Consumer interest in health benefits of forage-finished beef has led to increased product demand. To date, little information on sensory acceptability and chemical characteristics of rib-eye steaks from forage-finished steers. Rib-eye steaks from 3 forage-fed steers (S1 (bermudagrass+nregistras), etc.); S2 (bermudagrass+nbreakage+nbreaks, etc.); S3 (bermudagrass+nbreakage+nsoybeans+nbrown middles sojum, etc.) and one steer (commercial steer), were cooked by grilling and/or 2-side grilled, were evaluated for chemical composition and microbial safety. Sensory acceptability and microbial analysis was performed by trained and untrained assessors. Data were analyzed using ANOVA-Mixed, 0.05). C (New) was higher for PUFA (52.2-29,4%) and lower protein (49.4% vs. 73.5-74.4%), dry weight basis) contents compared with S1 and S2. S1 and S3 had higher omega-3 (49.0-55 vs. 0.096), lower omega-6/omega-3 ratio (5.21-81 vs. 10.07), and lower PUFA (3.41-77 vs. 8.4%) contents than C, thus exhibiting a healthier fatty acid profile. Concerning cooked steaks, the two cooking methods did not caused significantly different in liking scores. Juiciness and OL scores of C steaks (both cooking methods) and S3(Grilling) were not significantly different. Purchase intent (after health benefits of forage-finished steaks was informed) increased from 62-073 to 69-88-5%. The mean drop of liking scores was -1.00 to -0.50 to -2.0 on the 5-point OL scale, respectively. When cooked steaks were not good enough and tender-enough. Cooked and raw rib-eye steaks were free of E. coli. This study demonstrated that forage-finished steaks are potentially healthier than grain-fed commercial steaks and have market potential toward Hispanic population.

INTRODUCTION

Numerous studies have demonstrated the need to increase intakes of polyunsaturated fatty acids (PUFA), especially those being omega-3 (n-3) in foods for infants and adults (Raddo et al. 2007). The balance of n-3 to n-6 PUFA is an important determinant in decreasing the risk coronary heart disease. The n-3/n-6 ratio can be greatly modified by feeding animals grass/grain mixture diets. The objective of this study was to evaluate the availability of health benefits, chemical characteristics, and microbial safety of rib-eye steaks from forage-finished steers and one commercial steer cooked by grilling and/or 2-side grilled using Hispanic consumers. In addition to this, acceptability of selected frozen rib-eye steaks was also assessed.

MATERIALS AND METHODS

Steers, feeding systems, and rib-eye steaks: Steers were blocked into nine groups (3 steer/group) and each group was randomly assigned to one of three forage feeding systems (Table 1). Two steers per group (18 steers) were selected and harvested. Six steers from each steer (left and right) of carcass (18 steers) were used for two steaks. Right side steaks were randomly selected for the freshly harvested beef consumer study (first study) and left side steaks were stored during 5 months at -20 °C for the second study. Treatments to evaluate were rib-eye steaks from S1, S2, S3, and one commercially available grain-fed rib-eye steaks (C, USDA Choice grade, Winn-Dixie, Baton Rouge, LA).

Proximate, fatty acids and microbiological analyses of different rib-eye steaks: Analyses were done following AOAC standard procedures.

Consumer studies of different rib-eye steaks: For both studies (freshly harvested and grain-fed steaks), Hispanic consumer acceptance (sensory observation) and the first study consumers (untrained raters) were used. OAR and fat thickness were evaluated by a five-point hedonic scale. Based on their own preferences, willingness to pay for foraged-beef, and degree of doneness. Two cooking procedures were used: "2-side grilling" and "ripping" (grilling/ripping). After heating to approximately 120 °C, the steaks were refrigerated for 72 h, then re-heated to 90 °C before the cooking procedure. A Balanced Incomplete Design, Plan 11.10 (t = 8, k = 4, r = 7, b =14, N=112 for the first study and N=51 for the second study) answered questions on evaluation of the product appearances, their sensory characteristics, juiciness, tenderness, and overall liking. Consumer rated the steaks in the order in which they were presented using a 9-point hedonic scale. Consumers were also asked to rate the intensity of juiciness and tenderness using the just-about-right scale (JAR) with 3 categories (not enough, just about right, and too much). Consumer determined overall acceptability and purchase intent (1 of each product), based. On sensory liking, using the binomial scale.

Statistical analyses: All data were analyzed at ANOVA using the SAS software S-3.19 ANOVA was used to determine significant differences among steaks followed by the Tukey's studentized range statistic (Tukey). Duncan's multiple range test were used to compare means. One-way ANOVA with Tukey's honestly significant difference (LSD) was used to determine mean differences in characteristics of the products and variables.

RESULTS

Consumer acceptability of different cooked rib-eye steaks (freshly harvested beef): For all sensory attributes, no significant differences were found between cooking methods except for Can 3, where the grilling method had a higher mean score compared to 2-sided grilled. For overall appearance and overall beef flavor, no significant differences were found (P = 0.05) among steak treatments regarding the mean consumer acceptances. For juiciness, tenderness and overall liking; C (2-sided grilling and grilling) and S3(grilling) presented higher mean scores compared to other treatments. Differences among forage-finished steaks treatments could be due to differences in sensory panels or quality of the greenhouse raising. The purchase intent of all cooked steaks treatments was greater than 60%. Overall liking of S3 and S4 was negatively affected by the lack of juiciness and/or tenderness. Conversely, for C, lean 21-23% of the participants considered the steak not juicy enough and less than 16.36% considered the steaks to be tender enough. The attributes tenderness, juiciness, and overall liking were significantly correlated (ranging from 0.66 to 0.83) (Figure 1) of the linear discriminant functions.

Consumer acceptability of different cooked rib-eye steaks (grain-fed beef): For all sensory attributes, no significant differences were found between cooking methods for Can 3 where the grilling method had a higher mean score compared to 2-sided grilled. For overall appearance and overall beef flavor, no significant differences were found (P = 0.05) among steak treatments regarding the mean consumer acceptance scores. For juiciness, tenderness and overall liking; C (2-sided grilling and grilling) and S3(grilling) presented higher mean scores compared to other treatments. Differences among forage-finished steaks treatments could be due to differences in sensory panels or quality of the greenhouse raising. The purchase intent of all cooked steaks treatments was greater than 60%. Overall liking of S3 and S4 was negatively affected by the lack of juiciness and/or tenderness. Conversely, for C, lean 21-23% of the participants considered the steak not juicy enough and less than 16.36% considered the steaks to be tender enough. The attributes tenderness, juiciness, and overall liking were significantly correlated (ranging from 0.66 to 0.83) (Figure 1) of the linear discriminant functions.

DISCUSSION

CONCLUSIONS

Two cooking methods did not cause significant differences in liking scores. Purchase intent was affected by the lack of the health benefits of forage-finished steaks. The acceptability of forage-finished beef was not affected by the frozen storage.

The study demonstrated that forage-finished steaks are potentially healthier than grain-fed commercial steaks and have market potential toward Hispanic population.

Table 2 Mean values* for the proximate and fatty acid analyses of the rib-eye steaks

Table 3 Mean acceptance scores for overall appearance and overall flavor of the rib-eye steaks and their positive purchase intent (%) based on sensory analysis

Table 4 Mean acceptance scores for sensory attributes of rib-eye steaks cooked by the grilling method (frozen stored during 5 months)

Table 5 Mean acceptance scores for sensory attributes of rib-eye steaks cooked by the grilling method (frozen stored during 5 months)

Table 6 Pair-wise within categorical structure (r) describing variables that underlie group differences

Figure 1 Penalty plot on Overall liking regarding the Juiciness and Tenderness of the rib-eye steaks*

Figure 2 Sensory differences and chemical characteristics of healthy rib-eye steaks from forage-finished steers.
Sensory acceptability and chemical characteristics of healthy rib-eye steaks from forage-finished steers

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