FOLLICULAR STATUS AND SUPEROVULATION IN CATTLE: A FIELD TRIAL

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Two experiments conducted under field conditions were done to determine the influence of follicular status (experiment 1) and of follicular alteration (experiment 2) on superovulatory responses. In both experiments, ultrasonography was performed once daily over 4 d prior to gonadotropin treatment (Day 0), on the Day of estrus during superovulation and on the Day of embryo collection to monitor follicular development. Animals were superstimulated between Days 8 and 12 of the estrous cycle with 400 mg Folltropin-V given in decreasing doses over 4 d and luteolysis was induced with 2 injections of cloprostenol (2ml) given at the time of the fifth and sixth injections of Folltropin-V. Data were analyzed by the GLM procedure and Chi square analysis using SAS. In experiment 1, the relationships between follicular status prior to superstimulation and superovulatory responses were examined over 102 superovulation cycles. The diameter of the largest follicle (F1; 13.4 vs 9.8 and 10.1 mm; $P < 0.007$) and the difference between the diameter of the F1 and the second largest (F2) follicles (7.6 vs 4.5 and 3.8 mm; $P < 0.001$) were higher over a 4 d period prior to superovulation in animals yielding a high ($\geq$ 5 embryos) than a medium (3 to 4 embryos) and a low ($\leq$ 2 embryos) number of quality 1 embryos. In these cases, F1 and F1-F2 responses were indicative of a morphologically dominant follicle in the growing and regressing phases in animals yielding low and high numbers of embryos, respectively. The mean number of follicles $\geq$ 7 mm at estrus (19.7 ± 1.7 vs 12.9 ± 1.2) and the mean number of ovulations at time of embryo collection (12.8 ± 0.9 vs 9.6 ± 0.6) were higher ($P < 0.01$) in cows that were superovulated in the presence of a high ($n \geq 6$) than in the presence of a low ($n \leq 5$) number of follicles 4 to 6 mm on Day 0. Furthermore, the mean number of quality 1 embryos was higher (3.2 ± 0.3 vs 1.7 ± 0.5; $P < 0.01$) when superstimulation was initiated in presence of a low ($n \leq 1$) than in presence of a high ($n \geq 2$) number of follicles 7 to 10 mm on Day 0. In experiment 2, follicular status was altered 2 d prior to initiation of superstimulation (Day 0) by an im injection of GnRH (Cystorelin, 200 μg) given with (GnRH-puncture group, n=31) or without (GnRH-no puncture group, n=51) concomitant removal of the largest follicle by follicular aspiration. Responses were compared to those of the control untreated group (experiment 1, n=102). The proportion of animals with a high number ($\geq$ 2) of large follicles ($\geq$ 7 mm) on Day 0 was lower ($P < 0.001$) in GnRH-puncture and GnRH-no puncture groups (mean=19.6%) than in the control group (48%) while the increase in the number of medium size follicles (4 to 6 mm) on Day 0 was greater ($P < 0.06$) in the GnRH-puncture group. During superovulation, the proportion of animals with a high follicular response (i.e., more than 10 follicles $\geq$ 7 mm at estrus) was higher in both GnRH-treated groups than in the control group (81% vs 69 %; $P < 0.04$). Furthermore, the proportion of animals displaying a high ovulatory response (i.e., > 6 CL; 85% vs 30%;) and the mean ovulation rate ($10.6 \pm .9$ vs $6.2 \pm .7$ CLs) were higher ($P < 0.001$) in the GnRH-puncture than in the GnRH-no puncture group. Despite these changes in follicular and ovulatory responses, the mean number of embryos produced did not differ ($P > 0.1$) among treatments (4.35 ± 0.45, 3.71 ± 0.74, and 5.45 ± 0.80 in control, GnRH-no puncture, and GnRH-puncture groups, respectively). This was due primarily to an increase in the mean numbers of unfertilized ova ($p < 0.005$) and of degenerated embryos ($P < 0.06$) in the GnRH-puncture group. Results support the concept that superovulatory responses are improved when superstimulatory treatments are initiated in absence of a functionally dominant follicle and in presence of a large number of recruitable follicles (4 to 6 mm). The beneficial effects of treatment with GnRH and follicular puncture 2 d prior to superstimulation on follicular and ovulatory responses were limited however by an increase in the numbers of unfertilized ova and degenerated embryos. Oocyte competence may be compromised when GnRH is given shortly before superstimulation. (NSERC / Agriculture Canada # CRD 102563)