



## Effects of estradiol-17 $\beta$ on ovarian function and pregnancy in Nelore cows

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### Introduction

Estradiol is capable to induce follicular atresia and recruit a new wave of follicular growth within a known interval (1). Therefore, strategic administration of exogenous estradiol-17 $\beta$  could prevent the presence or action of a dominant follicle (DF) during the critical period for maternal recognition of pregnancy (CP). Estradiol produced by DF plays a key role in triggering luteolysis (2) and preventing gestation in the cow. This study aimed to assess the effects of the exogenous administration of estradiol-17 $\beta$  on ovarian function and its implications on the maintenance of pregnancy in Nelore cows.

### Material and Methods

130 Nelore cows (BW=412.7  $\pm$  33.9 kg and BCS = 5.5  $\pm$  0,5) were treated with the OvSync protocol, which consisted in the administration (IM) of 8 $\mu$ g of Buserelin acetate (GnRH analogous) followed by a 0.150 mg of d-Cloprostenol (PGF<sub>2 $\alpha$</sub>  analogous) seven days later and another Buserelin shot 48h after. Then, cows received nothing else (G<sub>C</sub>; n = 65) or 5mg of estradiol-17 $\beta$  (E<sub>2</sub>) on D<sub>12</sub> after estrus (GE<sub>2</sub>; n = 65). In the 1<sup>st</sup> trial 10 cows from each group were submitted daily to ovarian ultrasonography and determination of plasma progesterone concentration ([P<sub>4</sub>]) since the 2<sup>nd</sup> shot of GnRH until the subsequent natural ovulation. Progesterone concentrations were obtained through a validated RIA and samples were run in the Laboratório de Dosagens Hormonias – LDH of the FMVZ of Universidade de São Paulo. In the 2<sup>nd</sup> trial, the remaining cows (55 each group) were artificially inseminated by appointment (TAI) at 16h after the 2<sup>nd</sup> GnRH administration. Pregnancy rates (PR) were determined by ultrasound.

### Results and Discussion

Estradiol efficiently synchronized the emergency of a new wave (4.0  $\pm$  .69 days) and reduced (P < .05) the time within the CP under the influence of a DF (3.5  $\pm$  .8 and 4.7  $\pm$  .8 days respectively to G<sub>E2</sub> and G<sub>C</sub> from D<sub>15</sub> to D<sub>20</sub>). Interovulatory interval, mean number of follicular waves of development, maximum size reached by corpus luteum, interval from luteolysis to estrus and diameter of preovulatory follicle were not affected (P > .05) by treatment. Cows receiving estradiol<sub>17 $\beta$</sub>  showed maximum [P<sub>4</sub>] 12.0  $\pm$  0.6 days after estrus (P < 0, 01) compared to 13.4  $\pm$  0.6 for control cows. Cumulative value for [P<sub>4</sub>] throughout the luteal phase was also lower (P < 0, 01) to G<sub>E2</sub> (24.2  $\pm$  6.7 ng/mL) compared with 34.8  $\pm$  6.7 ng/mL to G<sub>C</sub>. Luteolysis (when [P<sub>4</sub>] < 1.0ng/mL) took place earlier in cows treated with estradiol (17.0  $\pm$  .57 days) if compared to control (18.2  $\pm$  .57 days) cows. Similarly, estrous cycle length was shortened (19.3  $\pm$  1.78 days) in G<sub>E2</sub> cows as compared to G<sub>C</sub> (23.4  $\pm$  1.38 days). In addition, DF size at luteolysis was too small to ensure the ovulation of a fully developed oocyte for G<sub>E2</sub> cows (7.8  $\pm$  1.75 mm) when compared to the normal value observed for G<sub>C</sub> (9.6  $\pm$  1.75 mm). Pregnancy rates (PR) at TAI were: 34.5% and 5.4% respectively for G<sub>C</sub> and G<sub>E2</sub>. PR at TAI for G<sub>E2</sub> was lower (P < .05) than G<sub>C</sub>. In summary, 5mg of estradiol-17 $\beta$  given 12 days after TAI caused pregnancy termination in the cows and significantly reduced PR. The same protocol given to non-inseminated cows promoted not only atresia of the DF but also induced luteolysis and in the cows. However, three cows (5.4%) were refractory to damaging effects of estradiol, once they maintained their gestation. It is fair to assume that luteolysis did not occur in these cows. It remains to be determined why these cows showed anti-luteolytic response strong enough to ensure the gestation to proceed. It is speculated the role of the conceptus itself in preventing the deleterious action of estradiol-17 $\beta$ . In conclusion despite of the fact that estradiol-17 $\beta$  given on day 12 of estrous cycle was capable to reschedule ovarian function, it also promoted luteolysis, caused embryonic losses and therefore it is not recommended.

### References

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