

ABSTRACTS: 34TH ANNUAL MEETING OF THE BRAZILIAN EMBRYO TECHNOLOGY SOCIETY (SBTE)

AI and IATF

Evidence of negative relationship between reproductive performance and feed efficiency in Nelore (*Bos indicus*) heifers submitted to TAI

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The objective of this study was to evaluate phenotypic relationships between fertility traits and feed efficiency in Nelore (*Bos indicus*) heifers submitted to TAI. A total of 149 Nelore heifers [11.2±1.3 months of age, body weight (BW)= 249.6±23.3 kg and body condition score (BCS)= 2.8±0.03 (1-5 scale)] from HoRa (MS state, Brazil) were used. Individual feed intake was monitored using the Intergado efficiency automated feeding system (Intergado®, Brazil) for 90 days to estimate the residual feed intake (RFI). Heifers were synchronized to receive TAI 70 days after starting feedlot. At random day of the estrous cycle (without previous synchronization; D0), heifers received an intravaginal device with 0.6g P4 (Fertilcare 600®, MSD) associated with 2mg EB (Fertilcare Sincronização®, MSD). At the same time, BW and BCS were evaluated and the presence of CL was detected by US (DP-2200Vet, Mindray®). Also, longissimus Muscle Area (LMU) and subcutaneous rib fat thickness (RFAT) were estimated via US (SSD 500, Aloka®). On D8, device was removed and heifers received 0.5mg PGF (Ciosin®, MSD), 0.5mg of EC (Fertilcare Ovulação®, MSD) and 200IU of eCG (Folligon®, MSD). Heifers were painted with chalk on their tailheads, and removal of chalk on D10 was used as an indication of estrus. TAI was performed 48h after device removal. Pregnancy diagnosis was done by US 30 days after TAI, heifers not pregnant were assigned to a second TAI, following the same procedure already described. Statistical analysis was performed by GLIMMIX procedure of SAS® 9.4. At the end of feedlot, heifers were classified as low RFI (good feed efficiency; -1.21±0.16 kg DM/d, n=75) and high RFI (1.47±0.08 kg DM/d, n=74). On D0, heifers with low RFI or high RFI had similar average BCS (3.00±0.02 vs. 3.05±0.03; P=0.12), BW (323.8±3.0 vs. 325.4±2.7kg; P=0.69) and cyclicity rate [9.3% (7/75) vs. 14.9% (11/74); P=0.18]. Moreover, LMU did not differ among groups (Low RFI= 52.0±0.7 vs. High RFI= 51.3±0.7cm²; P=0.42). However, the RFAT was lower in heifers with good feed efficiency (Low RFI) when compared with High RFI (4.87±0.2 vs. 5.36±0.2 mm; P=0.01). Heifers with low RFI expressed less estrus than high RFI [68.0% (51/75) vs. 82.4% (43/74); P=0.01]. There was a tendency for lower pregnancy per AI (P/AI) in Low RFI heifers at 1st TAI [Low RFI= 50.7% (38/75) vs. High RFI= 59.5% (44/74); P=0.08] and at 2nd TAI [Low RFI= 19.4% (7/36) vs. High RFI= 36.7% (11/30); P=0.10]. Finally, the cumulative P/AI (1st+2nd TAI) was 13 percentage points lower for Low RFI heifers [Low RFI= 61.3% (46/75) vs. High RFI= 74.3% (55/74); P=0.02]. Although the RFI did not impact phenotypic characteristics as BCS, BW, LMU and cyclicity rate, heifers with high feed efficiency (Low RFI) had lower RFAT and cumulative P/AI compared with high RFI. The results showed a negative relationship between reproductive performance and feed efficiency in Nelore heifers, which must be considered within the framework of the entire beef enterprise.