

Abstracts - 37th Annual Meeting of the Association of Embryo Technology in Europe (AETE)**OPU - IVF and ET**

Oocyte recovery and relationship between quality of oocytes and embryo production in zebu and crossbred dairy cattle

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This study conceived to compare oocyte recovery within breeds of cattle [Gir (Zebu), Sahiwal (Zebu) and Holstein-Friesian Crossbred (HFCB)] and to investigate the relationship between quality of oocytes and embryo production in respective breeds. The study was conceived to reveal the outcome of ovum pick-up and *in vitro* embryo production (OPU-IVEP) in these breeds which is yet sparse. A total of 34 OPU sessions (11, 11 and 12, respectively) were performed in 4 Gir, 4 Sahiwal, and 8 HFCB donors, without hormonal stimulation. OPU-IVEP was performed according to Patel (2020). Before IVM, oocytes were graded as graded according to presence of layers of cumulus cells and homogeneity of ooplasm as described by Viana *et al.* (2004). Blastocyst rate was calculated by dividing the total no. of blastocysts (produced on day 7 & 8) by total no. of oocytes in IVC. The evaluation of stage and grade of embryos were performed as per IETS guidelines (Manual of the IETS, 4th Edition). All the media used for OPU-IVEP were from IVF Bioscience, UK. Sperm separation medium was from FUJIFILM Irvine Scientific, USA. Descriptive statistics were used to calculate the oocyte recovery per OPU, cleavage rate and blastocyst rate in different breeds and overall means were represented as Mean±SEM. Means were compared between different breeds using one-way ANOVA using GLM. All the analyses were performed using SigmaPlot 11. During the 34 OPU sessions, a total of 148, 248 and 301 oocytes (n=697) were recovered from Gir, Sahiwal and HFCB donors, respectively. Overall, significantly (p<0.05) higher percentage of Grade 3 (27.7±4.5) and Grade 4 (38.8±5.6) oocytes were recovered than Grade 1 (6.5±1.4) and Grade 2 (19.3±3.9) oocytes. A total no. of embryos produced after IVEP (n=222, blastocysts rate across breed-35.5%) were 48, 60 and 114 in Gir, Sahiwal and HFCB, respectively. The average no. of oocytes recovered per OPU (overall average 20.5±1.9) in Gir, Sahiwal and HFCB were 13.5±2.3, 22.5±3.2 and 25.1±3.3, respectively. The corresponding cleavage rates observed were 66.5±5.1, 53.0±4.5 and 83.4±2.2%. The average no. of blastocysts per OPU in Gir, Sahiwal and HFCB were 4.4±1.2, 5.4±0.8 and 9.5±1.6, respectively. In all three parameters, values were significantly higher in HFCB compared to Gir (p<0.05). Combined no. of oocytes in Grade 3 and Grade 4 had positive correlation with cleavage rate (r=0.3) and blastocyst rate (r=0.4, p<0.05). **In conclusion**, significantly higher no. of oocytes recovered per OPU, cleavage rate and no. of blastocysts per OPU were attained in HFCB than in Gir. If the oocytes of grades 3 and 4 are processed together with the oocytes of higher grades, there is a chance to produce blastocysts also from the oocytes of lower grades. This is important in the zebu donors in which the total no. of oocytes harvested is less than in the HFCB donors.

Keywords: oocytes grade, blastocyst, cattle breed

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