CLINICAL AND ENDOCRINOLOGICAL STUDIES ON POSTPARTUM OVARIAN ACTIVITY IN LANKA BUFFALOES (Bubalus bubalis)

by

VADIVEL MOHAN BVSc (Peradeniya)

A thesis submitted in confirmity with
the requirements for the degree of

DOCTOR OF PHILOSOPHY

in the

Department of Veterinary Clinical Studies,
Faculty of Veterinary Medicine and Animal Sciences,
University of Peradeniya,
Sri Lanka.

January 1990

ABSTRACT

Long calving interval has been recorded as the important cause of poor fertility in Lanka buffaloes. However, buffaloes raised in some locations show short calving intervals and better fertility than animals in many other areas. The reasons for these differences could be genetic or environmental (ie. climatic, management, nutrition etc.) Further, the endocrinological changes associated with resumption of ovarian activity and the effect of suckling on these changes have not been studied in Lanka buffaloes. Therefore, four experiments were conducted to determine the following : 1. reason(s) for the differences in fertility in different locations; 2. endocrinological changes during the postpartum period and 3. effect of suckling on resumption of ovarian activity and other fertility indices.

First, sixteen buffalo cows from a "low fertility" area and a "high fertility" area (n=8 each) were brought to a different environment and maintained over a period of 3 years under a uniform system of management. Postpartum ovarian activity was monitored in these animals by observation for signs of oestrus, weekly rectal examination of internal genitalia and weekly measurement of plasma progesterone concentrations. Results showed that there were no differences ($p \geq 0.05$) in calving interval, time taken for

uterine involution, duration of postpartum anoestrus and in number of services required for conception between these two groups. Calvings were distributed throughout the year and the mean calving interval was similar to what was reported for this area.

Second, the endocrinological changes associated with the early postpartum period was monitored in 14 Lanka buffalo cows. On days 7,14, 21 and 28 postpartum, sequential blood samples were collected at 15 min. intervals for 8 hour periods. Subsequently intravenous administration of two injections of 12.5 µg GnRH was done two hours apart, followed by a further 4 hours of blood sampling at the same frequency. Plasma LH concentrations were measured by a heterologus RIA (detection limit 0.25 ng/ml).The validity of this RIA for measuring biologically active LH was checked by assaying some of the samples with a specific bioimmunoassay developed during this study. The LH concentrations remained below the detection limit of the assay and LH pulses were not seen in these animals up to day 28 postpartum. The pituitary did not respond to low doses of exogenous GnRH by increased LH release during this period.

Third, 18 pluriparous Lanka buffalo cows were allotted to 1 of 3 treatment groups to study the effect of suckling on pituitary and ovarian function. Calves were allowed to suckle continuously in group AS (ad lib. suckling) and for two periods of 20 minutes in group RS (restricted suckling).

Calves were completely weaned within day 15 in group ZS (Zero suckling). On days 30, 45 and 90 postpartum sequential blood samples were taken at 20 min intervals for 8 hours preceding intravenous administration of two injections of 25 µg of GnRH two hours apart; this was followed by blood sampling for a further 4 hours at same frequency. Weekly rectal examinations and measurement of plasma progesterone were also performed. Mean LH concentrations before GnRH treatment were below the detection limit of the LH radioimmunoassay on days 15 and 30 postpartum. These levels were around 0.5ng/ml on day 45 and around 0.6 ng/ml on day 60 postpartum and there was no differences ($p>0.05$) in the mean LH values between the groups. No animals in any of the treatment group resumed ovarian activity even by 240 days postpartum. The response to exogenous GnRH was measured by maximal response, area under the curve and mean LH. The response to GnRH was lower ($p<0.05$) in group AS when compared with that of groups RS and ZS on days 45 and 60. There was no difference ($p>0.05$) between groups RS and ZS. On days 15 and 30 no response was observed in any of the treatment groups.

Fourth, 18 pluriparous Lanka buffaloes were assigned to one of three treatment groups immediately after calving: Restricted suckling (RS), ad libitum suckling (AS) and Ad libitum suckling/supplementary fed (AS/S) in an experiment similar to the third experiment, but conducted under

different environmental conditions. The pre GnRH mean LH concentrations increased in all three groups with the days postpartum. The mean LH for group RS was higher ($p<0.05$) than that for other two groups. There was no differences ($p>0.05$) between groups AS and AS/S. The resumption of pulsatile LH secretion was delayed in group AS and AS/S when compared to the group RS. The absence of pulsatile LH release in animals belonging to group AS and AS/S was associated with long periods (more than 90 days) of anoestrus. Similarly the pituitary response to exogenous GnRH, which increased ($p<0.05$) with days postpartum in all three groups, was higher ($p<0.05$) in group RS.

These results suggest that the long calving intervals commonly recorded in Lanka buffaloes are mainly due to long periods of postpartum anoestrus. The reproductive efficiency of Lanka buffaloes is influenced by environmental and managemental factors which may be responsible for the differences in the fertility of Lanka buffaloes in different locations. Further, suckling can delay the resumption of ovarian activity during the postpartum period in Lanka buffaloes. This acts by delaying the reappearance of pulsatile LH secretion postpartum. Thus restricted calf suckling could be a practical and effective method for improving the efficiency of reproduction in Lanka buffaloes.