

CONSTRUINDO SABERES, FORMANDO PESSOAS E TRANSFORMANDO A PRODUÇÃO ANIMAL

PREDICTION OF BODY WEIGHT AND ANIMAL GROWTH IN BEEF CATTLE UTILIZING 3D IMAGES

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Body weight is one of the most important variable measured in animal production. An automated, assessment of body weight (BW) could be used to monitor growth curves in beef cattle without causing stress to animals. The objective of this study was to predict BW of beef cattle using 3D images. Two hundred and thirty-four Nellore cattle images were collected and used to develop the models. Data collection was divided in four phases, Weaning at 244 days of age and 202.3 Kg (\pm 27.1), Stocker at 457 days of age and 213.9 Kg (\pm 25.1), Initial Feedlot at 590 days of age and 334.5 Kg (\pm 29.2) and Finish Feedlot at 763 days of age and 449.5 Kg (\pm 47.5). The collection time of each image was 15 seconds and 10 frames were obtained for each animal. The image was segmented and 27 features were automatically extracted, including body volume, dorsal area, dorsal length, width dorsal in 6 points, height dorsal in 6 points, Back Curvature in 2 points and 10 Descriptive Fourier measures. These variables were then used to develop four models: 1) Multiple Linear Regression (MLR), 2) Least Absolute Shrinkage and Selection Operator (LASSO), 3) Partial Least Squares (PLS), and 4) Artificial Neural Network (ANN). To validate the models were performed cross-validation Leave-One-Out. The biometric features automatically extracted were consistently associated with body weight. All linear models presented for four phases to good fit to body weights. Weaning: (MLR: $R^2 = 0.49$, LASSO: $R^2 = 0.59$, PLS: $R^2 = 0.72$ and ANN: $R^2 = 0.63$). The PLS was the best model (Mean Bias = -0.01 kg, and RMSEP = 14.59 kg). Stocker: (MLR: $R^2 = 0.45$, LASSO: $R^2 = 0.71$, PLS: $R^2 = 0.69$ and ANN: $R^2 = 0.71$). The ANN was the best model (Mean Bias = 0.68 kg, and RMSEP = 13.42 kg). Initial Feedlot: (MLR: $R^2 = 0.45$, LASSO: $R^2 = 0.85$, PLS: $R^2 = 0.96$ and ANN: $R^2 = 0.89$). The PLS was the best model (Mean Bias = 0.00 kg, and RMSEP = 5.50 kg). Finish Feedlot: (MLR: $R^2 = 0.62$, LASSO: $R^2 = 0.79$, PLS: $R^2 = 0.84$ and ANN: $R^2 = 0.82$). The PLS was the best (Mean Bias = 0.84 kg, and RMSEP = 18.66 kg). Results indicate that image analysis can be used as a potential tool for prediction of body weight in beef cattle and monitoring animal growth.

Keywords: ANN, LASSO, MLR, PLS

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