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Prediction Equations to Estimate Cutability from Beef Carcasses Produced in Costa Rica

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Objectives

For years the Livestock Corporation of Costa Rica (Corporacion Ganadera, CORFOGA) has been gathering extensive cut-out data with an aim to establish a primary segregation of carcasses by sex class and then by yield grades. Despite the efforts of CORFOGA and associated academic groups, no reports were found on prediction equations for estimating cutability of Costa Rican beef carcasses. Hence, data from 292 carcasses, representing cattle produced in different regions of Costa Rica under similar extensive conditions (fed pasture/forage-based diets) representing different Bos indicus-influenced breed types and 2 sex classes (156 bulls, 136 heifers or cows) were used to develop equations to estimate yield of fabrication products (bone-in and boneless cuts) and co-products (bone and fat trimmings).

Materials and Methods

The independent variables (predictors) considered for the regression analysis were: carcass weight (CWEIGHT), kidney fat (KIDNEY), carcass length (CLENGTH) leg perimeter (LEGPER), back fat thickness (BACKFAT), external fat amount and distribution score (FINISH), loin eye area (LEA), and Achilles tendon length (LTENDON). Models were developed to predict total closely-trimmed, valuable boneless cuts (TVC) in kg [TVCKG] and percentages [TVC%]); total closely-trimmed, bone-in and boneless cuts (TC) in kg [TCKG] and percentages [TC%]), bone yield percentage (PBONE), and fat trim yield percentage (PFAT). Statistical analyses included descriptive tests, correlations, residual and multiple linear regression.

Results

Unexpectedly, fatness indicators (FINISH AND BACKFAT) were not significantly associated with TVC or TC yields, probably due to the usual hot fat trimming applied during carcass dressing at the Costa Rica harvesting plant. Sex class had low (ca. 2%) to moderate (ca. 66%) influence on TVC (in kg or %), TC (in kg or %), PBONE and PFAT. Most of the variation (50% or more) in TVC, TC, BONE, and FAT could not be explained by its simple linear regression over any of the 13 carcass traits considered as potential predictors. None of the equations for predicting percentages of TVC, TC BONE and FAT showed R^2 coefficients with high numerical values. The equations which explained the highest proportion of the variability in yield of products and co-products were: TVC%: 44.375 – 1.067 (KIDNEY) - 0.052 (CLENGTH) + 0.069 (LEGPER; *R*2 0.259; Mallow´s-Cp: 3.19; CME 17.36). TVCKG: 18.741 + 0.414 (CWEIGHT) - 3.254 (KIDNEY) - 0.835 (LTENDON; *R*2 0.953; Mallow´s-Cp: 4.00; CME 17.36). TC%: 70.551 + 0.663 (LEA; *R*2 0.334; Mallow´s-Cp: 1.13; CME 3.03). TCKG: 8.579 + 0.628 (CWEIGHT) - 4.159 (KIDNEY) - 0.633 (LTENDON; *R*2 0.968; Mallow´s-Cp: 4.00; CME 29.64). BONE%: –0.021 + 0.394 (CWEIGHT) + 0.394 (LTENDON) - 1.639 (BACKFAT; *R*2 0.303; Mallow´s-Cp: 4.00; CME 2.78). PFAT: –0.167 + 0.058 (LEGPER) + 0.567 (FINISH) - 0.148 (LTENDON; *R*2 0.190; Mallow´s-Cp: 4.00; CME 1.58).

Conclusion

Given that the equations to predict percentages of TVC, TC, BONE, and FAT did not show sufficient predictive capacity, future studies should consider to avoid the lack of variation in fatness indicators because of the carcass fat trimming procedure occurring in several Costa Rican packing plants. Although an eventual Costa Rican beef carcass grading program could consider the yield of cuts in absolute terms (kg) it is not recommended given the overwhelming, biased influence of carcass weight.

