



Biochemical and Hormonal Parameters as Prime Markers of Postpartum Anestrus in Murrah Buffaloes

Kalyan, U.P.V.¹, Vasantha, S.K.I.^{2*}, Nikhil Kumar Tej, J.² and Rambabu Naik³

¹BVSc & AH, NTR College of Veterinary Science, Gannavaram, A.P., INDIA

²Department of Veterinary Physiology, College of Veterinary Science, Gannavaram, A.P., INDIA

³Department of Physiology, College of Veterinary Science Tirupati, A.P., INDIA

*Correspondence address: IVS Kumari; E-mail: vasuinjarapu@gmail.com

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ABSTRACT

Reproductive and productive performance in buffaloes is greatly affected by post partum anestrus condition. So, the purpose of the present study was designed to determine alteration in blood biochemical and hormonal profile in post-partum anestrus Murrah buffaloes. 10 animals of same age were selected from a local farm at Tanuku, Andhra Pradesh, India. Gyneco-clinical examination was done to confirm the condition of anestrus post calving. The anestrus animals had serum cholesterol, total protein and estrogen within the normal range but towards the lower side. However, the progesterone and triglycerides levels are significantly lower than the normal reference values. This indicated that anoestrus is characterized by reduced cholesterol, total protein, triglycerides and progesterone. In conclusion the findings of the present study might help us for better understanding of some aspects related to post partum anestrus buffaloes and thereby improve reproductive management.

HIGHLIGHTS

- Evaluation of biochemical and hormonal parameters remains crucial for early detection of postpartum anestrus in buffaloes.
- Plasma protein and cholesterol are important for synthesis and functioning of pituitary and steroid hormones.
- Progesterone concentration of below 1.0 ng/ml is indicative of true anestrus.

Keywords: buffaloes, anoestrus, Reproductive, productive, biochemical

Physiological condition as well as health status of animals can be revealed by the changes in blood constituents. There are certain hormonal and metabolic parameters, which influence directly the process of reproduction in animals (Hafez and Hafez, 2000; Ashmawy, 2015). Buffalo is an integral part of agriculture having pivot role in the Indian livestock industry contributing towards the production of milk, meat and draft power. Reproductive problem is more in buffalo than cattle, hence buffalo is considered as difficult breeders primarily because of its inherent susceptibility of environmental stress which cause anestrus and sub estrus (Ashwamy, 2015).

Anestrus can be defined as the failure or deficiency of the expression of estrus. A period of anestrus after parturition is considered to be a normal physiological event but

becomes abnormal condition if its duration exceeds its accepted average (Abraham, 2017). It is one of the main factors that has a negative impact on reproductive performance in livestock thereby incurring economic losses to the dairy industry. It remains to be an important problem for reproduction in buffaloes. This is responsible for a prolonged inter-calving period resulting great economic losses to the dairy industry (Surya *et al.*, 2021). Nutritional intake, adverse climatic conditions, energy deficiency, high production, management stress, parasites

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and diseases could be various possible factors that lead to anestrus (Lawania *et al.*, 2017).

The development of endocrine and sex organs requires total protein in optimum levels. The lowered protein affects reproduction through pituitary and sex glands, by retarding the reproductive organs development. This might be the factor responsible for either failure or delay in the onset of postpartum estrus (Surya *et al.*, 2021). Cholesterol which is synthesized from acetate is an essential precursor for synthesis of steroid hormones of the testis, ovary and adrenal cortex (Sesh and Meur, 2013). True anestrus is characterized by a lack of progesterone production from the ovary (Peter *et al.*, 2009). Presence of 0.5–1 ng/ml of progesterone in the blood samples further confirms the diagnosis. If the progesterone levels are more than 1ng/ml, it indicates presence of corpus luteum and it might be due to unobserved estrus/silent estrus/persistent corpus luteum (kumar *et al.*, 2014). This indicates that the estimation of biochemical parameters and hormones of reproduction is of paramount importance. Hence the present study was designed to estimate the serum hormonal and biochemical profile in true anestrus Murrah buffaloes (*Bubalus bubalis*) of hot humid regions of A.P.

MATERIALS AND METHODS

The present study was conducted on apparently healthy buffaloes belonging to small farmers at Tanuku, Andhra Pradesh during the months of April-May. The animals (n=10) were between the second and third calving, aged from 5-8 years and their body weight ranged from 500-600 Kg. Animals were maintained on green fodder and supplemented with concentrate ration and drinking water was provided ad libitum. All animals were examined gynecologically twice at ten days intervals. Those which did not express estrus signs for more than 120 days postpartum, having smooth ovaries with no palpable structures, having no clinically detectable abnormalities in

their genital tract and no treatments with hormones during the last three months; were identified and used for the study. Blood samples were collected by jugular vein puncture and the serum was separated by centrifugation at 1500 rpm for 20 minutes, transferred into clean sterile cryovials and stored at -20°C until further analysis. All the hormonal parameters were estimated using commercial ELISA kits as per manufacturer instructions. Estimation of total protein, total cholesterol, triglyceride, were determined spectrophotometrically using standard diagnostic kits.

STATISTICAL ANALYSIS

Data from the present study were compared with established reference values for serum biochemical and hormonal constituents of buffaloes. Mean and standard error has been derived using descriptive statistics SPSS Ver. 20.

RESULTS AND DISCUSSION

The present study aims to compare the serum hormonal and metabolic profiles in postpartum anestrus with that of normal cyclic buffaloes. Table 1 showing the results in comparison with reference values in normal cyclic buffaloes as per Kumar *et al.* (2015). The low reproductive efficiency in buffalo is a major restriction in obtaining maximum production potential which sets a perfect platform for the present research input. Ovarian inactivity is still one of the most common reproductive disorders in this species (El-Wishy, 2007). The reason for the ovarian inactivity might be insufficient synthesis or secretion of gonadotropins for follicular development or it may indicate the failure of ovaries to respond to gonadotropins (Abraham, 2017). The present study aims to compare between the serum hormonal, metabolic and minerals profile in normal cyclic and postpartum anestrus Murrah buffaloes.

Table 1: Mean±SEM values of biochemical and hormonal parameters of anestrus Murrah buffaloes

Sl. No.	Parameter	Range	Mean ± SEM	Reference values
1	Total protein(mg/dl)	4.5-7.0	6±0.20	6-14 (Abd Ellah <i>et al.</i> , 2014)
2	Cholesterol(mg/dl)	80-100	82±0.77	80-120 (Abd Ellah <i>et al.</i> , 2014)
3	Triglycerides(mg/dl)	27-33	30.25±0.31	46.49-52.32 (Abd Ellah <i>et al.</i> , 2014)
4	Estrogen (pg/ml)	10-28	20±0.59	20-251 (Kumar <i>et al.</i> , 2015)
5	Progesterone (ng/ml)	0.03-0.09	0.05±0.03	0.1-6 (Kumar <i>et al.</i> , 2015)

The results of the present study clearly indicate that there is generalized alteration in biochemical and hormonal profile in comparison to normal cycling animals. The mean total protein is at the minimum level required. Our results were in accordance with Modi *et al.* (2017) and Rama Gowry *et al.* (2021). The lack of protein might have retarded the improvement of reproductive organs and so responsible for the postponement in beginning or failure of postpartum estrus (Patel *et al.*, 2018). The Cholesterol levels are also at the minimum levels; indicating its requirement for the formation of steroid hormones in the ovarian theca and luteal cells (Hafez and Hafez, 2000). Our results were in agreement to Jayachandran *et al.* (2013), Saikiran *et al.* (2020) and Rama Gowry *et al.*, 2021 who reported significantly higher serum cholesterol in cyclic than anoestrus bovines. The insufficiency in cholesterol is very well reflected by lowered progesterone. The changes in cholesterol were negatively associated with gonadal steroidogenesis (Ghani *et al.*, 2017), which would affect the ovarian activity and may induce anestrus (Rama Gowry *et al.*, 2021).

The significantly low serum estradiol levels in the present study are in agreement with the findings of Ahmed *et al.* (2010), Akhtar *et al.* (2010) and Kalasariya *et al.* (2017) in buffaloes. Along with rectal palpation, blood P₄ and E₂ profile can also be used as a novel diagnostic tool of ovarian activity. As, serum P₄ and E₂ levels reduce in anestrus animals due to the absence of LH surge and impaired follicular growth accompanied by ovarian inactivity (Surya *et al.*, 2021). Ahmed *et al.* (2010) reported variations of serum P₄ and E₂ in anestrus animals, indicating continual follicular growth and atresia. Manifestation of estrus, regulating functionality of genital tract along with coordination of sexual behavior and receptivity are the major functions of E₂ (Hafez and Hafez, 2000).

CONCLUSION

Anestrus being common cause of infertility in buffaloes leads to economic losses to buffalo breeders (Khan *et al.*, 2012). It is therefore important to understand the physiological status through biochemical and hormonal estimation which could help us to adopt strategies for improvement of reproductive function. Since postpartum anestrus is associated with production and income,

addressing this issue is of paramount importance. Thus early diagnosis by complete biochemical and hormonal assay would help us to identify the condition of the animal in advance and adopt strategies to improve the reproductive efficiency.

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