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Meat and Muscle Biology™

Evaluation of the Changes in Composition of Pork Chops During Cooking

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Objectives

The objective was to determine the change in extractable lipid concentration during cooking of boneless pork chops to different endpoint temperatures. Intramuscular fat (IMF) concentration of pork chops changes during the cooking process when chops are cooked to 63°C, water is lost thereby concentrating extractable lipid. When chops are cooked to 71°C, water is lost, but it was hypothesized that lipid is lost as well. This would result in less variability in IMF of cooked chops compared with raw chops. This reduction in variability may explain the lack of sensory perception differences between chops with substantial marbling and chops with little marbling. This is important because consumers use marbling to make purchasing decisions. The hypothesis was that the range in IMF would be lessened after cooking due to moisture loss and potentially lipid loss at higher cooking temperatures. Ultimately, the variation in IMF in cooked pork chops would be less than that of fresh pork chops.

Materials and Methods

Pork loins (152 total) were used by cutting 3 consecutive chops from each loin. Chop 1 was evaluated raw (not cooked), chop 2 was cooked to 63°C, and chop 3 was cooked to 71°C before evaluation for IMF. These chops were divided into 3 separate bins based on raw IMF percentages. The low group consisted of chops with an IMF percentage equal to or less than 3%, the average group consisted of IMF percentages between 3 and 4% and the high IMF group consisted of chops with an IMF greater than 4%. Moisture and IMF were determined using duplicate 10-g samples from each chop. Samples were dried and IMF was determined with the chloroform-methanol solvent method. Cook loss was calculated by weighing chops before and after cooking. Warner-Bratzler Shear Force (WBSF) was determined by shearing 5 cores from each chop. Data were analyzed using a one-way ANOVA with the fixed effect of IMF level. Means were separated using a probability of difference statement and considered significantly different at $P < 0.05$.

Results

Raw high IMF chops (4.94%) had greater ($P < 0.0001$) IMF than average IMF chops (3.51%). Raw average IMF chops (3.51%) had greater ($P < 0.0001$) IMF than low IMF chops (2.47%). High IMF chops cooked to 63°C (5.59%) had greater ($P < 0.0001$) IMF than average IMF chops cooked to 63°C (4.17%). Average IMF chops cooked to 63°C (4.17%) had greater ($P < 0.0001$) IMF than low IMF chops cooked to 63°C (3.39%). High IMF chops cooked to 71°C (6.12%) had greater ($P < 0.0001$) IMF than average IMF chops cooked to 71°C (4.55%). Average IMF chops cooked to 71°C (4.55%) had greater ($P < 0.0001$) IMF than low IMF chops cooked to 71°C (3.88%). Additionally, WBSF was not different ($P \geq 0.32$) among high, average or low groups when cooked to 63°C or 71°C. Cook loss was not different ($P \geq 0.31$) among high, average, or low groups when cooked to 63°C or 71°C. However, WBSF (2.77 kg) and cook loss (18.70%) was less in chops cooked to 63°C than when cooked to 71°C (3.10 kg, 23.37%).

Conclusion

The hypothesis was that the range and variability in IMF would be lessened after cooking due to moisture loss and potentially lipid loss at higher cooking temperatures. This was not the case and the differences in IMF percentages persisted even after cooking. Furthermore, WBSF and cook loss did not differ among chops categorized as high, average, and low IMF categories. Ultimately, IMF percentage of raw or cooked chops did not affect tenderness.