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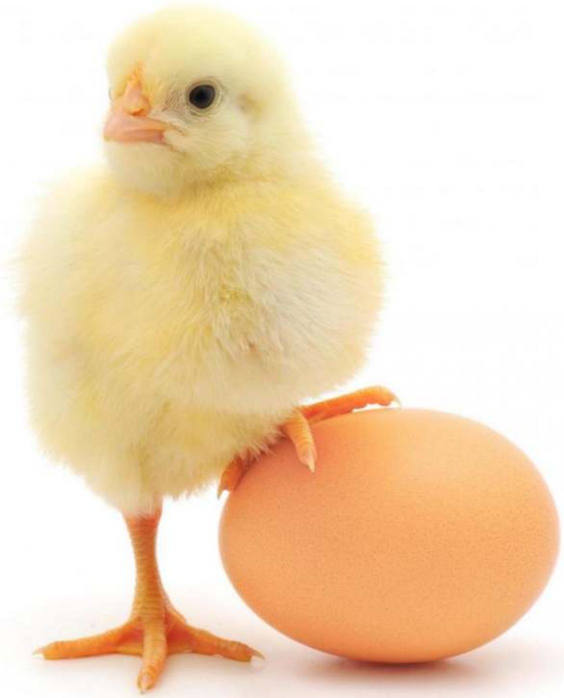

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Comparison of Sensory Descriptive Flavor Profiles Between Cooked Hot-boned and Cold-deboned Broiler Breast Fillets

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Abstract: Three trials were conducted to compare sensory descriptive flavor profiles of cooked broiler breast fillets (pectoralis major) that were either hot-boned or cold-deboned postmortem. Broiler carcasses were hot-boned (about 45 min postmortem) and cold-deboned 2 h postmortem (2 h) and 24 h postmortem (24 h). Descriptive sensory flavor as well as texture attributes were evaluated by 8 trained descriptive panelists using 0-15 universal intensity scales. There were no significant differences in average sensory descriptive flavor intensity scores between hot-boned and 2 h fillets. However, the average score of 24 h samples for the flavor attribute cardboardy was significantly lower than hot-boned fillets and was not different from 2 h fillets and the score for the attribute sweet was significantly higher than hot-boned and 2 h samples. These results indicate that sensory descriptive flavor profiles of cooked hot-boned and 2 h broiler fillets are similar to each other. However, cooked 24 h fillets have different sensory descriptive flavor profiles from either hot-boned or 2 h fillets.

Key words: Chicken breast, deboning time, meat quality, sensory, flavor

INTRODUCTION

Profiling sensory descriptive texture properties of cooked chicken breast fillets (pectoralis major) deboned pre-chill (hot-boned) and post-chill (cold-deboned) during Postmortem (PM) aging has been of research interests. Lyon and Lyon (1990) and Lyon *et al.* (1994) investigated the effect of PM deboning times, hot-boning (<5 min) and cold-deboning (2 h, 6 h, 8h or 24 h PM), on sensory descriptive texture profiles of broiler fillets and found that the sensory descriptive texture profiles of muscles hot-boned were significantly different from those cold-deboned 2, 6, 8 or 24 h PM. The 2-h cold-deboned sample had the descriptive texture profile different from those deboned after 6 h PM. There were no differences in the texture profiles between the late cold-deboned fillets (≥6-h PM). Cavitt *et al.* (2004, 2005) and Xiong *et al.* (2006) investigated sensory descriptive texture properties using broiler fillets deboned 0.25 (hot-boned), 1.25, 2, 2.5, 3, 3.5, 4, 6 and 24 h PM (cold-deboned) and reported that broiler fillet meat samples hot-boned at 0.25 h were not significantly different for initial hardness and cohesiveness, chewdown hardness, cohesiveness of mass, or number of chews to swallow attributes from those cold-deboned at 1.25 h through 3.0 h PM. As deboning time progressed to 24.0 h PM, meat samples decreased in initial hardness and cohesiveness values. The 6.0-h and 24.0-h PM treatments did not differ significantly from each other for any of the sensory texture attributes and they were significantly lower than samples deboned early (≤3.0 h PM). However, there are very limited studies on the effect of hot-boning and cold-boning on sensory descriptive flavor profiles of cooked chicken fillets without additives. Lyon and Lyon (2000) and Liu *et al.* (2004) reported the effect of deboning time on both sensory descriptive flavor profiles and texture profiles and reported the changes in the intensity scores with the increased deboning time (Liu *et al.*, 2004). However, only cold-deboned fillets (2 to 24 h PM) were evaluated. Zhuang *et al.* (2009) investigated sensory descriptive flavor and texture profiles of hot-boned and cold-boned broiler fillets in study on carcass chilling methods. However, they compared hot-boned broiler fillet samples (0.75 h PM) with only the fillets chilled and deboned 4.75 h PM. Currently, 1.5-2 h is usually PM time to remove chicken breast for retail markets in many processing plants (Owens, 2007) and cold-deboning 24 h PM is commonly used to represent the well-aged boneless skinless chicken fillet product. There is lack of peer-reviewed studies to compare sensory descriptive flavor profiles of hot-deboned versus 2-h broiler fillets and hot-deboned versus 24-h broiler fillets without additives. The objective of the present study was to compare sensory descriptive flavor as well as texture profiles of cooked broiler breast fillets that were hot-boned (about 45 min PM) or cold-deboned at 2 or 24 h PM.

MATERIALS AND METHODS

Broiler breast fillets: During each of 3 replications, commercial processed and eviscerated broiler

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Table 1: Sensory attributes and definitions used by descriptive analysis panel to evaluate test samples

Attribute	Definition
Texture phase 1. First few bites	
1. Cohesiveness	Distance you can bite into the sample before it breaks, cracks, crumbles-first bite.
2. Hardness	Force to compress the sample with the molars during first 2 bites
3. Juiciness/Dryness	Amount of moisture coming from the sample during the first 5 chews
Texture phase 2. Chew sample to bolus-evaluate	
4. Cohesiveness of Mass	Degree the chewed sample holds together in a wad
5. Bolus size	Change in sample size with formation of bolus or wad
6. Wetness of wad	Amount of moisture in the bolus.
7. Rate of Break-down	Rate the sample breaks down, fast to slow
Texture phase 3. Evaluate at time of swallow	
8. Chewiness	Amount of work to chew the sample to the point of swallow (or spit out)
Flavor phase 1. Aromatics	
Aromatic taste sensation associated with:	
1. Chickeny	Cooked white or dark chicken muscle
2. Brothy	Meat stock
3. Cardboardy	Cardboard, wet paper
4. Barnyard/Wet feathers	A chicken coop; combination of manure, moldy hay, feed and poultry odors including wet poultry feathers
5. Bloody/Serumy /Metallic	Raw or 'rare' lean meat, blood, serum or metal/iron
Flavor phase 2. Basic tastes	
6. Sweet	Sugars and high potency sweeteners
7. Salty	Sodium salts, especially sodium chloride (table salt)
8. Sour	Acids
9. Bitter	Caffeine or quinine

carcasses (approximately 42 d old) were obtained from a local processing plant (Athens, GA). Carcasses were placed, in bulk, in two 36L coolers (Igloo®, Shelton, CT 06484, internal dimension 52 x 30 x 35 cm) and transported to the laboratory within 20 min where ten pre-chill carcasses were hot-boned (about 45 min PM, average carcass temperature was 35.2°C) and ten postchill carcasses (2 h) deboned 2 h PM (average carcass temperature was 3.6°C). The other ten chilled carcasses (24 h) were placed in a 3.79L Ziploc freezer bags (1 carcass/bag) and held at 1-2°C in a refrigerator for 22 h before being deboned 24 h PM (average carcass temperature was 1.9°C). For the cold-deboned samples, carcasses were immersed in a pre-chill water tank at 14°C for 0.25 h, followed by submersion in water immersion chill tanks at 0-4°C for 1.0 h. The carcasses were placed on ice before deboning.

Color, pH, packaging and storage: Surface color (CIE L*, a* and b* values) of fillets were measured with a Minolta spectrophotometer CM-2600d (Konica Minolta, Ramsey, NJ) with settings of illuminant C, 10° observer, specular component excluded and an 8-mm aperture. Surface areas were selected that were free from obvious defects (bruises, discolorations, hemorrhages, or any other conditions that might have prevented uniform color readings). Three measurements were taken on the bone or medial side of the fillet. Each measurement was the result of 3 averaged readings by the spectrophotometer. The pH of the fillets was determined at the cranial end (wing end) with a Sentron model 2001 pH meter and a LanceFET piercing probe (Sentron, Gig Harbor, WA). Between measurements, the probe tip was cleaned with a soft toothbrush and rinsed with deionized water (Zhuang and Savage, 2008). Breast fillets were individually weighed, vacuum packed (508 mm Hg) in cooking bags (Seal-a-Meal bag, The Holmes Group, El Paso, TX) and then stored at -20°C before use.

Cooking, sampling and sensory evaluation: The frozen, bagged fillets were cooked directly from the frozen state and sampled by following the same procedures reported by this laboratory in Zhuang and Savage (2008). Sensory profiles included eight texture and nine flavor attributes (Table 1). Samples were evaluated by an 8-member, trained descriptive panel with a minimum of 100-h training in flavor and texture profiling with extensive experience in descriptive analysis using a Spectrum-like method. Data were collected using Compusense five, version 4.8 software (Compusense, Inc, Guelph, Ontario, Canada) as described in our previous publication (Zhuang *et al.*, 2009).

Statistics: Sensory data were analyzed using the General Linear Models (GLM) procedures of SAS (SAS version 9.1, SAS Institute Inc., 2004, Cary, NC). The main factors that were evaluated for sensory data were deboning time, replication, panelists and the interactions between deboning time and replication, deboning time and panelists and replication and panelists. Means were separated with the Tukey option at a significance level of 0.05. The null hypothesis (H_o) implied no difference in the measurement means between the different deboning times.

Table 2: Weight of broiler carcasses, whole raw fillet weight and fillet cook yield (mean±std, n = 30)

Deboning time	Carcass weight (g)	Whole raw fillet weight[1]	Cook yield[2] (%)
Hot-boned (45 min postmortem)	1407±162[b]	265±39[a]	80.2±3.6[a]
2 h	1549±228[a]	274±39[a]	77.8±2.6[b]
24 h	1451±159[b]	260±36[a]	78.0±2.3[b]

[ab]Mean values with no common superscript in the same column are significantly different from each other (p<0.05).
[1]Whole fillet weight = sum of left fillet weight and right fillet weight from the same carcass.
[2]Cook yield = 100 x (cooked fillet weight/raw fillet weight immediately after deboning)

Table 3: CIE color measurements and pH of raw broiler breast fillets (mean±std, n = 30)

Deboning time	L*	a*	b*	pH
Hot-boned (45min postmortem)	53.0±2.4[b]	0.4±0.8	11.5±2.1[a]	6.4±0.3[a]
2 h	53.2±2.1[b]	0.4±0.5	11.1±1.7[a]	5.9±0.3[b]
24 h	55.1±3.3[a]	0.1±0.7	10.1±1.3[b]	5.8±0.2[b]

[ab]Mean values with no common superscript in the same column are significantly different from each other (p<0.05)

RESULTS AND DISCUSSION

Tables 2 and 3 show some characteristics of broiler carcasses and fillets that were used in the present study. There were significant differences in carcass weight, cook yields, CIE L* and b* values and pH values among the three deboning times. There were no differences in whole harvested fillet weight and CIE a* value due to deboning time. These results indicate that the samples used in our study had physical characteristics and/or functionalities of broiler carcasses and breast muscles specifically for each deboning time. For example, Young and Smith (2004) measured the weight changes in eviscerated broiler carcasses during the first 24 h PM and found that water-chilled carcasses (30 min in ice water) absorbed 11.7% moisture in chilling and lost 41% of it after 24-h refrigerated storage. Sanders (1969) reported that with chiller agitation, eviscerated broiler carcasses picked up about 12% water during chilling and retained 56% of the moisture after 24-h storage at 4°C. In our experiment, 2-h deboned, water-chilled samples weighed 10.1% more than the hot-boned samples and 6.8% more than the 24 h samples. For cook yield, Thomson *et al*. (1986) reported that breast meat deboned 20 min PM exhibited lower percentage weight loss than meat deboned 24 h PM. Lyon and Wilson (1986) also found that broiler breast meat from un-chilled carcasses within 0.5-h postmortem resulted in significantly higher cook yield than breast meat held for 24 h prior to deboning regardless of heating methods. Alvarado and Sams (2000b) showed that cook loss (%) of broiler fillets deboned 0.25 h PM was 20%; however, it was about 30% for the fillets deboned 1.25 h and 33% for 24 h PM. Liu *et al*. (2004) observed the increasing in cooking yield along with deboning time from 2 h to 24 h PM; but changes were not statistically significant. For the fillets used in our research, the cook yield of the hot-boned sample was significantly higher than either the 2 h or 24 h samples and there was no difference between the 2 h and 24 h fillets.

Our results also show significant differences for the average CIE L* (indicating color lightness) values and pH values among the three deboning times. The 24 h fillets had significantly higher L* (lighter) than either the hot-boned or 2 h samples, which were not different from each other. The average pH values of hot-boned samples were significantly higher than either 2 h or 24 h samples and there was no difference between the 2 h and 24 h samples. These are consistent with the common observation that raw breast fillet L* value (or color lightness) significantly increases and pH significantly decreases during PM rigor process or with increasing PM deboning time. After the cessation of blood flow at the time of death, poultry carcasses undergo PM rigor. The metabolism required for ATP regeneration for muscle functions in poultry breasts firstly changes from aerobic respiration to anaerobic glycolysis. The anaerobic glycolysis uses stored carbohydrates in muscles to generate ATP and results in the gradual accumulation of lactic acid and therefore gradual pH reduction in muscles as PM rigor processes. A drop in pH value close to the isoelectric point (pH = 5.3) of many of the major muscle proteins (such as sarcoplasmic and myofibrillar proteins) results in visual paleness (increased L* values) by affecting the translucency of meat (Swatland, 2008). Lyon *et al*. (1984) found that the initial pH of broiler breast meat (20 min PM) was 6.1 and dropped to 5.7 at 1.5-h PM. After that the pH of broiler breast muscle did not decline significantly between 1.5 and 24 h PM. Lyon *et al*. (1985) investigated pH and tenderness of broiler breast meat deboned various times after chilling and found that pH of broiler breast meat reduced significantly from 6.22 at 1 h PM to 5.64 at 2 h PM and then the pH decline between 2 and 24 h PM was not significant and ranged from only 5.64-5.49. Thomas *et al*. (1986) reported that the pH within 20 min for breast meat from stunned birds was consistently and significantly higher than that for breast meat deboned from stunned birds 24 h PM. Alvarado and Sams (2000a) measured changes in pH and L* values of turkey breast muscle during the first 24-h rigor mortis development. They found that for stunned birds breast muscle pH significantly decreased over time through 2 h PM; however, there was no further significant reduction after 2 h PM. On the other hand, the L* values of the muscle increased over PM time, with no significant differences after 2 h PM. Huezo *et al.* (2007) also reported that deboning time significantly affected both pH and L* values of broiler breast fillets. In immersion-chilled fillet samples, pH significantly decreased from 0 h post-chill (about 60 min PM) to 1.67 h post-chill (about 3 h PM) and there was no significant difference between 1.67-h and 24-h post-chill samples. Deboning at 1.67 h and 24 h post-chill resulted in significantly higher L* value than deboning at 0 h post-chill. For air-chilled fillets, a significant increase in L* values was observed from 3 h PM to 24 h PM. Barbut (1993) reported that the L* values of both the intact and chopped turkey breast muscle had a significant negative correlation with pH. Zhuang and Savage (2009) demonstrated that there was a significantly linear negative correlation between L* value and pH in broiler breast fillets. Fletcher and Smith (2006) discussed the correlation between poultry breast meat lightness and pH and concluded that as muscle pH decreases in poultry breast meat, the lightness values increase, with a correlation coefficient between -0.6 and -0.8.

Table 4: Sensory mean scores (a 0-15 scale) of descriptive attributes of cooked broiler breast fillets (p. major) deboned at different postmortem time (mean±std, n = 24)[1]

	Deboning time		
Sensory attribute	Hot-boned	2 h	24 h
Texture			
1. Cohesiveness	$6.9^{a}\pm1.8$	$6.5^{a}\pm1.9$	$4.6^{b}\pm1.2$
2. Hardness	$6.6^{a}\pm1.2$	$6.4^{a}\pm1.2$	$4.7^{b}\pm0.9$
3. Juiciness/dryness	$5.6^{a}\pm1.1$	$5.5^{a}\pm1.1$	$5.3^{a}\pm1.2$
4. Cohesiveness of mass	$6.8^{a}\pm1.4$	$6.5^{a}\pm1.1$	$5.4^{b}\pm1.3$
5. Bolus/wad size	$6.3^{a}\pm1.2$	$5.8^{a}\pm1.2$	$4.7^{b}\pm1.2$
6. Wetness of wad	$6.0^{a}\pm0.8$	$6.0^{a}\pm1.1$	$6.0^{a}\pm0.9$
7. Rate of breakdown	$7.5^{a}\pm1.4$	$7.2^{a}\pm0.9$	$5.7^{b}\pm1.2$
8. Chewiness	$7.1^{a}\pm1.5$	$6.5^{a}\pm1.3$	$4.9^{b}\pm0.8$
Flavor			
1. Chickeny	$4.8^{a}\pm1.1$	$4.5^{a}\pm1.1$	$4.8^{a}\pm1.2$
2. Brothy	$4.1^{a}\pm1.4$	$3.8^{a}\pm1.3$	$4.0^{a}\pm1.4$
3. Cardboardy	$2.2^{a}\pm1.1$	$2.0^{ab}\pm1.2$	$1.7^{b}\pm0.9$
4. Barnyard/Wet feathers	$2.4^{a}\pm1.2$	$2.3^{a}\pm1.0$	$2.3^{a}\pm1.1$
5. Bloody/serumy/Metallic	$3.0^{a}\pm1.6$	$3.2^{a}\pm1.5$	$2.7^{a}\pm1.2$
6. Sweet	$2.3^{b}\pm1.2$	$2.3^{b}\pm1.2$	$2.5^{a}\pm1.3$
7. Salt	$2.5^{a}\pm1.0$	$2.4^{a}\pm1.2$	$2.5^{a}\pm1.1$
8. Sour	$2.5^{a}\pm1.1$	$2.4^{a}\pm1.3$	$2.5^{a}\pm1.0$
9. Bitter	$1.5^{a}\pm0.8$	$1.6^{a}\pm1.0$	$1.4^{a}\pm0.8$

[ab]Mean values with no common superscript in the same row are significantly different from each other ($p<0.05$).

[1]Intensities with a higher number are stronger

Table 4 shows average intensity scores for 8 texture and 9 flavor sensory attributes of cooked breast fillets deboned at different PM times. Average texture scores were all in the low to moderate portion (from 4.6 for cohesiveness of 24-h fillets to 7.5 for rate of breakdown of the hot-boned sample). Average flavor scores for all three deboning times were in the low portion (<5) of the 0 to 15 intensity scales (from 1.4 for bitter to 4.8 for chickeny). The intensity ranges for the sensory descriptive texture and flavor characteristics are slightly different from the previous sensory texture and flavor profiles reported by this laboratory; however, they fell in the same portion of the 16-point scales for cooked chicken breast meat deboned within 24 h PM and cooked to 75-80°C of endpoint temperatures. For example, Liu *et al.* (2004) reported that the average scores for 8 texture sensory attributes ranged from 3.0 for particle size to 6.0 for cohesiveness between the low and moderate portion when cooked broiler fillets deboned 2 to 24 h PM were evaluated. The range of average intensity scores for 8 flavor sensory attributes was from 1.9 for salty to 4.3 for chickeny and in the low portion of 0-15 point scales. Lyon *et al.* (2003) found that the intensity scores of 8 sensory flavor attributes for cooked hen breast meat deboned 2 to 24 h post-chill (3 to 25 h PM) ranging from 2.0 to 4.3, in the low portion of the 16-point intensity scale and they were in the low to moderate portion (ranging from 3.3-6.3) for 8 texture attributes. The small differences in the intensity score ranges between this experiment and the previous experiments could have resulted from experimental errors or variations of raw materials used for the sensory evaluation. Using similar experimental methods, Cavitt *et al.* (2004) in 2004 reported that the range of intensity scores for 5 descriptive texture attributes of cooked broiler fillets deboned between 0.5 h and 24 h PM was from 1.5 to 9.1. However, it was from 3.6 to 9.6 in the report published by the same group (Cavitt *et al.*, 2005) in 2005.

There were no significant differences between the hot-boned and 2-h deboned samples regardless of sensory descriptive attributes. There were no significant differences in the average intensity scores between the three deboning times for 7 out of 9 flavor attributes and the moisture-related texture attributes, wetness of wad and juiciness, tested. The hot-boned and 2 h fillets, which did not differ from each other, were scored significantly higher than the 24 h fillets for the 6 texture attributes cohesiveness, hardness, cohesiveness of mass, bolus/wad size, rate of breakdown and chewiness and significantly lower than the 24 h fillets for flavor attribute sweetness. For sensory flavor attribute cardboardy, the average scores of hot-boned fillets were significantly higher than 24 h samples, although there were no significant differences between the 2 h and hot-boned samples and between the 2 h and 24 h samples. For the effect of deboning time on the texture profiles of broiler fillets, our results agree with the data recently published by Owens' group (Cavitt *et al.*, 2004; 2005;

Xiong *et al.*, 2006) with the Department of Poultry Science, the University of Arkansan. Cavitt *et al.* (2004) collected sensory texture profile data of broiler fillets deboned 0.25, 1.25, 2, 2.5, 3, 3.5, 4, 6 and 24 h PM and found that there were no differences in descriptive texture attributes initial hardness and cohesiveness, chewdown hardness, cohesiveness of mass, or number of chews to swallow attributes between broiler fillet meat samples hot-boned at 0.25 h and those deboned at 1.25 h through 3.0 h PM. However, for these attributes, 24.0-h PM meat samples were significantly lower than the samples deboned early (<3.0 h PM). No significant differences were for moisture release between sample times 0.25 h, 2.0 h and 24 h PM. By using the broiler fillets deboned at the same intervals between 0.25 h and 24 h PM as in 2004, Cavitt *et al.* (2005) reported no differences (p>0.05) for moisture release across the deboning times. Deboning time points ranging from 0.25 h to 2.0 h PM did not differ (p>0.05) for any of the sensory attributes; however, the descriptive panelists detected significant differences for the other texture attributes, initial hardness, cohesiveness, chewdown hardness and number chews to swallow, between the early (≤2-h) and 24-h deboned broiler breast fillets. Xiong *et al.* (2006) also noticed that deboning time (between 0.25 to 24 h) was significant for all sensory descriptive textural attributes (initial hardness, cohesiveness, hardness of mass, cohesiveness of mass and number of chews to swallow) except moisture release. Although the descriptors or sensory attributes we used for the sensory descriptive study were slightly different from Owens' laboratory, there were no differences in sensory descriptive texture characteristics between deboning time point 0.75 h and 2 h PM. The 24-h deboned fillets were significantly less cohesive, hard and chewy and had a smaller bolus size. Their muscle mass did not hold together well and required less time to be breakdown than the early-deboned fillets. These results also further suggest that the fillets used in the present study had the typical sensory characteristics measured and published in literature for each deboning time.

Limited sensory evaluation studies with chicken fillets have shown that the deboning-time effect on flavor profiles of chicken fillets varied with experiments. Lyon and Lyon (2000) investigated sensory differences in broiler breast meat due to electrical stimulation, deboning time and marination and reported that the time of breast muscle removal (2 h or 6 h PM) had no effect on the flavor attributes brothy, chickeny, bloody, cardboardy, sweet, salty, sour and bitter evaluated by the trained panel. Lyon *et al.* (2003) measured effects of postchill deboning time, 2, 4, 8 and 24 h (about 2.75, 4.75, 8.75 and 24.75 h PM, respectively), on the sensory profiles of broiler breeder hen breast meat and concluded that deboning time did not have a significant effect on any of the eight flavor attributes. Zhuang *et al.* (2009) studied the effect of chilling method on sensory descriptive profiles of cooked broiler breast meat and found that there were no differences in 8-flavor attributes between the hot-boned samples and samples deboned 4.75 h PM. However, Liu *et al.* (2004) carried out analysis of sensory characteristics of chicken breasts deboned at 2, 4, 6 and 24 h PM and found that there was a reduction in two (cardboardy and wet feathers) out of 8 sensory flavor attributes from 2 to 24 h PM. Effects of aging (for poultry breast meat, it is similar to the deboning time) on meat sensory flavor characteristics have been reported with other meat products. Spanier *et al.* (1997) investigated the effect of postmortem aging on beef meat flavor quality and found that during the post-mortem aging there was a gradual decline in the flavor descriptors beefy, brothy, browned/caramel and sweet typically associated with desirable flavor. On the other hand, the undesirable aromatic flavor descriptors, painty and cardboard and the taste descriptors, bitter and sour show a moderate rate-of-increase in intensity. Gorraiz *et al.* (2002) found that aging of beef increased characteristic flavor and aftertaste. Bruce *et al.* (2005) reported that beef aroma and fatty flavor increased with aging. Marks *et al.* (1998) found that aged ostrich meat provided higher liking scores for flavor compared with lesser aged ostrich. Our present study, in agreement with the previous published discovery (Liu *et al.*, 2004), also showed that deboning time, or aging time on bones, can significantly affect flavor characteristics of chicken fillets. Breast meat deboned 24 h PM taste significantly less cardboardy than the hot-bone meat and sweeter than either the hot-boned or 2-h deboned samples.

In the last few decades, production of deboned poultry meat has rapidly increased due to the need for convenience by fast food industry and retail consumers. For the deboned poultry meat, when it is removed from bones, or deboning time, has significant quality and economic impacts. Several researchers have reported that meat harvested prior to the completion of rigor mortis (about 4 h PM) results in unacceptable toughness (Lyon and Lyon, 1991; Cavitt *et al.*, 2004; 2005; Xiong *et al.*, 2006). Carcasses provide the time necessary for rigor mortis development and production of tender meat acceptable to consumers (Lyon *et al.*, 1985; Dawson *et al.*, 1987; Lyon and Lyon, 1991). However, delayed deboning results in higher cost for the processing plant in terms of extra storage space and added refrigeration (Lyon *et al.*, 1989) and millions-of-dollars-worth yield loss (Hirschler and Sams, 1998). Therefore, early-deboning practice still draws a lot of interests from poultry processors. For example, many plants are currently still deboning immediately out of the chiller as early as 1.5 to 2.0 h postmortem, regardless of recommended aging times (>4 h PM) (Owens, 2007).

Dr. Kang of the University of Michigan recently developed a method applicable on an industrial scale for taking hot muscles from poultry carcasses prior to chilling and claimed that the hot boning practice can minimize processing time, increase throughput, induce slice integrity, improve slice yields and save energy, cooling space and maintenance costs (Thornton, 2010). The further investigation of sensory profile differences between hot-bone and 2-h deboned and between hot-boned and 24-h boned fillets can provide poultry processors first-hand and essential information about how those practices affect the meat quality perceived by consumers. The present data show that there were no differences in sensory descriptive flavor and texture profiles between hot-boned and 2-h deboned broiler fillets, suggesting that consumers would probably not be able to perceive any flavor and texture differences between these fillets, or that hot-boning and deboning immediately after chilling will not make any difference in flavor and texture of cooked broiler fillets. Our results also for the first time demonstrate, in addition to the differences in texture between early-deboned ($\leq$2 h PM) fillets and late-deboned (24 h PM) fillets, that there was the difference in the flavor between the hot-boned fillets and 24-h deboned samples. Hot-boning could result in negative flavor, more cardboardy and less sweet, as well as negative texture properties of boneless skinless broiler fillets.

Conclusion: There were no differences in sensory descriptive flavor profiles between hot-boned and 2-h cold-deboned broiler fillets, indicating that the cooked hot-boned and 2-h deboned broiler pectoralis major have similar flavor (consumers would probably not be able to perceive any differences between these 2 early deboned samples). However, the sensory descriptive flavor profile of 24-h cold-deboned broiler breast fillets was significantly different from those of either hot-boned or 2-h cold-deboned samples, suggesting that the cooked fillets cold-deboned 24 h PM have measurable differences in flavor from either hot-boned or 2-h cold-deboned products. The 24-h deboned fillets taste less cardboardy than the hot-boned products and sweeter than either the hot-boned or 2-h cold-deboned products. Deboning time less than 24 h PM does not affect flavor characteristics chickeny, brothy, barnyard, bloody, salty, sour and bitter of cooked broiler fillets.

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