

Effect of a Single Intrauterine Administration of Recombinant Bovine IFN- τ on Luteal Phase Length in Dairy Cows

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IFN-tau (τ) is a cytokine secreted by ruminant conceptus that has a key role of maternal recognition of pregnancy. IFN- τ prevents luteolysis by blocking oxytocin-induced release of prostaglandin (PG) F_{2 α} . Insufficient secretion of IFN- τ has been suggested to be one of the reasons for early embryo death. The objective of this study was to determine if a single intrauterine administration of recombinant bovine (rb) IFN- τ would delay luteolysis (Experiment 1 and 2) and inhibit oxytocin-induced release of PGF_{2 α} on day 17 of the estrous cycle (Experiment 3) in dairy cows.

In Experiment 1, a single dose (0.2 mg) of rbIFN- τ or bovine serum albumin (BSA) was infused into the uterus of Holstein-Friesian cows (n = 4) on d 13 (d 0 = day of ovulation). In Experiment 2, a single dose (2.0 mg) of rbIFN- τ or BSA was infused into the uterus of Holstein-Friesian cows (n = 6) on d 7. Ovaries were examined by ultrasonography and blood samples for progesterone and estradiol-17 β measurements were taken daily to determine the length of luteal phase and detect ovulation. Body temperature and additional blood samples were also taken 24 h and 10 min before and 1, 3, 6, 12 and 24 h after the infusion of rbIFN- τ or BSA to observe side effects of the cytokine. In Experiment 3, cows (n = 4) received 0.2 mg rbIFN- τ (or BSA) on d 13 or 2.0 mg rbIFN- τ (or BSA) on day 7. Oxytocin (100 IU, i.v.) was injected into each cow on d 17. Plasma samples were collected for the analysis of 13,14-dihydro-15-keto-prostaglandin F_{2 α} (PGFM).

In Experiment 1, the administration of rbIFN- τ slightly extended the length of luteal lifespan with no side effects observed. In Experiment 2, the length of luteal lifespan was longer when rbIFN- τ was given. However, 2.0 mg rbIFN- τ caused an acute rise in body temperature and a decrease in the numbers of peripheral lymphocytes and neutrophils. In Experiment 3, concentration of PGFM increased within 25 min in cows infused with BSA on d 13, while it unchanged in rbIFN- τ -infused cows. On the other hand, the response of PGFM in d 7-rbIFN- τ treated cows varied.

The present study suggests that a single administration of rbIFN- τ into the uterus on d 13 or d 7 may be effective in extending luteal lifespan. Future studies should be carried out to determine a proper dose, timing and route of administration of IFN- τ in order to make clinical application of the cytokine feasible as a means of preventing early embryonic death in cattle.

Keywords: Cattle, bovine IFN- τ , prostaglandin, corpus luteum, early embryonic death