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Brief Communication

Clinical and Endocrine Investigations after Dexamethasone and Prostaglandin Induced Premature Parturition – A Case Report

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Sometimes it is necessary to induce abortion/ parturition in cattle. The most common methods are by injections of either $PGF_{2\alpha}$ (or an analogue) or dexamethasone/ flumethasone. If the induction is performed too early in pregnancy the likelihood of achieving parturition or abortion is low. In an experiment where dexamethasone was used to induce parturition in heifers (*Kask et al.* 2000 ab, *Königsson et al*. 2001), one animal did not respond to the induction and this brief communication is based on that particular animal.

The heifer (Swedish Red and White breed) received 2 injections of dexamethasone (Vorenvet® vet., Boehringer Ingelheim, GmbH, Ingelheim, Germany) at 2½ weeks before expected term with a dose of 20 mg per injection, 24 h in between. Eleven days after the second injection of dexamethasone parturition had not yet occurred. At that time 25 mg prostaglandin $F_{2\alpha}$ (Dinolytic® vet., Boehringer Ingelheim) was given intramuscularly and this was repeated 24 h thereafter.

The general clinical status and occurrence of vaginal discharge were monitored daily until 7 weeks postpartum (PP). Rectal palpation for determining uterine tone and position were performed every third day starting on the day 5 PP. On the same days uterine content, measurements of the diameter of the cervix and uterine horns as well as resumption of the ovarian function were monitored by ultrasonography. Uterine biopsy samples were collected during 6 weeks postpartum for determination of elimination of uterine bacteria.

Jugular vein blood samples for analysis of $PGF_{2\alpha}$ metabolite were collected into heparinised Venoject tubes (Terumo Europé N.V., Leuven, Belgium) every hour starting immediately after first dexamethasone injection and was continued until the end of parturition. After parturition, collection frequency was decreased to 5 samples per day during 8 weeks PP. After centrifugation, about 5 ml of plasma were removed and stored at -20° C until hormone analyses were performed using a radioimmunoassay according to *Granström & Kindahl* (1982) for the PG-metabolite and an enhanced luminescence immunoassay (Amerlite®, Kodak Clinical Ltd, Amersham, England) for the progesterone. For progesterone analysis, 2 samples a day were selected. The duration of the PG re-

lease was calculated using a skewness method (*Zarco et al.* 1984). The plasma levels of PGF2a metabolite were considered to be significantly elevated as long as they exceeded the mean basal value plus 2 SD (line of significance).

The progesterone levels at the start of the experiment were around 20-40 nmol/l (Fig. 1). However from about 3 days after the first dexamethasone injection the levels of progesterone declined and stayed on around 10 nmol/l until the first $PGF_{2\alpha}$ injection 11 days after the first dexamethasone injection. The $PGF_{2\alpha}$ metabolite levels at the start of the experiment were around 100 pmol/l. No change in $PGF_{2\alpha}$ metabolite levels was seen during the first 4 days of the experiment. Then the levels started to increase and reached a maximum of 300 pmol/l 6 days after the first dexamethasone injection. At that time the $PGF_{2\alpha}$ metabolite levels started declining and reached preexperimental levels (100 pmol/l) on day 10 after first dexamethasone injection. This profile contrasts to what is seen after near term induction with dexamethasone when the $PGF_{2\alpha}$ metabolite levels increase in a more continuous fashion (*Königsson et al.* 2001).

Glucocorticoids such as dexamethasone appear to reduce placental secretion of progesterone as early as the fifth month of gestation, but luteolysis does not occur as a result of glucocorticoid treatment until the final month of gestation (*Barth* 1986). The present case supports that statement.

Immediately after the $PGF_{2\alpha}$ injections on days 11 and 12 after the first dexamethasone injection very high levels of prostaglandin metabolite were detected. These elevations originated from the exogenous PGF_{2a} injections. The prostaglandin injections resulted in decreased progesterone levels and the expulsion of a premature calf 6 h after the second PGF_{2a} injection. The calf was alive, but died within 2 h after delivery. The calf was covered with hair and the weight and length of the calf was 10.5 kg and 55 cm, respectively. The stage of pregnancy was estimated to around 7 months. After the induced premature parturition the placenta was retained and was not shed until day 6 PP. Large endogenous PG-metabolite levels were found after parturition and the levels remained high for a period of 10 days PP, but slightly elevated levels were found above the line of significance until day 15 PP. During that period a concomitant pathological uterine discharge was seen. This was similar with the results obtained from cows at full term induction with dexamethasone and prostaglandin (*Kask et al.* 2000abc) and is associated with RFM.

The uterus was atonic during the first week PP, but on day 7 PP after the expulsion of placenta the uterine tonus increased. According to ultrasonographic investigations a large amount of fluid was present inside the uterus during first 12 days PP. After that a successive decrease in fluid content was seen. Despite that there were no visible signs of vaginal discharge after day 28 PP, ultrasound still showed presence of small amount of uterine fluid.

The highest uterine bacterial content was recorded during first 3 weeks PP. No bacteria were detected in the uterus after day 25 PP. The most dominating bacteria found were *Escherichia coli, Arcanobacterium (Actinomyces) pyogenes* and Fusobacterium necrophorum. The bacterial content and elimination is shown in Figure 1.

Based on progesterone levels and ultrasonographic results there were no ovulations during the experimental period, but follicular activity was seen in the ovaries. At the first ultrasonographic examination of the ovaries on day 8 PP the first dominant follicle was found with a diameter of 0.8 cm. In total 3 follicular waves were seen with emergence and regression of dominant follicles during 32 d ultrasonographic

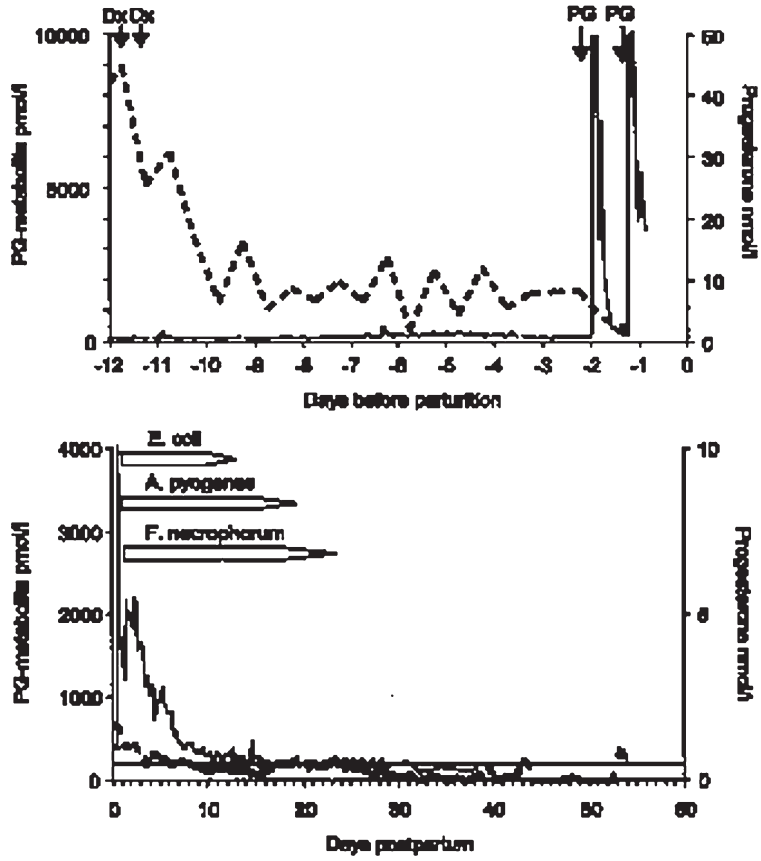

Figure 1. $PGF_{2\alpha}$-metabolite (—) and progesterone (**--**) levels during 12 days before parturition (upper graph) (arrows in the graph denote the time of dexamethasone and $PGF_{2\alpha}$ injections) and $PGF_{2\alpha}$-metabolite and progesterone levels during the postpartum period (lower graph). The horizontal bars in the lower graph denote bacterial elimination time. The horizontal line in the lower graph denotes the line of significance (mean basal value + 2 SD) for the PG-metabolite levels.

sessions. The average length of these waves was 9.1 days and the average size of dominant follicle was recorded to be 1.1 cm.

The time required for completed uterine involution was 27 days in the present study. It was judged to be completed according to following parameters: return of the uterus into its normal location in pelvic cavity, difference in diameters between previous pregnant and nonpregnant horn (1 cm or less) based on ultrasonographic investigations and complete elimination of bacteria. The involution time was also in the normal range for full term delivery in Swedish breeds (*Larsson et al.* 1984). Furthermore there was no difference compared with cows where more full term induction were used (*Kask et al.* 2000abc).

This case report points to a clinical situation,

which is not too uncommon – an animal is induced at too early stage due to wrong breeding records. The dexamethasone alternative was not effective and this is due to the immaturity of the placenta at 7 months of pregnancy. The $PGF_{2\alpha}$ injections were effective in inducing the premature parturition. The clinical and endocrine changes seen before and after this parturition are very similar to the changes seen around full term induction of parturition.

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