

PERMANENT REFERENCE
FOR USE IN THE
LIBRARY ONLY

ACKNOWLEDGEMENTS

STUDIES ON GONADAL STEROID HORMONES

I wish to express IN FEMALE GOATS thanks to Dr B.M.A.O. Perera for his personal interest, invaluable advice and stimulating criticism which have been of great help to me during this study.

by

To Dr R.D.Piyasena, I would like to extend my sincere thanks for his advice and for the facilities he has placed at my disposal during this study.

RUTH RANJANI THIAGARAJAH

I am greatly indebted to Prof.V.Basnayake for his continuous interest and for being the financial guarantee during this study.

To the staff of Nuclear Medicine Unit, I express my
A thesis submitted to the Faculty of Medicine in fulfilment of the requirements for the degree of Master of Science in Medicine.
I would also thank all friends and colleagues, named and unnamed who have helped me in many ways.

Department of Physiology,
Faculty of Medicine, my sincere thanks to the National
University of Peradeniya, and to the University of Peradeniya
Peradeniya, Sri Lanka January, 1982
for their financial support.

0
462367

Duration of Oestrus SUMMARY

The main objectives of this study were to examine the physiological and endocrinological aspects of the oestrous cycle, pregnancy, and parturition in goats and also to determine the time relationships between oestradiol secretion, oestrus, ovulation and formation of the corpus luteum. Indigenous goats were clinically observed for behavioural and physical signs during the oestrous cycle. Blood samples were collected from the jugular vein from these animals at fixed times during the oestrous cycle, pregnancy and parturition, and analysed for progesterone and oestradiol 17β by using radioimmunoassay techniques.

The hyperaemia and moistness of the vestibular mucosa during periods of swelling of the vulva were very prominent and characteristic signs.

Length of Oestrous Cycle

The mean length of the oestrous cycle was 19.4 ± 6.3 (1 S.D) days with a range of 6 - 32 days. Of the 19 oestrous cycles observed, 68.4% had a cycle length between 19 - 23 days while 15.8% cycles were of shorter duration. (6- 8 days).

Validation of Radioimmunoassay

Duration of Oestrus

The overall extraction efficiency of the samples treated solely by diethyl ether extraction was 95.9 ± 2.4 (S.D) and 98.83 ± 1.75 (S.D) for progesterone and oestradiol 17 β respectively. The duration of physical signs in 48% of the cycles ranged between 25 -36 hrs. Physical signs of oestrus were weakly expressed in 17.4% (4) of the cycles lasted for no longer than 12 hrs. Behavioural expression in 13 cycles (56.5 %) out of 23 had a duration of more than 24 hrs. A low intensity of behavioural expression of oestrus was observed during 13% (3) of the oestrus periods.

Physical Signs of Oestrus

(progesterone) and 4.8% to 5.5% (oestradiol-17 β).

The hyperaemia and moistness of the vestibular mucosa during periods of swelling of the vulva were very prominent and characteristic signs.

Steroid Concentration During Oestrous Cycle

Behavioural Changes During Oestrus

The concentration of progesterone and oestradiol

17 β in the serum of goats showed cyclic variation

Restlessness with increased frequency of tail wagging were found to be reliable indications of oestrus.

concentration in jugular blood observed in this study was characterised by low (0.23 - 0.2 ng/ml,

Validation of Radioimmunoassay

The overall extraction efficiency of the samples treated solely by diethyl ether extraction was 95.9 ± 2.4 (S.D) and 98.83 ± 1.75 (S.D) for progesterone and oestradiol 17β respectively. The limit of detection was 10.9 pg/ml and 11.96 pg/ml for progesterone and oestradiol 17β respectively. Recovery experiments of these steroids confirmed accuracy of recovery over 90% and 98% for progesterone and oestradiol 17β respectively. The within-assay variance in the determination of these steroids expressed as coefficient of variation was 9.8% to 10.3% (progesterone) and 4.8% to 5.5% (oestradiol 17β). The between-assay variation was 9% (progesterone) and 13% (oestradiol 17β).

Steroid Concentration During Oestrous Cycle

The concentration of progesterone and oestradiol 17β in the serum of goats showed cyclic variation during the oestrous cycle. Progesterone concentration in jugular blood observed in this study was characterised by low (0.23 ± 0.2 ng/ml,

mean \pm S.D) levels on the day of oestrus, a sharp rise from day 4 to day 10 of the cycle (above 1.4 ng/ml), followed by a more gradual rise to peak luteal levels of mean 2.5 ng/ml (\pm 0.86 ng/ml S.D) on day 12. Subsequently there was a decline in progesterone concentration from day 15 until the next oestrus. A well defined oestradiol 17β peak (137 ± 114.4 pg/ml, mean \pm S.D) around the day of oestrus, followed by rising serum levels of progesterone 4 days later were indicative of ovulation. The pattern of oestradiol 17β around the time of onset of oestrus appears to accurately reflect the growth and maturation of preovulatory follicles. Serum levels of progesterone in the luteal phase appear to be a good index of corpus luteum formation and activity.

Steroid Concentration During Pregnancy

Serum progesterone concentration during early pregnancy (range 0.9 - 4.28 ng/ml) was similar to the luteal phase values and remained steady from the first to eighth weeks. It was then found to rise gradually to reach a maximum of 24.8 & 15.7 ng/ml by the 18th week of gestation. This was followed by oestrus 48 - 84 hrs later.

112 113

Oestradiol 17β peaks were observed 2 hrs after treatment, and on the day of oestrus. The values of about 3 ng/ml until the day of subsequent oestrous cycles were 11 and 19 days in duration. Progesterone concentration further reaching basal values around 24 hrs after parturition. Serum levels of oestradiol 17β during these cycles reached maximum levels on day 5 and 11 respectively. From this study it can be concluded that prostaglandin is a potent luteolytic agent when given on day 12 of the oestrous cycle. The most dramatic change was seen in oestradiol 17β concentration during the last day of gestation, when it rose to 270 - 310 pg/ml. Thereafter there was a sharp fall to low levels (about 50 pg/ml) within a day and a further decline to basal levels within two more days. This indicates that an oestradiol elevation accompanied by progesterone decline were prominent feature at the time of initiation of parturition.

Steroid Level After Prostaglandin Treatment

Two does were treated with 125 μ g of the prostaglandin analogue Cloprostenol, intramuscularly (1 ml Estrumate I.C.I) on day 12 of the oestrous cycle. The progesterone levels decreased dramatically within 2 hours after treatment and this was followed by oestrus in 48 - 84 hrs later.

Oestradiol 17 β peaks were observed 2 hrs after treatment, and on the day of oestrus. The subsequent oestrous cycles were 11 and 19 days in duration. Progesterone concentration during these cycles reached maximum levels on day 5 and 11 respectively. From this study it can be concluded that prostaglandin is potent luteolytic agent when given on day 12 of the oestrous cycle.

- Abraham, G.E., Swerdloff, R., Tulchinsky, D., Odell, W.D. (1971). Radioimmunoassay of plasma progesterone. Journal of Clinical Endocrinology & Metabolism, 32, 619-624.
- Acritopoulou, S., Haresign, W., Foster, J.P. & Lemming, G.E. (1977). Plasma progesterone and LH concentrations in ewes after injection of an analogue of prostaglandin F-2 α . Journal of Reproduction & Fertility, 49, 337-340.
- Addington, L.H. & Cunningham, O.C. (1935). Milk goat breeding. New Mexico Agriculture Experimental Station Bulletin. No 229, pp81.
- Ali, S.Z., Hogue, P.A. & Mesnath, M.A. (1973). A study on growth and reproductive performance of black Bengal goats under farm condition. Indian Veterinary Journal, 50, 438-440.
- Arriola, G.C. (1936). A study on the breeding habits of goats. Philippine Agriculturist, 25, 11-13.
- Asdell, S.A. (1926). Variation in the onset of the breeding in the goat. Journal of Agriculture Science, 16, 632-669.