

CHAPTER VI

SUMMARY AND CONCLUSIONS

The ovary is the master organ of the female reproductive tract. Ovarian follicles and corpus luteum (CL) are the fastest growing tissue in the ovary. The complex form and function of ovary are heightened by their dual role. A better understanding of the reproductive efficiency has been made toward determining how to control ovarian follicular growth; however, mechanisms associated with initiation and growth of follicles, atresia, and formation of CL are not clearly defined. The results of experiments described in this thesis furthered our understanding of controlling ovarian follicular and CL functions in ruminants.

In the present study (Experiment 1), we characterized that 1) immunofluorescence localization of Factor VIII and eNOS were detected in blood vessels of the theca layers of antral follicles, 2) immunofluorescence detection of Factor VIII can be used as a reliable marker of endothelium to quantify vascularity of antral follicles, 3) a greater vascularization and expression of eNOS proteins along with a greater LI in granulosa and theca cells of healthy small and medium follicles were greater than large follicles, and with a greater LI in granulosa and theca cells of healthy were greater than atretic follicles, and 4) vasculature was positively correlated with eNOS expression and the LI of granulosa and theca cells but was negatively correlated with the size of the healthy follicle from the first follicular wave in *Bos indicus*.

With the use of goat ovarian model, we determined the effects of FSH treatment and withdrawal on follicular growth, mitotic activity, oocyte quality, embryo development, and gene expression (Experiment 2). In Experiment 2, we demonstrated the concept that administration of 3 d FSH and 2 d FSH + 1 d W treatments dramatically increased the total number of follicles, total number of healthy oocytes, and granulosa and thecal cell LI in follicles compared with those in the other treatments. Moreover, we showed that the relative abundance of Cx43 and Bcl-2 transcripts in embryos seems to be associated with different developmental competence.

From the results of Experiment 3, there is sufficient evidence to demonstrate that after hCG administration within a TAI protocol and after hCG or GnRH administration on day 5 after TAI, increased accessory CL and plasma P4 concentration on day 12 after TAI. Based on administering of GnRH replacement with hCG in TAI protocol, it was concluded that effectiveness of hCG (GPH and Ovsynch+hCG groups) in inducing ovulation of the dominant follicle, development of original CL or accessory CL, and increasing P4 concentration are similar to that observed in GnRH administration (Ovsynch+GnRH group).

Thus, taken together, these data obtained from this dissertation provide insight of the importance of vasculature, mitotic activity, and expression of eNOS of growing antral follicle. Goat model for induction of follicular growth and atresia is useful for revealing generalized effects of FSH treatment and withdrawal on follicular development and the quality of oocytes and embryos. Lastly, although conception rate to TAI was not differed among treatment groups, the administering of GnRH replacement with hCG in TAI protocol could be applied to increase formation of accessory CL and increase P4 concentration after TAI. The result of this dissertation enables a better informed use of vasculature (CAD, CND, and APC), eNOS expression, and mitotic activity as an indicator of follicular growth and development. Hence, it enables better informed selection of healthy follicle as well as healthy oocyte for use in assisted reproductive technology (ART) programs. Each component of the antral follicle contributes to the microenvironment essential for successful oocyte differentiation and subsequent fertilization. Administration of 3 d FSH and 2 d FSH + 1 d W treatments are able to induce multi-follicular growth and to produce high quality of oocyte. Thus, the selection of oocytes for IVP of high quality might increase the outcomes of ART. Administration of GnRH replacement with hCG in TAI protocol has potential to control both ovarian follicular and CL functions and to increase P4 concentration after TAI. Therefore, our expanding knowledge of ovarian follicular and CL functions during the estrous cycle has given basic and applied information for the ART in ruminants.