

EFFECT OF PREEVULATORY FOLLICLE VOLUME AND SERUM OESTRADIOL CONCENTRATION ON CONCEPTION RATE IN POSTPARTUM MURRAH BUFFALOES

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ABSTRACT

The oocytes recovered from large sized follicles have more potential for both meiotic and embryonic development, which helps in conception rate in cows and buffaloes. This investigation was carried out to study the effect of pre-ovulatory follicle volume, serum concentration of estradiol on conception rate in postpartum cyclical Murrah buffaloes during spontaneous estrus. Twelve postpartum cyclical buffaloes were randomly selected and double artificial insemination was done (Double AI) at an interval of 24 h during oestrus. Sonographic evaluation was performed during natural estrus (First AI) to study the POF volume and pregnancy diagnosis was done on day 28 post AI. Blood samples were collected and serum was separated at the time of first AI to quantify the serum estradiol concentration and it was correlated with the POF volume, oestrus intensity and conception rate. It is concluded that the pre-ovulatory follicle volume, the serum estradiol 17β concentrations and oestrus intensity on the day of AI had no correlation with conception rate in postpartum buffaloes.

Keywords: *Bubalus bubalis*, buffaloes, follicle volume, oestradiol 17β , pregnancy

INTRODUCTION

The domestic river buffalo (*Bubalus bubalis*) is an important livestock resource in many countries of Asia, the Mediterranean region and Latin America (Mishra *et al.*, 1990). There was an increasing trend in buffalo population throughout the globe and also in India.

Although there was an increase in buffalo population by 3.19% in India from 2007 to 2012, as per 19th Quinquennial livestock censuses 2012, there was a great decline in buffalo population in Tamil Nadu from 20,09,002 in 2007 to 7,80,431 in 2012. The percentage of decrease observed in our state was 61.15. Infertility is the prime constraint in buffalo farming (67.58%) (Mishra *et al.*, 1990). Therefore, at this juncture conducting research in buffaloes especially in augmenting reproduction to increase the production is highly mandate to sustain their population in Tamil Nadu. Various reproductive disorders as described by Madan *et al.* (1996) have been leading to low productivity in this species. These disorders in buffaloes are related to POF volume, oestradiol concentration and subsequent corpus luteum development (Varughese *et al.*, 2014). Hence, the present study was conducted in cyclical Murrah buffaloes to study the impact of POF volume, oestradiol

concentration and oestrus intensity on conception rate following AI at natural oestrus.

MATERIALS AND METHODS

An experiment was conducted in buffaloes which were brought to the Artificial Insemination (AI) Unit of Teaching Veterinary Clinical Complex (TVCC), Veterinary College and Research Institute, Namakkal. A total number of 12 healthy graded female Murrah buffaloes on completion of their 90 days postpartum period and aged between 2nd and 5th parity were included for this study. During natural estrus, all the buffaloes were inseminated twice (Double AI) at an interval of 24 h. The morphometry of the preovulatory follicle (POF) was assessed at the time of first AI by ultrasonography. All the buffaloes were again subjected to ultrasonographic examination on day 28 after first AI to detect early pregnancy. Ovaries of all cyclical postpartum buffaloes were examined by trans-rectal ultrasonography using Sonaray ultrasound scanner with a 5 MHz linear probe to characterize the follicle size at the time of Artificial insemination. Follicle volume was determined by using the internal calipers on the Sonaray scanner. The intensity of oestrus was classified as intense, intermediate and weak based on the score card as described by Rao and Rao (1984) with slight modification. Early pregnancy status and embryo viability (heartbeat) were determined on day 28 post AI by trans-rectal ultrasonography using Sonaray scanner 5 MHz linear probe. During natural oestrus the blood samples were collected. The serum samples were separated immediately and were stored at -20°C until the analysis of estradiol-17 β . It is analyzed by using commercial kits

by Enzyme linked fluorescent immunoassay (ELFA). The paired and unpaired T-test method was followed for the experiment and the data collected were analyzed using SPSS 20.0. software package.

RESULTS AND DISCUSSION

In this study follicular volume was measured to know the accurate amount of follicular contents that resided in the follicle (Echternkamp *et al.*, 2014). At the time of (i.e. AI), the mean (\pm SE) POF volume was greater in buffaloes which became pregnant than the non-pregnant (Table 1). Although the mean (\pm SE) POF volume was greater in pregnant animals when compared to the non-pregnant animals, statistically the difference was not significant ($P > 0.05$) at oestrus. Echternkamp *et al.* (2014) compared the follicular size and volume with the CL size and volume in cows and found correlation among these values. In this study, in pregnant buffaloes the POF had greater volume than the non-pregnant buffaloes. Pfeifer *et al.* (2012) stated that higher follicular size resulted in more serum progesterone concentration 7 days after ovulation which increase the pregnancy rate in cows. The increase in POF size ultimately resulted in increased POF volume. However the increased POF volume in pregnant buffaloes was not statistically significant during the natural estrus. Hence, a no correlation was observed between the POF volume and pregnancy rate in this study.

The mean (\pm SE) serum oestradiol 17 β level during oestrus in pregnant buffaloes was higher when compared to the non-pregnant buffaloes (Table 1). Similar levels of serum oestradiol 17 β concentration were observed by Bachalaus *et al.* (1979) in cows. In the present study, buffaloes which

became pregnant had more than 14 pg/ml of serum oestradiol 17 β concentration during oestrus with high oestrus intensity. This finding corroborated with the result of Bachalus *et al.* (1979) in cows. The elevated level of estradiol 17 β at the time of oestrus might be reason for conception in buffaloes. The alteration in oestradiol progesterone ratio by increased level of oestradiol and reduced level of progesterone favored the fertility in these buffaloes as explained by Lopes *et al.* (2007). POF diameter and volume had positive correlation with plasma oestradiol concentration at oestrus, post ovulation luteal profile and conception rate by altering the steroid biosynthesis of POF in buffaloes of this study as opined by Pandey *et al.* (2011).

In this study, the intensity of oestrus was classified as intense, intermediate and weak. Similar classification was followed in buffaloes by Ravikumar (2014). In the current experiment, more pronounced oestrus intensity was noticed in pregnant buffaloes when compared to the non-pregnant buffaloes (Table 1). It might be due to the increased POF volume produced more concentration oestradiol and it sensitized the hypothalamus for induction of behavioral signs

of oestrus in pregnant buffaloes. This finding was in accordance with the results Lopes *et al.* (2007). In the current study, early pregnancy diagnosis by Doppler ultrasonography was attempted on day 28 post AI and 5 MHz rectal transducer was used to diagnose the pregnancy. Kastelic *et al.* (1989) recommended 5 MHz transducer after day 18 and Kastelic *et al.* (1991) proposed 7.5 MHz before day 16 after AI. Ultrasonographically presence of anechogenic area in the uterine lumen with discrete non-echogenic structure containing embryo proper was searched in this experiment. Out of 12 buffaloes, 8 buffaloes had embryo along with heart beats within the anechoic area of the uterine lumen on day 28 of gestation. The conception rate observed was 66.67%.

CONCLUSION

From this investigation, it is concluded that a no correlation was observed among POF volume, oestradiol concentration, oestrus intensity and conception rate during natural oestrus in postpartum cyclical buffaloes.

Table 1. Mean (\pm se) pof volume and oestradiol-17 β concentration at the time of oestrus in postpartum cyclical buffaloes.

Murrah buffaloes	POF volume (mm ³)	Oestradiol-17 β (pg/ml)	P-value	Oestrus intensity
Pregnant	46.61 \pm 1.97	14.59 \pm 0.93	0.253	Intense
Non-pregnant	42.84 \pm 2.33	13.39 \pm 0.37	0.329	Weak

P>0.05 = Statistically not significant,

P<0.05 = Statistically significant,

P<0.01 = Statistically highly significant

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