74.15±1.30[a]	0.000
	formulation sig		0.000	0.001	
a*	NS	LF	2.95±0.30b	2.37±0.27	0.012
		NF	4.23±0.23a	2.95±0.15	0.003
	LS	LF	2.89±0.26b	2.56±0.39	0.154
		NF	4.28±0.46a	2.97±0.49	0.000
	formulation sig		0.000	0.068	
b*	NS	LF	3.97±0.64c	4.94±0.49b	0.029
		NF	7.84±0.46a	6.43±0.18a	0.152
	LS	LF	3.57±0.32c	5.21±0.33b	0.000
		NF	7.01±0.23b	6.73±0.32a	0.000
	formulation sig		0.000	0.000	

Kramer shear force (N/g) L*: lightness, a*: redness, and b*: yellowness. Values are expressed as mean standard deviation.**Sig. HPP** indicates significant differences due to high-pressure processing compare to the untreated control.**Sig. formulation** indicates significant differences due to th formulation.Significance was determined using Tukey's test ($p \leq 0.05$).

Figure 1. Sensory analysis of turkey burger formulations with different levels of Iberian pork fat and salt, with and without high-pressure processing (HPP).



Kramer shear force (N/g) L*: lightness, a*: redness, and b*: yellowness. Valu are expressed as mean ± standard deviations**. HPP** indicates significa differences due to high-pressure processing compared to the untreat controls**. Ingredients** indicate significant differences due to the formulatio Significance was determined using Tukey's test ($p \leq 0.05$).

IV. CONCLUSION

The new formulations offer a promising opportunity for the incorporation of by-products from the Iberian meat industry, regardless of their salt and fat content. High-pressure processing significantly affected the formulations but appears to be a potential tool to extend the product's shelf life.

V. ACKNOWLEDGEMENTS

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