SERUM LUTEINIZING HORMONE DURING THE PREGNANCY OF A ZEBU COW

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For studies on the serum LH concentrations of Zebu cattle during the oestrous cycle (Carr, 1971), sequential blood samples were collected from one pregnant cow. A solid phase radioimmunoassay for LH (Goding, Catt, Brown, Kaltenbach, Cumming & Mole, 1969) was carried out on the separated sera and several were found to provide elevated values. As levels of blood LH in pregnant sheep are reported to be consistently low (Geschwind & Dewey, 1968; Niswender, Roche, Foster & Midgley, 1968; Goding *et al.*, 1969), it was decided to collect regular samples for assay until parturition.

The subject was a 5-year-old Angoni (short-horned Zebu) cow in good condition which had calved 9 months previously. Rectal palpation indicated that the animal was 3 to 4 months pregnant at the time that the first blood samples were collected. Blood samples were collected by venipuncture at least daily until parturition.

All serum samples were compared with NIH-LH-B6 kindly supplied by the Endocrine Study Section of the National Institutes of Health, Bethesda, Maryland, U.S.A., and a general base-line value of 0.5 to 3 ng/ml was obtained. This value was similar to that obtained during the oestrous cycle (Schams & Karg, 1969a; Carr, 1971). However, it was soon apparent that sharp increases in the level of LH secretion occurred for periods lasting 3 days or less and at varying intervals. Many of these peak levels reached a value of 100 to 2000 times the base-line values. These peaks of activity were usually characterized by a very sharp onset, followed by a tailing away over 2 or 3 days. For instance, sequential samples taken at 08.00 hours daily at about Day 180 of the gestation period were as follows: 1.0, 1.2, 2000, 60, 14.4, 6.0, 2.4, 1.4 ng LH/ml. The main peak, however, always dropped to a relatively low value within 24 hr.

The sharpness of these peaks was analogous with those obtained during the oestrous cycle (Schams & Karg, 1969a; Carr, 1971) and emphasized that frequent sampling was necessary to ensure detecting peak values. The half-life of exogenous LH in blood has been reported as about 35 min (Schams & Karg, 1969b), and this quick clearance is obviously of great significance particularly during pregnancy.

The first peak detected, showing a maximum value of 200 ng/ml, occurred when the animal was about 4 months pregnant and was observed in two blood samples collected at 08.00 and 16.00 hours on the same day. Sequential samples

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before and after the peak were low. A small peak of 12 ng/ml was detected 21 days later and, after a further 14 days, considerable fluctuation of values occurred (1 to 15 ng/ml), persisting for about 10 days and culminating in a sharp peak of 400 ng/ml. Thereafter, an irregular pattern of exceedingly high values separated by between 5 and 10 days occurred, with a final peak of 5500 ng/ml at 7 months' gestation. This period of intense blood LH activity lasted for 6 weeks.

Recently, Donaldson, Bassett & Thorburn (1970) have reported on the progesterone concentration in peripheral plasma in cows in different reproductive states. In pregnancy, progesterone rose initially, declined during mid-pregnancy, and then increased to maximum values. This decline during mid-pregnancy presumably occurred in the period of intense LH activity reported here.

Evidence exists that LH plays a major rôle in the maintenance of luteal function in the ewe (Nalbandov & Karsch, 1968), and the same would be expected to apply to the cow. The effect of oestradiol on the preovulatory release of pituitary LH in the ewe was clearly shown by Goding *et al.* (1969) who suggested that it was a major factor in the mechanism of LH release. Although increases in plasma oestrogen have been shown to occur in the later stages of pregnancy in the cow (Saba, 1964; Pope, Jones & Waynforth, 1965), these appear to occur later in the gestation period than the LH peaks reported here.

After 7 months, serum LH concentrations dropped to 1 to 4 ng/ml until within 2 weeks of parturition, when levels were reduced to below the sensitivity of the method (± 0.5 ng/ml) in most samples. This corresponds to the decrease in plasma progesterone (Donaldson *et al.*, 1970) and increase of oestrogen (Saba, 1964; Pope *et al.*, 1965) on calving.

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