ENDOCRINE RESPONSE OF THE POST WEANING AND ANESTROUS SOW TO EXOGENOUS ESTRADIOL AND GONADOTROPINS

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The percentage of sows which return to estrus following weaning as well as the fertility of sows are diminished during the summer months in the USA (Hurtgen et al., 1980 a,b). These post-weaning problems appear to be much more evident in primiparous than multiparous sows in confinement. BeVier et. al. (1981) have observed that 61.8% of primiparous sows return to estrus within 2 weeks following weaning while 39.2% fail to exhibit estrus for 14-90 days post-weaning (PW). The objective of this investigation was to determine the dysfunctional component of the hypo-rhalamo-hypophyseal-ovarian (H-H-O) axis which results in prolonged anestrus following weaning of primiparous sows in confinement.

In Study One, crossbred, primiparous sows housed in total confinement were checked twice daily for estrus in the presence of boars from the time of weaning until they resumed estrus activity or until they remained anestrous for >30 days PW. Beginning at 42.8 ± 3.1 days PW, samples of plasma were obtained by vena cava venipuncture at daily intervals for 5 consecutive days and levels of progesterone (P_4) were measured by RIA. Circulating levels remained >6.5 ng P_4/ml plasma in 12 of 44 (27%) and <1.0 ng/ml in 32 sows (73%). These data indicate that while a majority of PW anestrous sows have acyclical ovaries a minority are ovulatory.

In Study Two, 29 primiparous sows which had not shown estrus following weaning and had <1.0 ng P_4/ml plasma were randomly assigned in a 3 x 2 factorial design to treatment with 10 ug estradiol benzoate (EB)/kg BW, 1000 iu Pregnant Mare's Serum Gonadotropin (PMSG)/sow, or 1 ml corn oil plus 1 ml saline (CO/SAL)/sow at 2 days PW (d2) or at >30 days PW (d>30). Samples of plasma were taken by venipuncture at 6-12 h intervals and assayed (RIA) for concentrations of 17β estradiol (E_2), luteinizing hormone (LH), and P_4.

In Figures 1 and 2, the peripheral concentrations of E_2, LH, and P_4 following treatment of the d2 and d > 30 PW sows with EB and PMSG are given. Following the administration of EB circulating levels of E_2 reached maximal levels of 246 ± 69 and 193 ± 45 pg/ml at 12 h. following treatment before declining. This increase was followed by a surge of LH in 4 of 4 d2 and 5 of 5 d >30 sows at 60 and 48 h., respectively. The magnitude of discharge in the two groups was 4.43 ±0.84 and 8.67 ± 3.11 ng LER 786-3/ml. One of 4 d2 and 4 of 5 d >30 sows showed increases in levels of P_4 to >1.5 ng/ml indicating ovulation. Following treatment with PMSG circulating levels of E_2 rose from <20 pg/ml to maximal concentrations of 63 ± 16 and 66± 9 pg/ml at 48-60 and 72-84 h. post treatment, respectively, in d2 and d>30 sows. A surge of LH occurred in 4 of 4 d2 and 6 of 6 d>30 sows at 0-24 h. following peak levels of E_2. Maximal levels of LH were 4.88± 0.56 and 12.73 ± 0.95 ng/ml in the d2 and d>30 sows, respectively. Ovulation as reflected by increases in P_4 levels to >1.5 ng/ml was observed in 4 of 4 and 6 of 6 sows, respectively. Levels of E_2, LH, and P_4 remained <20 pg/ml, <1.5 ng/ml and <1.5 ng/ml, respectively, following treatment of d2 and d >30 sows with SAL/CO. Estrus was observed in 9 of 9 sows treated with EB, 10 of 10 treated with PMSG, and 0 of 8 treated with SAL/CO. No sows conceived to matings following EB while 7 of 10 sows mated following PMSG were diagnosed as pregnant by ultrasound at 45 days post coitus.

In conclusion, differences in the LH responses to EB and PMSG appear to exist between sows at the 2 stages of post-weaning anestrus. Nonetheless, these data indicate that each component of the H-H-O axis of both d2 and d>30 sows is responsive to external endocrine stimuli. It is, therefore, likely that they are also responsive to endogenous hormones. This logic would suggest that integration of the signals between the components of the axis is incomplete or that a trigger required to initiate estrous cyclicity is lacking.

Fig.1 Post Weaning Response of Sows To Estradiol Benzoate

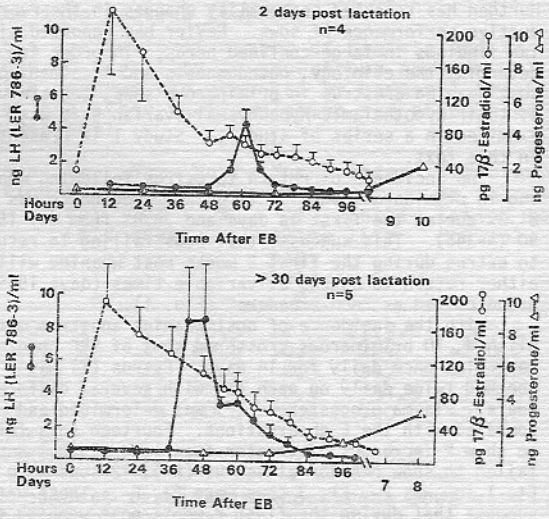
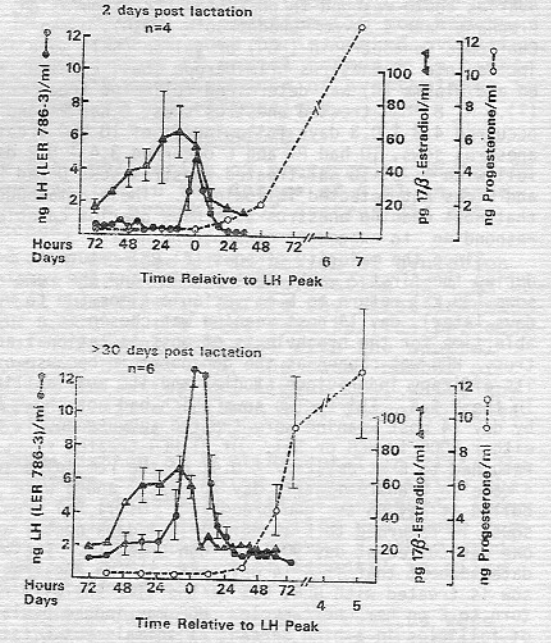


Fig.2 Post Weaning Response of Sows to PMSG



BeVier, G.W., G.D. Dial, B.K. Gustafsson and J.E. Hixon Incidence of Postweaning Anestrus in Primiparous Sows and Responses to Treatment with Exogenous Gonadotropins. Amer. Soc. Ani. Sci., 73rd Annual Mtg, Abstract #426, 1981.

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