

to be compact good COC (>3 layers of cumulus cells) than compact regular COC (1-3 layers of cumulus cells) (66.7 v. 31.0% respectively;  $P < 0.05$ ), along with a higher number of transferable embryos on Day 7 (60.0 v. 23.8%, respectively;  $P < 0.05$ ). In conclusion, wood bison oocytes collected during the anovulatory season from non-superstimulated, non-synchronized bison and matured *in vitro* using portable incubators were competent to develop to the morula and blastocyst stages following IVF and culture. These results are important for future plans that require transporting oocytes from remote collection sites to the IVF laboratory, particularly with respect to the effectiveness of commercial maturation media which does not require CO<sub>2</sub> supplementation.

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### 134 Effects of Gas Tension During Culture upon Development of Bovine Embryos from Beef (Nellore) and Dairy (Girolando) Breeds

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Culture of bovine embryos is a critical step during *in vitro* embryo production (IVEP) and, as such, has been the focus of numerous studies on cattle IVEP. Improvements of culture conditions to mimic the *in vivo* maternal microenvironment involves studying the optimal gas tension for pre-implantation embryonic development. In the commercial conditions, there is great variability in results, in part because of the difference between breeds and donors. The objective of this study was to evaluate the effects of culture in high or low oxygen tension upon the development of embryos from a crossbred dairy breed (Girolando F<sub>1</sub>; Gir × Holstein) and a beef *Bos indicus* breed, Nellore. We collected data from an IVEP commercial operation located in a tropical area of southeastern Brazil (Minas Gerais State) from February to May 2017. The study was designed in a 2 × 2 factorial arrangement of treatments: 2 O<sub>2</sub> tensions during culture (5%, low O<sub>2</sub> v. 20%, high O<sub>2</sub>) and 2 breeds (Nellore, beef v. Girolando F<sub>1</sub>, dairy). Thus, the following 4 groups were studied: Nellore-high O<sub>2</sub> ( $n = 86$  donors), Nellore-low O<sub>2</sub> ( $n = 107$  donors), Girolando F<sub>1</sub>-high O<sub>2</sub> ( $n = 114$  donors), and Girolando F<sub>1</sub>-low O<sub>2</sub> ( $n = 110$  donors). Outcome variables were the number of cleaved embryos 72 h post-insemination (hpi), cleavage rate relative to the total number cumulus–oocyte complexes (COC) put in culture, number and percentage of blastocysts 192 hpi relative to the structures kept in culture. Variables that were not normally distributed were transformed using the formula  $\log(y + 0.05)$ . Data were analysed using the GLM procedure of SAS (SAS Institute Inc., Cary, NC, USA) for the main effects of gas tension (low v. high O<sub>2</sub>) and breed (Girolando F<sub>1</sub> v. Nellore). Results are shown as mean ± SEM. Gas tension affected the number of cleaved embryos ( $10.52 \pm 0.92$  v.  $8.33 \pm 0.72$  for high and low O<sub>2</sub>, respectively;  $P < 0.01$ ) and cleavage rates ( $40.58 \pm 2.49$  v.  $44.41 \pm 2.88$  for high and low O<sub>2</sub>;  $P < 0.01$  in Nellore), but did not affect these variables in Girolando F<sub>1</sub> donors ( $13.23 \pm 1.33$  v.  $10.76 \pm 0.76$  cleaved embryos, for high and low O<sub>2</sub>;  $P = 0.63$ ;  $58.01 \pm 2.00$  v.  $60.19 \pm 1.97$  cleavage rate, for high and low O<sub>2</sub>;  $P = 0.80$ ). Nonetheless, the number and percentage of blastocysts were not affected by gas tension in either breed. Results for Nellore were  $4.99 \pm 0.56$  v.  $3.51 \pm 0.38$  blastocysts in high and low O<sub>2</sub>, respectively ( $P = 0.051$ ) and  $41.92 \pm 3.91\%$  v.  $39.81 \pm 3.77\%$  blastocysts, in high and low O<sub>2</sub> ( $P = 0.11$ ). For Girolando F<sub>1</sub>, numbers of blastocysts were  $5.84 \pm 0.66$  v.  $4.24 \pm 0.39$  in high and low O<sub>2</sub> ( $P = 0.19$ ) and percentage of blastocysts  $49.14 \pm 2.97\%$  v.  $49.11 \pm 3.40\%$  in high and low O<sub>2</sub> ( $P = 0.46$ ). These results suggest that oxygen tension during culture affects IVEP differently depending on breed. The initial period of culture, recognised as critical in IVEP, seemed more sensitive to high O<sub>2</sub> tension, particularly in Nellore.

### 135 Effect of Different Bovine Breeds on Efficiency of Embryo Production by Ovum Pick-Up-IVF

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Production of bovine embryos by ovum pick-up (OPU)-IVF has increased in recent years. However, numerous factors affect efficiencies of embryo production using this technology. This study was investigated the effects of different breeds on embryo production by OPU-IVF. In total, 98 OPU-IVF sessions were conducted on 41 Holstein and 27 Japanese Black cows from February 2015 to May 2017. The collected cumulus–oocyte complexes (COC) were matured for 22 h. After co-culture of COC with sperm for 6 h, the presumptive zygotes were washed and denuded by pipetting. Those zygotes were then cultured in CR1aa medium supplemented with 5% calf serum for 9 days in a micro-well culture dish. Blastocyst formation rates were analysed at 9 days post-insemination (hpi). The kinetics of embryo development was observed at 27, 31, and 55 hpi. Four factors were considered for selecting embryos to predict pregnancy competence: (1) timing of first cleavage; (2) formation of 2 blastomeres after first cleavage at 31 hpi; (3) absence of fragments after first cleavage at 31 hpi; (4) formation of 8 or more blastomeres at 55 hpi. The quality of blastocysts was compared with the proportions of embryos that were selected based on these 4 factors. Data were analysed by the Chi-squared test with Yates' correction and Student's *t*-test. Total numbers of COC from Holstein or Japanese Black cows were 1330 ( $n = 51$ ) and 1543 ( $n = 47$ ), respectively. However, no differences were observed in the numbers of collected and cultured COC per OPU session between Holstein ( $26.1 \pm 20.1$  and  $21.7 \pm 20.1$ ) and Japanese Black ( $32.8 \pm 24.7$  and  $28.7 \pm 22.7$ ) cows. The percentage of COC linked into Grade 1, 2, or 3 was 47.6, 32.1, and 10.7% for Japanese Black and 45.8, 25.6, and 12.2% for Holstein cows, respectively. The proportion of COC with expanded cumulus cells was significantly higher ( $P < 0.01$ ) in Holstein (12.7%) than in Japanese Black (7.7%) cows. The number of blastocyst and transferable embryo production per OPU session in Holstein ( $7.5 \pm 8.3$  and  $7.3 \pm 7.7$ ) cows was not different from that in Japanese Black ( $10.6 \pm 9.3$  and  $9.8 \pm 9.0$ ) cows. Moreover, there was

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