The Indian Journal of Animal Reproduction; 29(1): 37-41; June 2008

Research Article

LH and Prolactin interrelation with respect to estrus in buffaloes*

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ABSTRACT

The present study was conducted to find out the association between LH and Prolactin hormones during different seasons with respect to the estrus. Blood samples were collected from six normal cycling buffaloes at 4 hr intervals up to 36 hrs from the start of estrus. The level of hormones in plasma was estimated by RIA. The average concentration of prolactin ranged from 7.09 to 26.37, 0.31 to 2.71 and 3.26 to 19.59ng/ml during hot-humid, cold and warm season, respectively and that of LH ranged from 0.32 to15.70, 0.27 to 13.41 and 0.39 to 4.83ng/ml, respectively. The individual animal data indicated that in majority of estrus LH peak was associated with concomitant rise in Prolactin. The findings suggest a positive relationship of LH and prolactin release during the estrus.

Key words: LH, Prolactin, Estrous, Buffalo

INTRODUCTION

Prolactin hormone secreted from adenohypophysis plays an important role in development of mammary gland and its secretion during lactation. However, during the summer season prolactin level is very high as compared to those in winter. High level of prolactin during summer has been reported to have a suppressing effect on cyclicity of buffaloes. Similarly, LH secreted from adenohypophysis helps in ovulation and secretion of progesterone from theca cells of corpus luteum thereby controlling cyclicity of animal. In buffaloes, the circulating levels of prolactin during summer are 2-6 folds higher as compared to other seasons. Furthermore, there is a sharp fall in prolactin level after ovulation during peak and medium breeding seasons (Sheth *et. al.*, 1978). Pahwa and Pandey (1984) also reported a clear cut peak at the time of estrus in buffaloes. The LH levels are reported to be higher on the day of estrus and lower during rest of the estrous cycle (Heranjal *et. al.*, 1976; Kaker *et. al.*, 1980; Arora and Pandey 1982). Although, several workers have reported levels of LH and prolactin in buffaloes as a separate entity however, there is no work which co-relates both these hormones together considering their immense role in reproduction. Thus in view of the above facts a study was undertaken to find out interrelation of these hormones during the different seasons especially at the time of estrus.

MATERIALS AND METHODS

Six healthy, normal cycling, multiparous and non-lactating Murrah buffaloes were selected from NDRI buffalo herd. These animals were kept in loose paddock having brick flooring and asbestos roof over the manger. The animals were maintained as per standard feeding and managemental practices followed at the farm. The roughage consisted of a combination of green fodder, hay, wheat straw and silage depending on the availability at the farm. Fresh tap water for

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drinking was available to the animals throughout the day. Buffaloes were given shower bath during the hot hours of summer season.

Buffaloes were not inseminated during the period of study. Estrus was detected by parading a vasectomised bull (teaser) twice daily each for 30 minutes at 7.00 a.m. in the morning and at 7.00 p.m. in the evening. The time of first detected estrus was taken as '0' hour. Signs of estrus expression were also observed by visually and recorded as suggested by Fraser (1968).

For seasonal study (Hot-humid: August-September; Cold: December-January and Warm: April), jugular blood samples were collected in heparinized vacutainer tubes. After detection of estrus the sampling of blood was done at 0, 4, 8, 12, 16, 20, 24, 28, 32 and 36hr. The samples were immediately carried to the laboratory in ice and were centrifuged at 3000 rpm for 20 minutes to separate out plasma. Plasma was kept frozen at -20°C pending analysis. RIA was used to measure the concentration of LH (Niswender *et. al.*, 1969) and prolactin in plasma samples. Percent recovery of LH and prolactin were 95.8--108.7 and 96.9-108.5, respectively. Mean intra-assay and inter-assay coefficient of variation for LH were 3.78-8.94 and 8.15-9.95 and for prolactin 3.19-10.32 and 7.16-8.19, respectively.

The data were subjected to appropriate statistical analysis to draw scientific inferences. Means and SE were calculated, least square analysis performed and correlations were worked out as described by Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

Mean circulatory levels of LH and prolactin at 4 hourly intervals during the estrus are presented in Table I. The pattern of changes in pooled data of LH and prolactin concentrations has been presented in Figures 1- 3. The level of LH was highest at 4 hrs after the detection of estrus in hot-humid and cold seasons whereas in warm season it was highest at 28 hr. As such, there was no difference in the overall mean levels of LH during the three seasons. Individual animal data for three seasons revealed that peak of LH in two buffaloes occurred at 0 hr, in three buffaloes at 4 hr and in one buffalo at 36 hr during the hot-humid season. In cold season, the peak value in three buffaloes occurred at 4 hr, in one buffalo at 12 hr and in two buffaloes LH peak was not observed and value remained at a basal level. In warm season, the peak of LH in one buffalo occurred at 4 hr, in two at 12 hr, in one at 24 hr and in one at 28 hr. Due to these differences in animal response the variation during different hours of sampling were statistically highly significant (P<0.01).

A perusal of figures 1- 3, indicates that LH peaks were scattered at different hours and not similar in all the buffaloes. Earlier study also indicates that the interval between first behavioral sign of estrus and LH peak may vary from 0 to 171 hr or more (Barile *et. al.*, 1996). Had the frequent samplings been continued for longer duration, LH peaks could have been captured in all the buffaloes. The pattern of change in LH levels on different hours after estrus detection was almost similar to what has been reported by Kaker *et. al.* (1980).

Overall mean concentrations of prolactin remained higher in hot-humid followed by warm and cold seasons and the effect of season was highly significant (P<0.01). In hot- humid season, prolactin ranged between 7.09 and 26.37ng/ml, in warm season between 3.26 and 19.59ng/ml and in cold season between 0.31 and 2.71ng/ml.

A perusal of individual as well as pooled data indicated that the LH peak was associated with a concomitant rise in prolactin. The initial report by Pahwa and Pandey (1984) also states a prolactin peak at the time of estrus. The rise in the level of prolactin at the time of oestrus may be due to single or multiple factors. A decrease in the concentration of dopamine in ventromedial hypothalamus of ewes (Anderson

et. al., 2001) or in intermediate and anterior lobe of the pituitary at pro-estrus in rats (De Maria *et. al.*, 1998) has been reported to induce prolactin secretion. Similarly, ciliary neurotrophic factor has been reported to induce LH and prolactin release in rats (Watanobe and Habu, 2001). LH and prolactin has been reported to be higher due to release of free ex subunit in fetal ovine pituitary culture (Chabot *et. al.*, 2000).

ACKNOWLEDGEMENTS

Authors acknowledge kindness of the Director, ICAR Research Complex for NEH Region, Umiam, in granting study leave to the first author and kindness of the Director, N.D.R.I. Kamal, for providing facilities and financial support during the study period.

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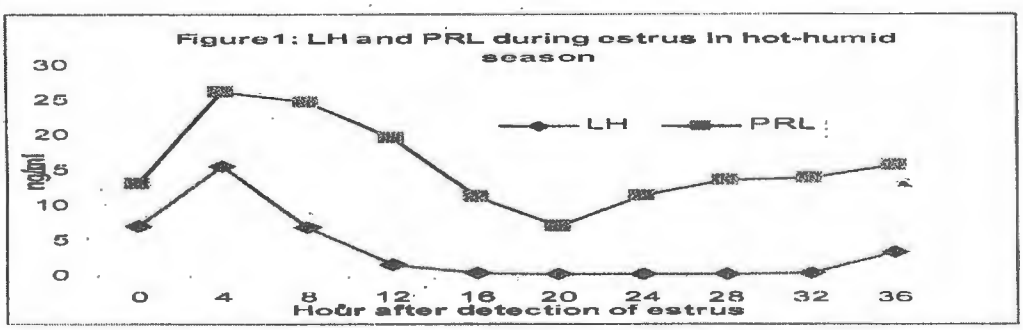

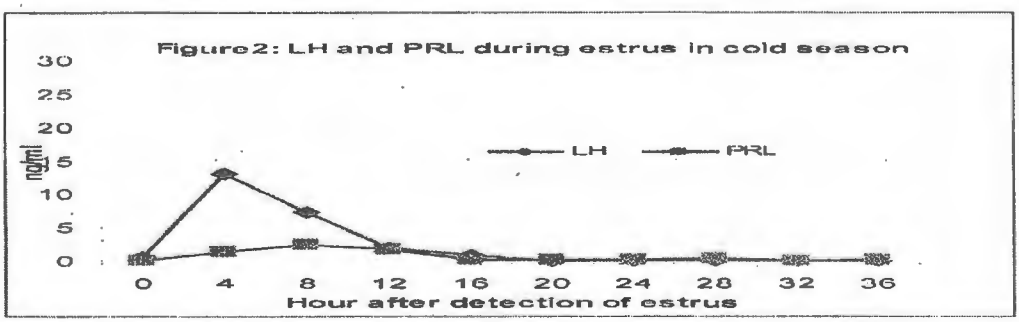

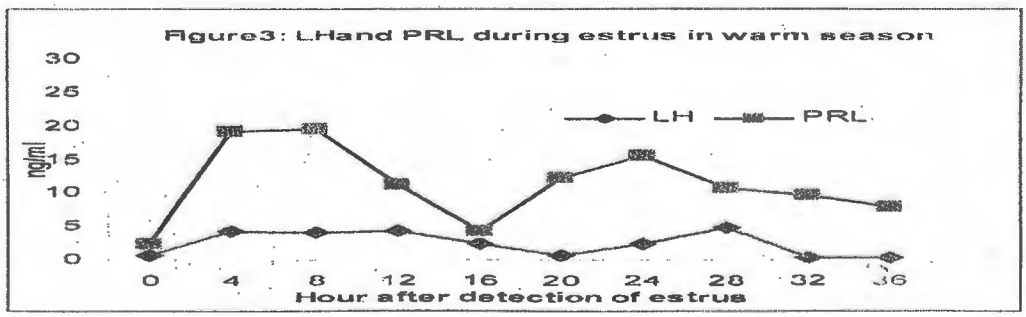

Tablet-1: Mean circulatory levels of LH and Prolactin after detection of estrus

Season	Time in relation to detection of estrus (hours)										
	0	4	8	12	16	20	24	28	32	36	Overall mean**
	LH (ng/ml)										
Hot-humid	7.12±3.93	15.70±3.75	7.08±2.82	1.63±0.66	0.52±0.1 0	0.32±0.11	0.41±0.16	0.41±0.07	0.44±0.07.	3.53±3.17	3.74
Cold	0.88±0.27	13.41±7.35	7.57±5.35	2.24±1.56	1.18±0.80	0.42±0.11	0.28±0.05	0.38±0.10	0.27±0.09	0.40±0.13	2.70
Warm	0.61±0.17	4.42±3.77	4.12±1.88	4.36±2.33	2.42±1.84	0.74±0.37	2.36±2.06	4.83±4.40	0.41±0.17	0.39±0.11	2.47
Overall mean*	2.87	11.18	6.26	2.74	1.37	0.49	1.02	1.87	0.37	1.44	
	Prolactin (ng/ml)										
Hot-humid	13.09±4.89	26.37±8.93	24.82±4.69	19.71±5.24	11.37±3.94	7.09±4.04	11.50±6.25	13.66±7.35	13.98±7.73	15.77±6.00	15.74
Cold	0.31±0.08	1.79±0.63	2.71±1.10	2.13±1.03	0.51±0.18	0.44±0.23	0.47±0.17	0.73±0.30	0.40±0.17	0.47±0.11	0.996
Warm	3.26±1.67	19.33±5.85	19.59±4.94	11.28±3.73	4.36±1.49	12.26±9.49	15.58±8.64	10.81±0.86	9.65±3.21	8.02±4.12	11.41
Overall mean*	5.55	15.83	15.71	11.04	5.41	6.60	9.18	8.40	8.01	8.09	

*overall mean of period, * *overall mean of season

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