CHANGES OF PROGESTERONE PATTERNS AFTER ADMINISTRATION OF ALFAPROSTOL A NEW ANALOG OF $PGF_2\alpha$ IN LATE PREGNANT SOWS

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The initiation and completion of parturition in the sows depend largely on a drop in progesterone production by the corpora lutea. The plasma concentration of this hormone starts falling 48 h before parturition (Molokwu and Wagner, 1973), and it decreases rapidly simultaneously with a rise in the blood concentrations of endogenous prostaglandin $F2_\alpha$ and its metabolites, as well as oestrogens (Nara and First, 1977; Gustafsson et al., 1976).

The administration of $PGF2_\alpha$ to sows close to parturition (111-112th day) induces a reduction in plasma progesterone, thus triggering thechains of events that lead to parturition, which normally occurs 22-30 h after treatment (King et al., 1979).

The purpose of this study was to investigate the luteolytic activity of a new analogue of $PGF2_\alpha$ (alfaprostol) in sows at term (111th day), comparing the fall in progesterone in treated sows with the progesterone profile in sows farrowing naturally. Besides the plasma progesterone concentration, we also compared the intervals between treatment and farrowing, and the number and weight of piglets born.

Thirty sows at term, race LxLW, mean weight 140-160 kg, were divided into three groups of ten. One group was given 2 ml/head i.m. of alfaprostol, equivalent to 2 mg of active ingredient on day 111 of pregnancy. A second group was treated with 2 ml/head i.m. of propylene glycol (excipient) on day 111, and the third group was not treated, and farrowed at term. Blood samples were drawn from the alfaprostol-treated sows at time 0 (before treatment) and every 6 hours thereafter up to 24 h. Blood samples from the sows given propylene glycol were taken at time 0, 24, 36 and 48 h then every 6 h until parturition. Untreated sows were observed from day 111, then from day 113 blood samples were taken every 6 h for 24 h.

Plasma progesterone was determined by radioimmunoassay (RIA) (Abraham et al., 1971).

All the animals treated with alfaprostol farrowed within 29 h (min. 22, max 29). The control groups either injected with the excipient (propylene glycol) or not injected (untreated animals) delivered respectively within 88 h (min. 63, max 88) and 80 h (min. 70 max 80) from the start of observation on day 111 of pregnancy. Our data confirm the recent observations by Cerne & Jochle (1981) that the new analogue of $PGF2_\alpha$, alfaprostol, hastens parturition in swine. The results we obtained were highly significant ($p < 0.001$) as regards the time from treatment to parturition. In the group of animals treated with propylene glycol, there was wider variability regarding the time of the beginning of farrowing, and the mean time from injection to parturition was slightly (4 h) shorter than in the control group (untreated animals). This difference not statistically significant, might in our opinion be attributable to the disturbance caused to the animals during manipulation.

No difference was recorded between the groups regarding the number of piglets born (10.2; 9.9; 10.3), the liverborn (9.8; 9.6; 9.5) and stillborn (0.4; 0.3; 0.6); their mean weight were also close (1.031; 1.021; 1.036 kg).

At the beginning of the trial on day 111 of pregnancy blood progesterone levels in the treated group were between 4 and 10 ng/ml; whereas the progesterone levels in the two control groups on day 113 were 3 - 5.0 ng/ml. The mean blood progesterone concentrations measured 12 h after alfaprostol treatment on day 111 of pregnancy, corresponding to 13 h before parturition were 3.17 ± 0.73 ng/ml. The control groups had progesterone levels 10 - 13 h before parturition of 1.8 ± 0.46 ng/ml (animals injected with glycol) and 2.41 ± 0.27 ng/ml (untreated animals).

These differences in blood progesterone are not statistically significant, showing that only 12 h after administration of alfaprostol there is a drop in plasma progesterone comparable to that occurring during parturition at term; the pattern of reduction of progesterone in the treated animals resembled that of the controls.

CONCLUSIONS

These results show that the use in sows of the new analogue of $PGF2_\alpha$ (alfaprostol) on day 111 of pregnancy induces farrowing within 29 h from treatment, thus reducing the time of the beginning of parturition in a highly significant way compared to the control groups of animals treated with the excipient only (glycol) in which parturition occured within 88 h, or the untreated animals which farrowed within 80 h. No differences were noted between treated animals and controls concerning the number of liveborn and stillborn and their weight, so it would appear that the drug does not interfere with the newborn piglets wellbeing.

The pattern of progesterone decrease in the treated group overlapped that of the controls 24 h before parturition, suggesting that alfaprostol causes luteolysis similar to that of normally farrowing sows.

These results are not different from those obtained with the natural product $F2_\alpha$ which also induces parturition within 24 h (Maffeo et al., 1977). However, alfaprostol did not induce the side-effects typical of natural $PGF2_\alpha$ i.e.: restlessness, sialorrhea and defecation. It would thus appear that the product is very well tolerated in this animal species.

Selected reference: Abrham G.E., Swerdloff R., Tulckinsky D., Odell W. (1971), J. Clin. Endocr., 32, 619; Cerne F., Jöchle W. (1981), Theriogenology, 16, 4, 459; Gustafsson B., Einarsson S., Larsson K., Edquist L.E. (1976), Am. J. Vet. Res., 37, 9, 1018;; King G.J., Robertson H.A., Elliot J.I. (1979), Can. Vet. J., 151, 160; Maffeo G., Socci A., Redaelli G., Casiraghi F. (1977), La Clinica Vet., 100, 780; Molokwu E.C.I., Wagner W.C. (1973), J. An. Sci., 36, 1158; Nara B.S., First N.L. (1977), J. An. Sci., 45 (suppl. 1) 191.