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Effect of two different feeding strategies on prepubertal Nelore Heifers' growth performance and oocytes and in vitro embryo production

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The younger the embryo donors, the greater the impact on breeding programs, since it promotes a reduction in the interval between generations, which positively influences the genetic gain in cattle herds. It is known that oocytes from pre-pubertal heifers and calves have a different composition from the oocytes of cows, because they have different enzymatic and metabolic activity, besides changes in the composition of proteins and hormones, which leads to a lower oocyte competence for in vitro embryo production. In this context, the objective of the study was to investigate the effects of two nutritional plans on Nelore pre-pubertal heifer growth performance and development of follicles, oocytes quantity and quality, as well as in vitro embryo production. Thirty four Nelore heifers (experimental unit) with average initial age of 8.5 months were used throughout the experiment in a completely randomized design, distributed in two treatments: T1- nutritional diet with pasture and 650 g of concentrate with 21.9% of crude protein and 79.1% of total digestible nutrients per day; T2- nutrition diet with pasture and 1.8 kg concentrate with 21.7% of crude protein and 80.8% of total digestible nutrients per day. Withers height and body weight of all animals were measured monthly. Subcutaneous fat deposition was measured at the end of the study by ultrasonography. Heifers were aspirated every 15 days without prior follicular wave synchronization for 4 months. Immediately before OPU, all follicles were quantified and follicles above 3 mm were punctured. The oocytes were subjected to IVF with semen from the same bull with known fertility. Oocytes from adult females from slaughterhouses were fertilized as control group. The animals from treatment 2 showed greater growth performance than the animals from treatment 1, where it was observed greater height at the withers (1.37 ± 0.09 m vs 1.33 ± 0.03 m), monthly body weight gain (0.650 kg and 0.550 kg), fat subcutaneous rib thickness (3.7 ± 0.58 mm vs 3.11 ± 0.48 mm) and subcutaneous rump thickness (5.23 ± 0.56 mm vs 4.11 ± 0.99 mm). This higher growth performance did not affect the population of follicles on the surface of the ovaries, but influenced the number of retrieved oocytes (87.3 ± 25.73 vs 129.17 ± 35.17 oocytes for T1 and T2, respectively; $p=0.04$), number of viable oocytes (71.33 ± 20.87 vs 98.16 ± 30.80 oocytes for T1 and T2, respectively; $p=0.038$) and number of blastocysts in D7 (16.67 ± 12.50 vs 25.66 ± 15.54 embryos for T1 and T2 respectively; $p=0.0176$). There was no difference in the blastocyst rate between T2 and control with oocytes from slaughterhouse female adult (25.11% vs 37.11% ; $p>0.05$), but T1 was lower than the control (21.43 vs 37.16 ; $p = 0.0264$). Prepubertal heifers usually present a greater number of follicles available for aspiration, but in vitro embryo production in this category is lower than in adult animals. In this study, it was observed that embryo production of prepubertal heifer group that received more concentrated feed was equal to the control group with adult cows. This information demonstrates that nutritional supplementation contributes to the body development and reproduction of pre-pubertal Nelore heifers. Financial support: SEG Embrapa and CNPQ.

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