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Studies on the Change of Serum LH, FSH and Prolactin Levels in the Puerperal Sow

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돼지에 있어서 分娩前後의 血淸中 LH, FSH 및 Prolactin 水準의 變化에 關한 硏究

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Summary

The Purpose of this study was to determine the serum content of LH, FSH and prolactin. Blood samples collected from day 20 prepartum to 20 postrtum in 8 sows. LH, FSH and prolactin were assayed by radioimmunoassay methods.

LH levels increased from 2.3 mIU/m*l* day 6 prepartum to 5.8 mIU/m*l* by day +2 and remained quite constant thereafter.

The mean serum FSH increased from 7.5 mIU/m*l* day 6 prepartum to 10.0 mIU/m*l* at the time of parturition, but the difference in LH and FSH patterns reported here provide further evidence that the controlling mechanisms for the two gonadotropins are independent.

Prolactin reached a peak mean level of 68.5ng/m*l* at day 0.

Ⅰ. Introduction

No systematic study has, as yet, been reported on the changes in the concentration of LH, FSH and prolactin in the serum of the sow during the puerperal period. In earlier studies, the levels of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) were determined in pituitaries obtained from pigs during the estrous cycle(Parlow et al., 1964), pregnancy and lactation(Melampy et al., 1966). However, the levels of LH in serum from pigs have been determined only in a large pools of blood from which the LH was extracted and bioassayed by the ovarian ascorbic acid depletion bioassay (Anderson et al., 1966). This was a complex procedure and not adaptable to large numbers of samples.

The recent development of radioimmunoassay techniques for LH in cows (Niswender et al., 1969), sheep (Goding et al., 1969) and pigs (Niswender et al., 1970; Rayford et al., 1971; Hallford et al., 1975); for FSH in dairy cows (Hilary Dobson, 1978), ovine (Kragt and Cons, 1973) and pigs (Rayfor et al., 1974) and for prolactin in rats (Linkie et al., 1972), sheep (Davis et al., 1971), rabbit (McNeilly and Friesen, 1978) and pigs (Brinkely et al., 1972) has made it possible to determine levels of these hormones in small aliquots of blood.

The purpose of the present study was to concurrently analyze serum LH, FSH and prolactin during the peripaturient (20 days prepartum to 20 days postpartum) in the sow in order to determine the sequence or relationship of changes in these gonadotropic hormones during this period.

Ⅱ. Materials and Methods

Animals used in this study consisted of 8 sows (Duroc ♂×(Large White ♂×Landrace ♀) F_1♀ Matings). The sows were maintained under normal conditions of husbandary throughout the experimental period. Every other day blood samples were collected beginning 20 days prior to expected farrowing date (based on 114 day gestation length) and continuing through day 20 postfarrowing. Especially, for prolactin blood samples were taken from all sows 30 min. after the nursing period. For blood withdrawal the animals were restained by a snout rope when in farrowing crates, or in a hog squeeze at other times. Blood samples were obtained by inserting a 21-gauge, hypodermic needle attached to 10 cc syringe through surface veins in the ear. Blood samples were permitted to sit at 4°C for 3 hours and then was centrifuged at 500g at 4°C for 20 min. Serum was collected and stored frozen until ready for assay.

The concentration of LH, FSH and prolactin in serum was determined by radioimmunoassay. The principles of RIA and the basic techniques and procedures for developing and validating a radioimmunoassay system have been reported (Berson and Yalow, 1964) and these techniques and procedures were followed with minor modifications. The technical procedure used in setting up this RIA i.e., buffer systems, incubation times, counting technique, etc., have been described (Odell et al., 1967; Layford et al., 1974; Brinkely et al., 1972).

Ⅲ. Results

The mean serum LH levels are shown in table 1 and figure 1. The concentration of LH in serum from 20 days before until the day of parturition ranged between 1.6 mIU/m*l* and 5.8 mIU/m*l*. The level peaked at 5.8 mIU/m*l* on day 0 and then began to decline on day 2 postpartum. The serum level remained fairly constant at about 2.8 mIU/m*l* day 4 showed similar patterns of change.

Table 1. Serum LH, FSH and prolactin levels in sows during the periparturient period (Mean±S.E.)

No. of days to farrowing	LH (mIU/m*l*)	FSH (mIU/m*l*)	Prolactin (ng/m*l*)
−20	1.6±0.3	6.5±1.5	17.0±4.0
− 6	2.3±0.5	7.5±2.0	15.5±3.5
− 4	2.7±0.6	9.0±2.6	18.6±5.7
− 2	4.9±0.7	8.8±2.4	34.2±4.9
0	5.8±1.1	10.0±3.0	68.5±9.5
+ 2	4.2±0.9	8.5±1.9	38.0±5.6
+ 4	2.8±0.7	8.9±1.5	38.5±4.8
+ 6	2.1±0.5	7.8±1.6	29.5±3.5
+20	2.9±0.7	9.0±2.3	30.0±3.9

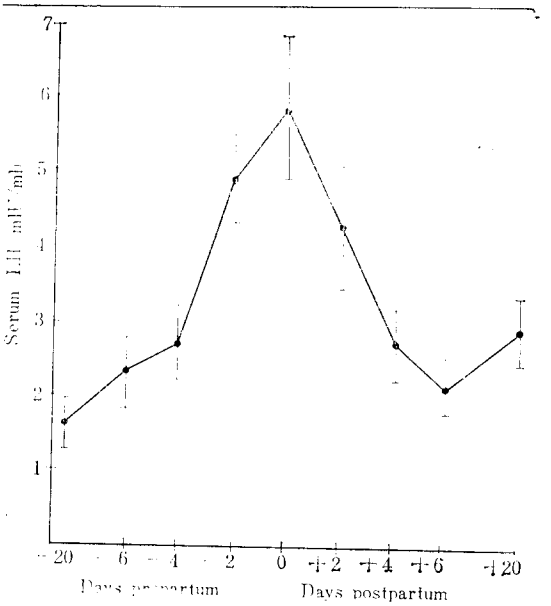

Fig. 1. Serum LH levels in sows during the puerperal period. Vertical bars represent standard error of the mean.

The mean serum FSH level (table 1 and figure 2) started to rise on day 6 prepartum. The level peaked at 10.0 mIU/m*l* on day 0 and then began

to decline after parturition. The serum level remained fairly constant at about 8.5mIU/m*l* from day 2 showed similar patterns of change.

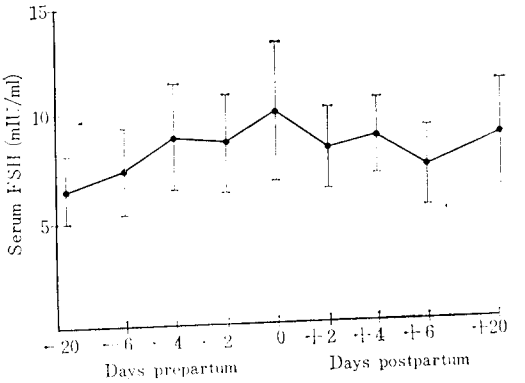

Fig. 2. Serum FSH levels in sows during the puerperal period. Vertical bars represent standard error of the mean.

The levels of prolactin in serum were below 15.5 ng/m*l* during late pregnancy (table 1 and figure 3). Levels increased from 34 ng/m*l* 2 days prior to parturition to a peak 68.5 ng/m*l* at parturition. Levels varied between 29.5 ng/m*l* and 38.5ng/m*l* from the 2 days postpartum until 20 days.

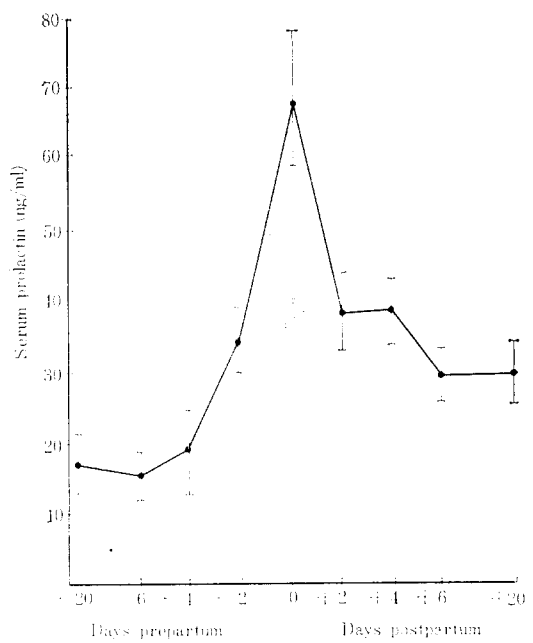

Fig. 3. Serum prolactin levels in sows during the purperal period. Vertical bars represent standard error of the mean.

Ⅳ. Discussion

The serum LH concentrations varied greatly between and within animals. The pattern of changes in LH levels observed in this study is in general agreement with the patterns noted in the cow (Schams et al., 1972), rat (Linkie and Niswender, 1972), mouse(Murr et al., 1974), gilts (Wettemann et al., 1977), but Ingalls et al.(1973) have not observed significant changes in serum LH around parturition in heifers.

It may be conclude that, in the sow, the demonstration of a luteotrophic action of LH may occur in certain situations, for instance in the presence of active luteal tissue with a low progesterone synthesis rate, provided that there is no dominance of any possible luteolytic activity. The decline of progesterone near parturition is not due to a lack of LH, so other factors have to be considered to luteolyse and hence to intiate parturition.

No previous study has been done on serum levels of FSH in the puerperal sow, but the pattern of changes observed in this study is similar to that found in the plasma of rat, mouse and dairy cows (Murr et al., 1974; Linkie and Niswender, 1972; Hilary Dobson, 1978).

An increase in the levels of proalctin at the time of parturition has been noted in several species including the rat, sheep, goat and cow (Arai and Lee, 1967; Bryant and Greenwood, 1968; Amenomori et al., 1970; Davis et al., 1971; McNeilly, 1971; Buttle and Forsyth, 1971; Ingalls et al., 1971; Fell et al., 1972; Lamming et al., 1974). An increase in the levels of prolactin about 2 days before parturition was noted by Ingalls et al. (1971) and Fell et al.(1971). It is tempting to associate this with the rapid rise in free circulating estrogens and the decrease in progesterone that takes place at this time (Challis, 1971; Obst and Seamark, 1972; Chamley et al., 1973; Robertson and Smeaton,1973), but a careful study of the time sequence of these events is necessary any more definite conclusions can be drawn.

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