Prostaglandin $F_{2\alpha}$ administration and oxytocin release in the pig and miniature pig

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During parturition there is a complex pattern of maternal hormone release, many of the hormones interacting one with another. Reflex secretion of oxytocin during vaginal distension appears to produce elevated prostaglandin F (PGF) levels (Flint, Forlsing, Mitchell & Turnbull, 1975). On the other hand, prostaglandins may influence the release of oxytocin. Gillespie, Brummer & Chard (1972) reported that infusion of $PGF_{2\alpha}$ stimulated oxytocin release in man, but Prilusky & Deis (1976) could find no such response in anaesthetized rats.

In the present study the effect of an intramuscular injection of $PGF_{2\alpha}$ was studied in four Landrace pigs (weighing 106–108 kg) during dioestrus and four miniature pigs (weighing 45–50 kg) six days post partum. Blood was sampled from an indwelling catheter in one jugular vein at 5–10 min intervals and oxytocin determined in the extracted plasma as described by Chard & Forsling (1976). The young were removed at approximately 09.00 h from the lactating miniature pigs and observations made in all animals for a control period of 60 minutes. An injection of 0.15M sodium chloride containing 1% benzyl alcohol was then given, followed 60 min later by an injection of $PGF_{2\alpha}$ (5 mg) kindly supplied by Upjohn Co., Kalamazoo).

Injection of the saline solution alone had no effect on plasma oxytocin, the concentrations of < 0.4–4.4 μu/ml being similar to those found in the control period. After the injection of $PGF_{2\alpha}$ the animals exhibited marked behavioural changes and defaecated frequently. In one of the miniature pigs in which the uterine electromyograph was recorded using bipolar electrodes implanted on the uterus (Naaktgeboren, van der Weyden, Klopper, Kroon, Schoof & Taverne, 1973) prolonged permanent contraction was seen. Injection of $PGF_{2\alpha}$ also produced an increase in the circulating concentration of oxytocin of 14.2–30.4 μu/ml. These concentrations approach those recorded during parturition (Forlsing, Ellendorff & Taverne, 1977). Prostaglandin can therefore stimulate the release of oxytocin in the conscious pig, but it is not possible to state whether this is a direct effect or related to other changes associated with prostaglandin infusion.

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References

CHARD, T. & FORSLING, M.L. (1976). Bioassay and radioimmunoassay of oxytocin and vasopressin. In *Hormones in Blood,* ed. H.N. Antoniades, pp. 485–516. Cambridge (Mass.), Harvard University Press.

FLINT, A.P.F., FORSLING, M.L., MITCHELL, M.D. & TURNBULL, M.D. (1975). Temporal relationship between changes in oxytocin and prostaglandin F levels in response to vaginal distension in the pregnant and puerperal ewe. *J. Reprod. Fert.,* **43,** 551–554.

FORSLING, M.L., ELLENDORFF, F. & TAVERNE, M. (1977). Pattern of oxytocin release in the miniature pig. *J. Endocr. (in press).*

GILLESPIE, A., BRUMMER, I. CHARD, T. (1972). Oxytocin release by infused prostaglandin. *Br. Med. J.,* **i,** 543–544.

NAAKTGEBOREN, C., VAN DER WEYDEN, G.C., KLOPPER, P.J., KROON, C.H., SCHOOF, A.G. & TAVERNE, M.A.M. (1973). Electrophysiological observations of uterine motility during the oestrus cycle in sheep. *J. Reprod. Fert.,* **35,** 511–518.

PRILUSKY, J. & DEIS, R.P. (1976). Inhibitory effect of prostaglandin $F_{2\alpha}$ on oxytocin release and on milk ejection in lactating rats. *J. Endocr.,* **69,** 395–399.