Relationships between residual feed intake and feedlot profitability, growth performance and carcass traits in Brahman cattle

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The definition of strategies to improve the herd feed efficiency has been shown to be fundamental in the selection of beef cattle, resulting in economic advantages which in turn are necessary to the sustainability of the production system. However, it is also necessary to investigate the impacts of selection for improved feed efficiency in other economic relevant traits such as feedlot performance and carcass traits. Therefore, the aim of this study was to evaluate the relationships between residual feed intake (RFI), profitability, feedlot performance and carcass traits in Brahman cattle. Twenty-four Brahman young bulls from the Uberbrahman Performance Test, carried out between 2011 and 2012, in Uberlandia, MG, Brazil were evaluated. The cattle were 19-month old and 370 kg of initial body weight (BW) in average, at the beginning of the feed efficiency test. The animals were subjected to a 14-d adaptation period and had the dry matter intake (DMI) and average daily gain (ADG) measured in individual pens during the following 54-d period. Cattle received a total mixed ration containing (TMR) 73.5% TDN and 14.5% CP (dry basis) and they were weighed each 14 d to calculate ADG as the regression of BW against the weighing dates. Ultrasound carcass scanning was also performed in the beginning and in the end of the test period to determine ribeye area (REA), backfat thickness (BFT), rump fat thickness (RFT), marbling score (MAR) and the ratio (RTO, ratio between ribeye height and width). Based on DMI, BW and ADG, the feed conversion rate (FCR), the gross feed efficiency (GFE), the RFI, the residual daily gain (RDG) and the residual intake and gain (RIG) were calculated as the feed efficiency traits. The profitability and the production cost were calculated, taking into account the current local (September 2012) TMR (R$/kg DM) and carcass (R$/@) prices. The cattle were divided into three RFI classes, representing the low-RFI class (high feed efficiency, RFI<-0.5*standard deviation), medium-RFI class (intermediary feed efficiency, +0.5*standard deviation<RFI<-0.5*standard deviation) and high-RFI class (low feed efficiency, RFI>+0.5*standard deviation). Low-RFI cattle showed lower DMI in BW percentage than medium- and high-RFI ($P<0.05$; 2.42 vs. 2.70 vs. 2.87%BW, respectively). There were no differences across RFI classes for mid-test BW and ADG ($P>0.05$). The Low-RFI class also had the better FCR, GFE and RIG ($P<0.05$); however, the RFI classes did not differ for RDG ($P>0.05$). A difference of R$1.62 d^{-1} was observed between Low-RFI (R$0.29 d^{-1}) and High-RFI (R$-1.33 d^{-1}) classes ($P<0.05$). This differences was mainly due to the lower DMI observed for Low-RFI cattle. The initial and final REA, BFT, RFT, MAR and RTO did not differ across RFI classes ($P>0.05$). The selection of Brahman cattle for improved feed efficiency may result in greater profits without compromising carcass quality.

Keywords: animal breeding, *Bos indicus*, feed costs, growth, ultrasound