Effect of divergence in residual feed intake on feeding behavior, blood metabolic variables, and body composition traits in growing beef heifers

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Abstarc :

This study examined the relationship of feed efficiency andperformance with feeding behavior, blood metabolic variables,and various body composition measurements in growing beef heifers.Individual DMI and growth were measured in yearling Limousinx Holstein-Friesian heifers [n = 86; initial BW = 191.8 (SD= 37) kg] fed a TMR diet comprising 70:30 concentrate:corn silageon a DM basis (ME of 2.65 Mcal/kg of DM; DM of 580 g/kg) for82 d. Meal duration (min/d) and meal frequency (events/d) werecalculated for each animal on a daily basis using an Insenteccomputerized feeding system. Physical measurements as well asultrasonic fat and muscle depths were recorded on 3 equallyspaced occasions during the experimental period. Blood sampleswere collected by jugular venipuncture on 4 equally spaced occasionsand analyzed for plasma concentrations of IGF-I, insulin, leptin,and various metabolites. Phenotypic residual feed intake (RFI)was calculated for all animals as the

residuals from a multipleregression model regressing DMI on ADG and midtest $BW^{0.75}$. Overall,ADG, DMI, feed conversion ratio (FCR), and RFI were 1.51 (SD= 0.13), 6.74 (SD = 0.99), 4.48 (SD = 0.65), and 0.00 (SD =0.48) kg/d, respectively. Residual feed intake was positivelycorrelated with DMI (r = 0.47) and FCR (r = 0.46), but not withADG or midtest BW. Positive correlations (ranging from r = 0.27to r = 0.63) were estimated between ultrasonic measures of finallumbar fat and lumbar fat

accretion over the test period andDMI, FCR, and RFI. The inclusion of gain in lumbar fat to thebase RFI model increased R^2 (0.77 vs. 0.80) value for the degreeof variation in DMI not explained by midtest BW and ADG alone.The Pearson rank correlation between RFI and carcass-adjustedRFI (RFI_c) was high (r = 0.93). From the plasma analytes measured,NEFA (r = −0.21; $P < 0.05$) and ?-hydroxybutyrate(r = 0.37; $P < 0.05$) concentrations were correlated withRFI. Plasma leptin (r = 0.48), glucose:insulin (r = −0.23),NEFA (r = −0.32), and ?-hydroxybutyrate (r = 0.25)were associated with FCR. However, systemic IGF-I and insulinwere unrelated ($P > 0.05$) to any measure of feed efficiency.The feeding behavior traits of eating rate, daily feeding events,and nonfeeding events were positively correlated ($P < 0.05$)with RFI and RFI_c. This multifactorial study provides new informationon some of the biological processes responsible for variationin feed efficiency in beef cattle.

Key Word :
beef cattle, body composition, feed efficiency, feeding behavior, plasma analyte