SENSORY TEXTURE ANALYSIS OF MARINATED AND NON-MARINATED WOODEN BREAST FILLET PORTIONS

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I. INTRODUCTION

The wooden breast (WB) condition is an emerging myopathy that occurs in the *Pectoralis major* muscle of broilers. Fillets with the WB myopathy often have visual quality defects, impaired technological meat quality, and altered muscle composition [1]. In addition, many of the distinct myopathic lesions associated with WB are often more evident on the ventral-cranial surface of the breast muscle [2], indicating that WB effects are not uniform throughout the muscle. Marination with a salt-phosphate based marinade is often used to enhance the yield and quality of poultry meat products. Although it has been reported that breast meat with the WB condition exhibits altered sensory texture characteristics [3, 4], the effects of marination on the sensory attributes of breast fillets with the WB myopathy are unknown. The objective of this study was to investigate the interacting effects of the WB myopathy, marination, and fillet portion (dorsal and ventral) on the sensory texture quality of broiler breast fillets using sensory descriptive analysis.

II. MATERIALS AND METHODS

Boneless, skinless butterfly breast fillets were collected from a commercial broiler processing plant at approximately 3 h postmortem. Individual breast fillets were categorized as normal (no WB) or severe WB based on palpable hardness and muscle rigidity throughout the fillet. A total of 60 butterfly fillets (30 normal and 30 severe WB) were utilized. For each butterfly fillet, samples from one side (left or right) were marinated while the samples from the opposite side served as non-marinated controls. Fillets from each butterfly were horizontally portioned into ventral (skin-side) and dorsal (bone-side) portions. Samples were vacuum-tumbled for 20 min at 16 rpm, −0.6 atm in marinade contained 5% NaCl and 3% sodium tripolyphosphate. Portioned fillets were cooked to an internal temperature of 78˚C. Sensory analysis was performed using a descriptive panel of 9 trained panelists and a 0-15 point intensity scale. Data were subjected to three-way ANOVA using the mixed model procedure of SAS. Marination treatment, WB category, fillet portion, and their interactions were included in the model as fixed effects. Experimental replication, butterfly fillet, and panelist were treated as random effects. Least square means were separated statistically with the Tukey's HSD method at $P < 0.05$.

III. RESULTS AND DISCUSSION

Table 1 shows that the sensory scores for springiness, cohesiveness, hardness, fibrousness, and chewiness were greater ($P < 0.05$) in fillets with the WB condition in both control and marinated samples. The WB effects on these 5 attributes were also more severe in the ventral portions of the fillets than the dorsal portions. Marination decreased ($P < 0.05$) cohesiveness and chewiness, but did not influence springiness ($P > 0.05$). The decrease ($P < 0.05$) in hardness and fibrousness due to marination, however, was only observed in the dorsal portion of the fillets. In WB samples, springiness, cohesiveness, hardness, fibrousness, and chewiness scores were greater ($P < 0.05$) in the ventral portions than the dorsal portions of the fillets. Marination increased juiciness in both the ventral and dorsal portions ($P < 0.05$). In normal fillets, the sensory texture attributes were similar between the dorsal and ventral portions. Similar results were also reported in literature. Descriptive sensory analysis of frozen-thawed breast fillets found that hardness and springiness were greater in WB fillets [3] and that toughness scores were greater in breast

fillets exhibiting WB and white striping [4]. The altered texture characteristics observed in the WB meat in this study were likely due to compositional changes in the muscle tissue.

Table 1. Average intensity scores of sensory descriptive texture attributes of cooked breast meat (lsmeans).

		Springiness	Cohesiveness	Hardness	Fibrousness	Juiciness	Chewiness
Main Effects:							
Normal		5.7^{b}	5.2^{b}	5.2^{b}	3.9^{b}	4.5^{a}	4.9^{b}
WB		7.0^{a}	6.4^{a}	5.8^{a}	4.9^{a}	4.2^{a}	5.6^{a}
	SEM	(0.6)	(0.4)	(0.4)	(0.7)	(0.4)	(0.3)
Control		6.4^{a}	6.0^{a}	5.7^{a}	4.7^{a}	4.1^{b}	5.4^{a}
Marinated		6.3^{a}	5.6^{b}	5.4^{b}	4.2^{a}	4.7^{a}	5.1^{b}
	SEM	(0.6)	(0.4)	(0.4)	(0.7)	(0.4)	(0.3)
Ventral		6.7^{a}	6.2^{a}	5.7^{a}	4.7^{a}	4.4^{a}	5.4^{a}
Dorsal		6.0^{b}	5.4^{b}	5.3^{b}	4.1^{b}	4.3^{a}	5.1^{b}
	SEM	(0.6)	(0.4)	(0.4)	(0.7)	(0.4)	(0.3)
Two-Way Interaction Effects:							
Control	Normal	5.9^{b}	5.6^{b}	5.3^{bc}	4.1^{bc}	4.3^{ab}	5.0^{bc}
	WB	7.0^{a}	6.5^{a}	6.0^{a}	5.2^{a}	3.8^{b}	5.8^{a}
Marinated	Normal	5.6^{b}	4.9^{c}	5.1^{c}	3.7^{c}	4.8^{a}	4.8^{c}
	WB	7.0^{a}	6.3^{a}	5.7^{b}	4. 7^{ab}	4.6^{a}	5.4^{b}
	SEM	(0.7)	(0.5)	(0.4)	(0.7)	(0.5)	(0.4)
Control	Ventral	6.8^{a}	6.5^{a}	5.7^{a}	4.7^{a}	4.1^{b}	5.6^{a}
	Dorsal	6.1^{b}	5.6^{bc}	5.6^{a}	4.6^{a}	4.0^{b}	5.2^{ab}
Marinated	Ventral	6.7^{a}	6.0^{ab}	5.7^{a}	4.8^{a}	4.7^{a}	5.2^{ab}
	Dorsal	5.9^{b}	5.2^{c}	5.0^{b}	3.6^{b}	4.6^{a}	4.9^{b}
	SEM	(0.6)	(0.5)	(0.4)	(0.7)	(0.5)	(0.3)
Normal	Ventral	5.8^{bc}	5.3^{b}	5.3^{b}	3.8^{b}	4.7^{a}	4.9^{b}
	Dorsal	5.6^{c}	5.1^{b}	5.2^{b}	4.0^{b}	4.4^{ab}	4.9^{b}
WB	Ventral	7.6^{a}	7.1^{a}	6.2^{a}	5.6^{a}	4.1^{b}	5.9^{a}
	Dorsal	6.4^{b}	5.7^{b}	5.5^{b}	4.3^{b}	4.3^{ab}	5.3^{b}
	SEM	(0.7)	(0.5)	(0.4)	(0.7)	(0.5)	(0.4)
Factor Significance:							
WB condition (WB)		***	***	***	***	NS	***
Marination (Mar)		NS	*	*	NS	**	*
Portion (Port)		***	***	**	*	NS	*
WB × Mar		NS	NS	NS	NS	NS	NS
Mar × Port		NS	NS	*	*	NS	NS
WB × Port		**	***	**	**	NS	NS
WB × Trt × Port		NS	NS	NS	NS	NS	NS

$^{a-c}$ lsmeans within an attribute and effect lacking a common superscript differ ($P < 0.05$).

*** P < 0.001; ** P < 0.01; * P < 0.05; NS = not significant

IV. CONCLUSION

This study demonstrates that the WB condition may directly affect sensory texture quality of cooked breast meat with increased intensities of springiness, cohesiveness, hardness, fibrousness, and chewiness. The negative effects of WB on the sensory texture attributes were more noticeable in the ventral portions of the breast fillets. Even though vacuum-tumbling marination can be used to improve the sensory attributes of WB fillets, differences in cooked texture characteristics due to the WB myopathy are still detectable in marinated broiler breast meat, predominantly in the ventral portion of the fillet.

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