PROGESTERONE LEVELS IN PLASMA DURING THE OESTROUS CYCLE OF THE SOW MEASURED BY A RAPID COMPETITIVE PROTEIN BINDING TECHNIQUE

L. E. EDQVIST AND A. M. LAMM

Departments of Clinical Biochemistry and Obstetrics and Gynaecology,
Royal Veterinary College, S-104 05 Stockholm, Sweden

(Received 6th November 1970)

An adaptation of the technique described by Johansson (1969), whereby progesterone was measured by a rapid competitive protein binding technique, has been used to determine the progesterone levels in the peripheral plasma of the cow (Edqvist, Ekman, Gustafsson & Åström, 1970). The purpose of this paper is to report the usefulness of the same technique for the measurement of progesterone levels in the peripheral blood plasma of the sow during the oestrous cycle.

Two sows of the Swedish Landrace Breed, fed on a commercial pig diet with unlimited water supply, were used. Sexual receptivity was checked twice a day with a boar. The first day of receptivity was considered to be the first day of the oestrous cycle.

About 1 ml of blood was collected daily from an ear vein into heparinized tubes. Plasma was removed after centrifugation and stored at \(-15^\circ C\) until assayed. A total of sixty-eight blood samples were analysed in duplicate, each determination requiring 0.1 ml of plasma. The basic steps of the rapid competitive protein binding technique (Johansson, 1969; Edqvist et al., 1970) include (1) extraction of the plasma with petroleum ether, (2) evaporation of the extract, (3) binding reaction, (4) separation of bound and unbound fractions and (5) radioactive counting of the bound fraction. A standard-curve was processed simultaneously for each set of samples analysed. Corticosterone-1,2,3-H (obtained from New England Nuclear, Boston, Mass., U.S.A.) with a specific activity of 50 Ci/mM was used as tracer and domestic fowl plasma as assay protein.

The plasma progesterone levels during the sexual cycle in two animals are presented in Text-fig. 1. An initial rise occurs on Days 3 and 4 of the cycle. Peak luteal progesterone levels (28 to 37 ng/ml) were obtained on Days 13 and 14. Minimum values were observed during the follicular and ovulatory phases (2.5 ng/ml). This period lasts for about 6 days.

Tillson & Erb (1967), using a double isotope derivative technique, found about 7 ng of progesterone/ml plasma at oestrus, and peak levels of about 25 ng/ml plasma occurred on Day 10 of the cycle. Stabenfeldt, Akins, Ewing & Morrissette (1969), using gas–liquid chromatography with electron-capture detection, found values of about 0.5 ng/ml at oestrus and 35 ng/ml plasma at

447
Day 14 or 15 of the oestrous cycle. The average value during the luteal phase was 27 ng progesterone/ml plasma.

The higher values obtained during the follicular phase in the present investigation compared with those reported by Stabenfeldt et al. (1969) are due to the fact that no correction has been made for the blank values. The high values during the follicular phase reported by Tillson & Erb (1967) are probably due to excess of tritiated products not associated with progesterone, which will give an over-estimation of progesterone. The values found during the luteal phase are in very good agreement with those obtained by Stabenfeldt et al. (1969).

**Text-fig. 1.** Progesterone concentration (ng/ml) in venous plasma of two sows during the oestrous cycle (oestrus = Day 1). Vertical bars indicate the range of duplicate determinations. Uncorrected for petroleum ether blanks which are $10 \times 0.1$ ng = 1 ng/ml.
Plasma progesterone in sows during oestrous cycle

The main advantages of the competitive protein binding technique for the estimation of peripheral plasma progesterone in the sow are that (1) very small amounts of plasma are required for the assay, sampling from an ear vein providing enough blood for the test, and (2) the method is very rapid and easy to handle. At least twenty samples can be assayed in one day by one person.

We are indebted to Hannelore Rotter for excellent assistance.

REFERENCES


