

ENDPOINT TEMPERATURE AND VARIABILITY IN PORK AND BEEF COOKED TO VARYING DEGREES OF DONENESS USING TWO DIFFERENT COOKING METHODS

D. Shirey^{1*}, E. Bryan¹, J. Redifer¹, B. Harsh¹, and A. Dilger¹,

¹Animal Sciences, University of Illinois, Urbana-Champaign, IL, USA,

[*dshirey2@illinois.edu](mailto:dshirey2@illinois.edu)

I. OBJECTIVES

The objective was to determine endpoint temperature (EPT) and Warner-Bratzler shear force variability differences in pork and beef cooked to varying degrees of doneness using grilling and sous vide.

II. MATERIALS AND METHODS

Ten beef *semitendinosus* muscles were cut into four 2.54-cm steaks ($n = 40$) and aged for 21 d. Fifty-one pork loins were cut into four 2.54-cm chops starting at the 10th rib each loin ($n = 204$) and aged for 7 d. Steaks and chops were randomly allotted within whole muscle to 4 treatments: grilled or sous vide to 63°C, or grilled or sous vide to 71°C. An analysis of variance (ANOVA) precision immersion cooker (ANOVA Applied Electronic, Inc., San Francisco, CA) in 18 L of water, and a Farberware Open Hearth grill (model 455N; Walter Kidde, Bronx, NY) were used. Sous vide chops and steaks remained in the water bath for 90 min to complete cooking. A thermocouple was inserted into the geometric center of each grilled chop or steak. When thermocouple readings reached the allotted EPT, chops or steaks were removed from the grill. Regardless of cooking method, 2 handheld thermometers were inserted into each end of the chop or steak after cooking to determine actual EPT. Chops and steaks were cooled to room temperature before 6 cores were excised parallel to the muscle fibers and analyzed for Warner-Bratzler shear force. Data were analyzed using two-way ANOVA with originating *semitendinosus* or loin muscle and cook day as blocking factors. Least-squares means were separated using the PDIFF option in the MIXED procedure of SAS (SAS Institute Inc., Cary, NC).

III. RESULTS

Among pork chops cooked to 63°C, the 2 recorded EPT within grilled chops differed by 4.05 degrees but differed by only 0.23 degrees in sous vide chops ($P < 0.01$). When cooked to 71°C, the 2 recorded EPT within grilled chops differed by 4.16 degrees but differed by only 0.21 degrees in sous vide chops ($P < 0.01$). Among chops cooked to 63°C, average recorded EPT of grilled chops deviated 9.46 degrees from target temperature, whereas recorded EPT of sous vide chops deviated 1.57 degrees ($P < 0.01$). When cooked to 71°C, average recorded EPT of grilled chops deviated 8.90 degrees from target temperature, whereas recorded EPT of sous vide chops deviated 1.69 degrees ($P < 0.01$). Among beef steaks cooked to 63°C, the 2 recorded EPT within grilled steaks differed by 3.08 degrees but differed by only 0.26 degrees in sous vide chops ($P < 0.01$). When cooked to 71°C, the 2 recorded EPT within grilled steaks differed by 2.97 degrees but differed by only 0.48 degrees in sous vide chops ($P < 0.01$). Among beef steaks cooked to 63°C, average recorded EPT of grilled steaks deviated 4.04 from the target temperature, whereas recorded EPT of sous vide steaks deviated 0.34 degrees ($P < 0.01$). When cooked to 71°C, average recorded EPT of grilled steaks deviated 5.64 degrees from target temperature, whereas recorded EPT of sous vide steaks deviated 0.64 degrees ($P < 0.01$). Sous vide pork chops were more tender at 63°C than grilled chops but

less tender at 71°C ($P \geq 0.06$). There were no differences between cooking methods in tenderness of beef steaks at either temperature ($P \geq 0.49$).

IV. CONCLUSION

Overall, these data indicate that using sous vide results in less EPT variability in both pork and beef cooked to varying degrees of doneness.

Keywords: endpoint temperature, grilling, sous vide, variability