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Brief Communication

Patterns of Plasma Oestradiol-17ß in Relation to the Interval from Weaning to Oestrus in Sows

Sows generally are anoestrus during lactation. Weaning the litter normally results in a rapid increase in follicular growth that terminates in oestrus and ovulation. Follicular development after weaning is characterized by an elevation in the blood concentrations of oestradiol-17ß (E_2). Although the post-weaning patterns of E_2 in blood circulation have been reported previously (*Cox & Britt* 1982, *Edwards & Foxcroft* 1983, *Rojanasthien* 1988), the plasma patterns of E_2 in relation to the interval from weaning to oestrus (WOI), to our knowledge, have not been assessed. The purpose of this study was therefore to relate the blood patterns of E_2 to the WOI in sows exhibiting their first oestrus within 10 days after weaning.

Twenty primiparous crossbred (Swedish Landrace x Swedish Yorkshire) sows were brought to the Department of Obstetrics and Gynaecology 4 weeks before expected farrowing. They were kept in individual pens and fed according to the Swedish breeding stock standard (*Göransson* 1984). The number of piglets was adjusted to uniform size with a minimum of 7 piglets per sow within 24-48 h after birth. The sows were weighed within 2 days of farrowing and weaning. Jugular vein catheterization was performed during the fourth week of lactation (*Rodriguez & Kunavongkrit* 1983). All sows were weaned on day 35±2 of lactation. After weaning, oestrous detection was performed in the presence of a boar twice daily at about 0800-0900 and 1500-1600 h. Blood samples were collected in heparinized tubes every 12 h (at 0900 and 2100 h) from 3-5 days before weaning until the appearance of prooestrous symptoms and every 3 h thereafter until oestrus subsided. Samples were immediately centrifuged after collection and plasma was stored at –20°C until assayed. The sows were slaughtered following their post-weaning oestrus, and the reproductive organs were examined to confirm ovulation.

Plasma concentrations of E_2 in the samples were determined by radioimmunoassay technique (*Boilert et al.* 1973, *Kunavongkrit et al.* 1983). The sensitivity of the assay system was 20.6 pmol/l. The inter-assay variations were 16.9 and 18.6% for low and high assay controls, respectively. The intra-assay variation calculated from the precision profile was less than 10% in the ranges between 36.9 and 133.3 pmol/l.

The sows were grouped according to the length of WOI as follow: Gr1: (WOI = 3-4 days, n = 7), Gr2: (WOI = 5 days, n = 7) and Gr3: (WOI = 6-8 days, n = 6). The changes in plasma concentrations of E_2 were studied from the E_2-patterns of individual sows. The pre-weaning level of E_2 was defined as the mean of all values obtained before weaning. An elevation of E_2 after weaning was considered to have occurred when E_2 rose above the pre-weaning level plus 2 standard deviations. The results were analysed by least-square analysis of variance using the General Linear Model procedure (*SAS Institute Inc.* 1985). The model for analysing the between-

group differences in all parameters included the effect of group.

All sows exhibited standing-oestrus with normal ovulation within 8 days after weaning. Changes in plasma levels of E_2 in relation to WOI are presented in Table 1. No significant differences in the number of piglets weaned or body weight loss during lactation were observed between the groups. Pre-weaning levels of E_2 did not differ among the groups of sows. Concentrations of oestradiol measured were, however, just above the detection limit of the assay. If variation in preweaning follicular development existed among the sows, it was too low to be reflected in differences in E_2 concentrations.

All sows in our study showed typical patterns regarding the preovulatory rise in plasma E_2 prior to oestrus. The shorter interval from weaning to the elevation of E_2 in Gr1 and Gr2-sows than in Gr3-sows ($p<0.01$) clearly indicates that follicular development started earlier after weaning in the sows exhibiting the earlier oestrus. The interval from weaning to the start of prooestrus as well as the duration of prooestrus was recently found to be shorter in sows exhibiting oestrus early after weaning than in those coming into oestrus later on (*Rojkittikhun et al.* 1992). The tendency ($p<0.1$) for the interval from the rise in E_2 to the onset of oestrus to be shorter in Gr1-sows in the present study thus corresponds well with the duration of prooestrus. The fact that there were no between-group differences in the duration of the E_2-elevation indicates that follicular maturation after weaning in sows required about the same amount of time regardless of the length of the weaning-to-oestrous interval. Our results indicate that the maximal levels of the preovulatory rise in E_2 and the number of ovulatory follicles were similar among sows exhibiting oestrus within 8 days after weaning.

Consequently, we suggest that differences in the time interval from weaning to the rise in oestradiol among groups of sows were mainly due to factors other than the stage of follicular development or the size of the follicular population at weaning. The differences in hypothalamic and pituitary responsiveness to weaning

Table 1: Clinical data and patterns of plasma oestradiol-17ß (E_2) in relation to weaning-to-oestrous interval (WOI) in primiparous sows exhibiting oestrus within 8 days after weaning[1].

Group	Gr1	Gr2	Gr3
WOI (days)	3-4 (n=7)	5 (n=7)	6-8 (n=6)
No. of piglets weaned	9.0±0.7	9.7±0.7	10.2±0.8
Weight loss during lactation (kg)	20.4±4.5	23.3±4.5	26.8±4.9
Pre-weaning levels of E_2 (pmol/l)	22.9±2.2	23.4±2.2	20.2±2.4
Maximal levels of E_2 (pmol/l)	94.6±6.6	92.0±6.6	89.8±7.2
Interval from weaning to the elevation of E_2 (h)	22.0±7.7[a]	35.6±7.7[a]	76.2±8.3[b]
Interval from the rise in E_2 to the onset of oestrus[2] (h)	68.3±6.5	83.0±6.9	85.0±7.0
Duration of the E_2-elevation (h)	76.6±7.9	89.7±7.9	96.7±8.6
Number of corpora lutea	19.4±1.4	17.5±1.5	18.5±1.5

[1]Data are presented as LSmean±SEM. Values within a row without superscript are not significantly different. Values within a row with different superscripts differ significantly ($p<0.01$).
[2]Values in Gr1 tended to be lower than in Gr3 ($p<0.1$).

and the degree of body weight loss during lactation are probably among the factors involved.

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