SENSORY EFFECTS OF HICKORY, CHERRY, AND MESQUITE WOOD USED TO GENERATE HIGH AND LOW TEMPERATURE SMOKE FOR AMERICAN-STYLE BARBECUE PORK RIBS

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I.   OBJECTIVES

The study objective was to determine differences in flavor, color, aroma, and acceptance of smoked pork ribs using descriptive and consumer sensory analysis.

II.   MATERIALS AND METHODS

Cherry, hickory, and mesquite wood were used to create high- (HT) and low-temperature (LT) smoke treatments. Pork ribs, Institutional Meat Purchase Specifications 416A ($n = 246$), were cooked and smoked using one of 2 Enviro-Pak MP-2500 ovens (Enviro-Pak, Clackamas, OR). The HT smoke treatments denoted as cherry high, hickory high, and mesquite high were created using a log burning smoke generator. LT smoke treatments denoted as cherry low, hickory low, and mesquite low were generated using a wood chip burning smoke generator. HT smoke combustion temperature was controlled between 540°C and 650°C, with LT smoke combustion temperatures being controlled between 260°C and 315°C. All smoke treatments were coupled with an identical 4-h thermal process (30 min at 63°C, 30 min at 71°C and 3 h at 88°C; maintaining a 35% relative humidity for all stages). Fully cooked ribs were chilled prior to color measurements (L^*, a^*, b^*) being recorded. Racks of the same treatments were then vacuum packaged 3 to a bag and stored for 5–7 d at 3°C, prior to sensory panel evaluation. All treatments were evaluated by descriptive analysis by highly trained panelists ($n = 8$), following Sensory Spectrum® methods. Consumer acceptance test utilized prescreened barbecue consumers ($n = 205$) who were divided into primed consumers ($n = 103$), for whom wood smoke treatment was revealed prior to samples being served, and unprimed consumers ($n = 102$), for whom treatment was not revealed prior to being served.

III.   RESULTS

Principal component analysis of trained panelists and color data coupled with external preference mapping suggested that mesquite treatments were associated with higher L^* and b^* values, higher smoke aroma, lower fruity/cherry flavor, lower sweet taste perception, and lower overall liking scores compared to cherry and hickory wood treatments. Analysis of variance and penalty analysis from consumer acceptance data suggested that both wood type and smoke temperature were significant ($P < 0.05$) determinants of overall liking, smoke flavor liking, appearance/color liking, and aroma liking. The highest preference was for hickory and cherry woods, as well as the HT smoke treatments for all wood types. Priming had no impact on consumer liking/acceptance scores ($P > 0.05$). When consumers were asked follow-up questions related to smoke flavor characteristics, they were generally unable to identify descriptors for specific smoke flavors of different treatments. Primed consumers more aptly assigned differentiating features to different wood type treatments. This signals that consumers may have underlying assumptions about different wood sources.

IV.   CONCLUSION

Trained panelists effectively distinguished flavor differences due to wood type and smoke temperature used to produce American-style barbecue pork ribs. Temperature of smoke generation appears to impact flavor liking of smoked meats, with HT smoke resulting in higher consumer acceptability scores. Unprimed consumers show low ability to differentiate flavor characteristics of specific wood used for smoking. Primed consumers are able to describe smoke flavor differences, signaling opportunities for labeling/marketing of smoked meats.