Impacts of Immunomodulatory Feed Supplementation on Ovum Pick-Up Collections in Beef Cattle

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Assisted reproductive technologies are implemented to improve the efficiency of genetic selection with ovum pick-up (OPU) becoming a popular strategy for obtaining oocytes from genetically elite cattle. However, *in vitro* production (IVP) of embryos from these oocytes remains suboptimal. The focus of this work is to explore schemes for improving oocyte quality of donor females. OmniGen-AF® (OG; Phibro Animal Health Corporation, Teaneck, NJ, USA) is an immunomodulatory supplement formulated to improve stress responses in dairy and beef cattle. Several benefits of OG to fertility have been identified, but limited research has explored how OG may specifically influence OPU efficiency and oocyte quality. We propose that OG supplementation to beef cows will improve oocyte and/or cumulus cell quality and these benefits will improve OPU efficiency. Commercial Angus and Charolais cows (n=7/treatment) were blocked by breed and body condition and sorted into one of two groups: control animals fed a base supplement daily (1 kg cracked corn, 30 g molasses) and OG animals were supplemented daily with the base supplement and 56 g OG. All animals were on pasture with ad libitum access to tall fescue grass, hay, and water. The diets began 28 days prior to the beginning of OPU. Ovulation was synchronized and induced during this period so cows would be at 7-day post-estrus on the first OPU event. Ovum pick-up sessions were completed 2x/week at 3-4 day intervals for 5 weeks. Total follicle numbers and diameters of follicles ≥ 5 mm were recorded at each OPU event. Retrieval rate was evaluated for all punctured follicles (≥ 5 mm). Follicular fluid was collected once weekly from the largest follicle. Cumulus oocyte complexes (COC) were scored (IETS scoring system) and ooplasm quality was scored based on color and granularity. Both datasets were analyzed using the GLM procedure in SAS. The MIXED repeated measures in SAS with type AR(1) covariance structure was used to examine total follicle numbers, greatest follicle size at each collection, average follicle size ≥ 5 mm, number of follicles aspirated, and COC recovery rate. Neither OG treatment, time, nor their interaction influenced the number of non-aspirated (< 5mm) and aspirated (≥ 5mm) follicles and COC retrieval rates. There was a reduction (P=0.05) in the mean diameter of the largest follicle when comparing the OG group with controls (8.37±.35 vs 9.45±.35 mm, respectively). Additionally, mean aspirated follicle size tended to be reduced (P=0.07) with OG supplementation. No effects of OG treatment, time, or their interaction were detected for any of the COC quality measurements. In summary, OG supplementation did not have a positive influence on morphometric assessments of follicle development and oocyte quality. Work is underway to explore whether OG supplementation benefits follicular fluid composition and the ability of COCs to generate IVP embryos. This project was supported by Agriculture and Food Research Initiative Competitive Grant no. 2021-67015-34485 and 2023-67011-40399 from the USDA National Institute of Food and Agriculture, from the Virginia Agricultural Council Project no. 825, and Pratt Research

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