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The effect of cooking method and cooked color on consumer acceptability of boneless pork chops (#515)Lauren T. Honegger¹, Erin E. Bryan¹, Taylor K. Ruth², Anna C. Dilger¹, Dustin D. Boler¹¹ University of Illinois, Animal Science, Urbana, US; ² University of Illinois, Agricultural Communications Program/Food Science and Human Nutrition, Urbana, US**Introduction**

For the pork industry to be successful, pork products must meet consumer demands for quality. It is important to remember the consumer makes the final estimation of quality for all meat products. Therefore, consumer perception of meat quality is important and helps to guide the type of research that meat scientist need to focus on. Making pork tender, juicy, and flavorful is influenced by several quality factors that can occur before, during, and after the harvest process. Previous data indicated that visual color, marbling, and ultimate pH may affect meat quality traits, but do not appear to have an effect on consumer acceptability of boneless pork chops. However, lowering the final internal cooking temperature from 71°C, the previous recommended temperature, to 63°C increased the percentage of consumers rating of tenderness (81.25%), juiciness (70.61%), flavor (39.83%), and overall acceptability (61.82%). However, it is unclear whether, when able to visualize differences in cooked color, consumers will continue to prefer pork chops cooked to 63°C. Additionally, the current study used an increasingly popular method of cooking, sous-vide. One limitation with sous-vide cooking is the appearance of less done pork, potentially causing consumers to be more resistant to cooking pork to the recommended degree of doneness. Sous-vide cooking does not provide the same appearance and may not have the same flavor profile as grilled pork due to the lack of browning. Therefore, the objective was to determine the effect of cooking method and degree of doneness on consumer eating experience of pork chops when consumers were allowed to observe differences in cooked color under white lighting. The hypothesis was that when consumers were able to visualize cooked color, they would rate pork cooked to 63°C less acceptable than chops cooked to 71°C due to historical perceptions of pork degree of doneness. Additionally, consumers would find sous-vide chops less acceptable due to the lack of browning compared to grilled chops.

Methods

Sensory procedures for all consumer evaluations were reviewed and approved by the University of Illinois Office for the Protection of Research Subjects. Loins were purchased from a commercial abattoir at 1 d postmortem, vacuum packaged, aged until 10 d postmortem, and then frozen. Frozen pork loins were cut into 3.2 cm thick chops. Loin origin was maintained for each chop such that consumers were served 4 chops originating from the same loin. Frozen chops were vacuum packaged and allowed to thaw at approximately 4°C. Pork chops were cooked to either 63°C or 71°C using either an

open-hearth grill or an immersion cooker sous-vide device. After cooking, chops were removed from the heating source and cut to expose the internal cooked surface. Cooked color was measured with a Minolta chroma meter to determine instrumental color (lightness, L*; redness, a*; yellowness, b*). Chops were cut into 1 cm × 1 cm × 3.2 cm sections and served to 132 consumers. Consumers were seated in a breadbox style sensory booth room under white light to allow for cooked color appraisal. Each consumer was provided 4 samples (grill/63, grill/71, sous-vide/63, sous-vide/71). Consumers used a 9-point Likert-type score system to determine tenderness, juiciness, flavor, and overall acceptability. Cooked color data were analyzed using the MIXED procedure of SAS using the model including cooking method, degree of doneness, and their interaction. Sensory data were organized as a percentage of responses and analyzed using the GLIMMIX procedure of SAS to determine the effects of cooking method, degree of doneness, and their interaction.

Results

Chops cooked to 63°C (4.10, 9.08) were more red and less yellow ($P = 0.01$) than chops cooked to 71°C (3.82, 9.39). Consumers rated a greater percentage ($P < 0.001$) of chops cooked sous-vide to 63°C as tender (82.82%) and acceptable (60.34%) compared with all other cooking method and degree of doneness combinations. There were no differences ($P = 0.06$) in the percentage of chops rated tender of when cooked to 71°C between those sous-vide (33.07%) and grilled (22.42%). Additionally, there were no differences ($P = 0.06$) in the percentage of chops rated acceptable when cooked to 71°C between those sous-vide (26.35%) and grilled (28.63%). For juiciness, consumers rated a greater ($P < 0.01$) percentage of chops cooked to 63°C as juicy (44.37%) compared with those cooked to 71°C (14.78%) but ratings as juicy did not differ between cooking methods. For flavor, consumers rated a greater ($P < 0.01$) percentage of chops cooked to 63°C flavorful juicy (34.61%) than those cooked to 71°C (24.31%). Contrary to the expectation, ratings as flavorful did not differ between cooking methods ($P = 0.88$).

Conclusion

A greater percentage of consumers rated chops cooked to 63°C as tender juicy, flavorful, and overall more acceptable compared with chops cooked to 71°C. Even when consumers were able to assess cooked color, they preferred chops cooked to 63°C. Chops cooked sous-vide had a greater percentage of consumers rating chops as tender and overall acceptable. The lack of browning on chops cooked sous-vide did not compromise eating quality of chops.

Notes

	Degree of doneness			Cooking method			P-value		
	63°C	71°C	SEM	Sous vide	Grill	SEM	DOD	Method	DOD × Method
Observations, n	48	48		48	48				
Lightness, L* ¹	77.70	77.41	0.29	77.58	77.52	0.29	0.48	0.89	0.54
Redness, a* ¹	4.10	3.82	0.09	4.13	3.79	0.09	0.01	0.03	0.88
Yellowness, b* ¹	9.08	9.39	0.08	9.07	9.40	0.08	0.01	0.01	0.09

¹L* measures darkness to lightness (greater L* indicates a lighter color), a* measures redness (greater a* value indicates a redder color), and b* measures yellowness (greater b* value indicates a more yellow color).

Table 2:
Effects of degree of doneness (DOD) and cooking method on instrumental color of cooked pork chops

	Sous vide		Grill			P-value		
	63°C	71°C	63°C	71°C	SEM	DOD	Cooking method	DOD × Method
Consumer tenderness								
Not tender	1.39 ^c	15.95 ^{ab}	10.00 ^b	22.03 ^a	4.26	< 0.0001	< 0.01	0.05
Neutral	15.91 ^b	50.00 ^a	51.52 ^a	54.55 ^a	4.35	< 0.0001	< 0.0001	< 0.001
Tender	82.82 ^a	33.07 ^{bc}	37.66 ^b	22.42 ^c	4.68	< 0.0001	< 0.0001	< 0.001
Consumer juiciness								
Not juicy	1.47 ^c	34.77 ^a	14.89 ^b	27.85 ^a	4.70	< 0.0001	0.01	< 0.01
Neutral	42.52	53.94	50.89	51.65	4.55	0.17	0.49	0.23
Juicy	55.83 ^a	10.87 ^d	33.47 ^b	19.80 ^c	4.90	< 0.0001	0.62	< 0.001
Consumer flavor								
Not flavorful	16.00	26.05	16.77	18.31	4.27	0.12	0.38	0.26
Neutral	45.21	51.30	51.30	54.34	4.58	0.30	0.30	0.73
Flavorful	38.15	22.10	31.23	26.65	4.81	0.01	0.88	0.16
Overall acceptability								
Not acceptable	2.22 ^c	22.75 ^a	12.01 ^b	21.21 ^a	4.14	< 0.0001	0.02	0.01
Neutral	37.15	50.06	48.55	49.30	4.50	0.12	0.22	0.16
Acceptable	60.34 ^a	26.35 ^c	38.60 ^b	28.63 ^{bc}	4.87	< 0.0001	0.04	0.01

^{a,b} Least square means within a row among main effects lacking a common superscript differ ($P < 0.05$)

¹Values reported are a percentage of responses for each of the interaction means

²Consumers used a 9-point Likert-type score system where scores 1 through 3 were considered not tender, not juicy, not flavorful, or unacceptable. Scores 4 through 6 were considered neutral for tenderness, juiciness, flavor, and overall acceptability. Scores 7 through 9 were considered tender, juicy, flavorful, and acceptable.

Table 1:
Effect of degree of doneness (DOD) and cooking method on consumer sensory traits of pork chop

Notes