EFFECTS OF BONE AND SUBCUTANEOUS FAT ON THE YIELD AND PHYSICAL-CHEMICAL TRAITS OF DRY-AGED BEEF

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I. OBJECTIVES

Compared to wet aging, dry aging is considered a costly process, and requires strict control of cooling conditions and larger spaces in chambers. Bone and subcutaneous fat could reduce weight loss during dry aging, preventing liquid evaporation from the lean. So, the present study aimed to evaluate the individual and combined effects of bone and subcutaneous fat on total yield and physical-chemical traits of dry-aged beef from grass-fed zebu cattle.

II. MATERIALS AND METHODS

Eight paired, bone-in strip loins from grass-fed zebu steers (~30 mo old; ~290 kg of carcass weight; ~6.0 mm of subcutaneous fat thickness) were collected. Each loin was cut in the middle, and each half-loin was assigned to one of the 4 treatments: bone-in with subcutaneous fat, bone-in without subcutaneous fat, boneless with subcutaneous fat, and boneless without subcutaneous fat. The loin sections were aged for 21 d (2°C and 70% relative humidity). After aging, the evaporation and trimming losses and total yield were determined. After trimming, the loins were cut into steaks and analyzed for surface water activity (crust), internal pH and moisture content, shear force, and instrumental color stability during retail display up to 9 d (with no lights). The experimental design was a 2 × 2 factorial (bone-in and boneless; with and without fat). The data obtained were statistically analyzed using Statistica Version 10.0 by two-way analysis of variance. Color results were analyzed by SAS version 9.2 (SAS Institute Inc., Cary, NC), using the PROC GLIMMIX procedure with bone, fat, and time as a fixed factor and carcasses as a random factor. When significance ($P < 0.05$) was indicated, LSMEANS and DIFF functions were used to separate the means.

III. RESULTS

No interactions between bone and subcutaneous fat were found for evaporation, trimming, and yield traits, and for the pH, surface water activity, moisture content, shear force, and color attributes ($P > 0.05$). Boneless samples showed higher evaporation (22.76% ± 0.96%) and trimming losses (18.18% ± 0.65%) and lower yield (40.79% ± 1.42%) compared to bone-in samples (15.63% ± 0.76%, 8.16% ± 0.55%, and 49.77% ± 1.15%, respectively). Similarly, samples without subcutaneous fat had higher evaporation (21.81% ± 1.23%) and trimming losses (14.64% ± 1.53%) and lower yield (41.64% ± 1.46%) compared to samples with subcutaneous fat (16.58% ± 0.88%, 11.70% ± 1.21%, and 48.92% ± 1.46%, respectively). Shear force (3.25 ± 0.25 kgf) and pH (5.44 ± 0.01) were not affected by the presence or absence of bone or fat ($P > 0.05$). Boneless samples had lower values of moisture (72.97% ± 0.21%) and surface water activity (0.9324 ± 0.0021) than bone-in samples (74.06 ± 0.23 and 0.9409 ± 0.0020, respectively). Samples without subcutaneous fat showed lower surface water activity values (0.9336 ± 0.0024) than samples with subcutaneous fat (0.9396 ± 0.0020). For color, there was a bone and display time interaction ($P < 0.05$) for CIE a^* and b^* parameters. After 6 d of display, bone-in samples had a greater decrease of a^* values, and the b^* values were lower after 8 d, compared to boneless samples.

IV. CONCLUSION

Results indicated that bone and subcutaneous fat had a protective effect on the lean beef, reducing evaporation and trimmings, resulting in a more economically feasible process. However, the presence of bone could lead to a decrease in color stability during retail display.

Keywords: aging, dry-aged, yield