

EFFECT OF CORPUS LUTEUM ON QUANTITY AND QUALITY OF OOCYTES RECOVERED FROM SHEEP OVARIES

SUDHIR KUMAR, UTSAV SHARMA*, SHARAD KUMAR and R.K.BHARDWAJ

Division of Veterinary Gynaecology and Obstetrics, Faculty of Veterinary Sciences and Animal Husbandry,
Sher-e-Kashmir University of Agricultural Science and Technology of Jammu, Jammu-181101, India

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ABSTRACT

The study was undertaken to assess the effect of corpus luteum (CL) on quantity and quality of sheep oocytes. Ovaries were collected from local slaughtered sheep and oocytes were recovered by three methods viz., aspiration, puncture and slicing. Sheep ovaries with CL (n=681) and without CL (n=1119) were utilized for study and numbers of cumulus oocytes complexes (COCs) collected graded and recorded for both type of ovaries. The mean number of good, fair and usable oocytes yield in ovaries without CL were significantly higher ($P<0.05$) than ovaries with CL whereas, poor quality and total oocytes were significantly higher ($P<0.05$) in ovaries with CL compared to other group. The recovery of poor quality oocytes were significantly higher ($P<0.05$) compared to good and fair quality oocytes in ovaries having CL. The number of fair quality oocytes recovered from ovaries without CL was significantly higher ($P<0.05$) compared to good and poor quality oocytes.

Key words: Corpus Luteum, Oocyte, Recovery, Sheep

Presently, *in vitro* embryos production (IVEP) is considered as one of the most important aspects of livestock industry. Large number of oocytes recovery from ovaries of slaughtered livestock as well as their quality is essential requirement for *in vitro* maturation (IVM), *in vitro* fertilization (IVF) and successful production of IVM-IVF embryos. The oocytes recovery and quality varies with the presence or absence of CL on ovaries during estrous cycle and also depends on the reproductive status of the donor, season, species and breed (Izquierdo *et al.*, 2002). Several researchers found that the absence of CL (non-luteal phase) on ovary have significantly higher number of oocytes yield in sheep (Wani *et al.*, 1999; Sofi, 2009; Alsafy and El-Shahat, 2011) and goat (Rahman *et al.*, 2016), contrarily others isolated a lower numbers of oocytes (El-Naby *et al.*, 2013). Therefore, the present study was undertaken to investigate the effect of CL on oocyte yields and quality of oocytes recovered derived from slaughtered sheep ovaries.

MATERIALS AND METHODS

Sheep ovaries were collected from local abattoir within one hour of slaughtering and transported immediately to the laboratory in thermos at 37°C containing sterile normal saline with antibiotic (100 µg/ml streptomycin and 100 IU/ml penicillin). In laboratory, extraneous tissue and overlying bursa were removed to clean the ovaries. Prior to oocytes collection, the ovaries were rinsed in physiological saline and 70% alcohol to minimize the risk of contamination followed by three washings in Dulbecco Phosphate Buffered saline (DPBS) with antibiotics (100 µg/ml streptomycin and 100 IU/ml penicillin). The ovaries were then transferred in a beaker containing holding medium (TCM-199 and FBS 10%). Ovaries were then categorized in two groups. Group 1 ovaries had at least one corpus luteum (CL) on their surface and Group 2 ovaries had no CL on their surface. All

visible follicles were harvested by three different methods viz., aspiration, puncture and slicing and numbers of Cumulus Oocyte complex's (COCs) collected were graded and recorded. Oocytes were graded as good, fair and poor based on layers of cumulus cells and homogeneity of cytoplasm (Wani *et al.*, 2000). Statistical analysis was done using SPSS software version 16.0 (I.B.M). Difference were considered to be significant at $P<0.05$.

RESULTS AND DISCUSSION

The mean number of good (1.50 ± 0.01), fair (1.89 ± 0.02) and usable (Good+Fair) (3.40 ± 0.02) oocytes yield in ovaries without corpus luteum were significantly higher ($P<0.05$) than ovaries with CL (Table 1). The present findings are in agreement with the studies of Sofi (2009) in sheep and Dar (2014) in goat who observed significantly higher number of good, fair and usable oocyte in ovary without CL than with CL.

The recovery of poor (2.53 ± 0.02) quality oocytes was significantly higher ($P<0.05$) compared to good (1.06 ± 0.01) and fair (1.56 ± 0.01) quality oocytes in ovaries bearing CL and fair quality oocytes recovered from ovaries without CL was significantly higher ($P<0.05$) compared to good and poor quality oocytes. However, good and poor quality oocytes did not differ significantly ($P>0.05$) with each other in without CL bearing ovaries. Our study was in agreement with the findings of Wani *et al.* (1999) who also recorded higher number of poor quality oocytes in ovary with CL than without CL ovary. The cause of higher number of poor quality of oocytes in ovaries with CL and fair quality oocytes in ovaries without CL, as presence of CL inhibits the growth of follicles by restriction of gonadotrophin secretion resulting in follicular degeneration (Webb *et al.*, 1999) and increase rate of atresia (Hafez, 1993).

But in absence of CL in non-cyclic female, the negative effect of progesterone might not be functional and estrogen-progesterone remains in balanced level which

*Corresponding author : utsav_shrm@yahoo.co.in

Table 1

Mean number of good, fair, poor, total and usable oocyte recovered from sheep ovaries with or without corpus luteum

S. No.	Ovary characteristic	No. of ovaries	No. of oocytes recovered	Oocyte quality				
				Good	Fair	Poor	Total	Usable (Good+Fair)
1	With CL	681	3513	1.06±0.01 ^{aA} (20.64%)	1.56±0.01 ^{aB} (30.29%)	2.53±0.02 ^{bC} (49.07%)	5.15±0.03 ^b	2.62±0.02 ^a (50.93%)
2	Without CL	1119	5487	1.50±0.01 ^{bA} (30.73%)	1.89±0.02 ^{bB} (38.75%)	1.49±0.01 ^{aA} (30.52%)	4.90±0.03 ^a	3.40±0.02 ^b (69.48%)
	Overall	1800	9000	1.33±0.01 (26.79%)	1.77±0.01 (35.44%)	1.88±0.01 (37.77%)	5.00±0.02	3.11±0.02 (62.23%)

Means with superscripts a, b, c within a column differ significantly at P<0.05

Means with superscripts A, B, C within a row differ significantly row-wise at P<0.05

Figures in parentheses indicate percentage

allows follicular growth and oocytes maturation.

Findings of our study are in accordance with the previous report of El-Naby *et al.* (2013) who also recorded higher oocyte yield in ovaries bearing CL than without CL. The significantly higher total oocyte yield in ovaries with CL might be due to inadvertently use of higher percentage of slicing and puncture techniques for oocytes recovery. However, the present study contradicts with the earlier reports of Alsafy and El-Shahat (2011) in sheep, Asad *et al.* (2016) and Khandoker *et al.* (2011) in buffaloes who recorded higher number of total oocytes in ovaries without CL. Thus on the basis of our results it can be concluded that the presence of corpus luteum have deleterious effect on recovery of usable oocytes from slaughtered sheep ovaries.

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