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Haematological and biochemical changes in repeat breeding Graded Murrah buffaloes

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Abstract
The present study was undertaken to evaluate the changes in haematological and biochemical status in repeat breeding Graded Murrah buffaloes (n=60) in comparison with normal cyclical buffaloes (n=15). Blood samples were collected at observed estrus in both repeat breeders and normal cyclical buffaloes for estimation of haematological and biochemical parameters. Repeat breeder Graded Murrah buffaloes exhibited lowered levels of mean haemoglobin (8.61±0.20 gm%), Packed cell volume (35.21±0.99%) when compared to normal cyclic buffaloes. Further, biochemical parameters like mean serum glucose (48.26±2.83 mg/dl), calcium (7.21±0.18 mg/dl), phosphorus (4.44±0.12 mg/dl), total protein (6.57±0.09 g/dl) and cholesterol (85.57±1.90 mg/dl) concentration also showed lowered levels in repeat breeder buffaloes when compared to normal cyclical buffaloes. In conclusion, the decreased levels of biochemical parameters like calcium, phosphorus and cholesterol could be cause of repeat breeding in buffaloes.

Keywords: Haematology; biochemical parameter; repeat breeder; buffaloes

Introduction
Animal that has failed to conceive even after three or four successful services with fertile bull or artificial inseminations are often termed as repeat breeders. Repeat breeding is one of the major problems in dairy farm management especially in buffaloes which have low reproductive efficiency [1]. Repeat breeding seems to be normal phenomenon but it becomes a task especially when the percentage is high in buffaloes with low hormonal profiles. The complete recovery from repeat breeder syndrome in buffaloes is a time bound programme and may require early remedial measures as buffaloes are partially seasonal breeders with low level of endocrine profiles. When physical and clinical methods of examination fail to suggest the cause of repeat breeding condition, haemato-biochemical parameters may be used to identify the condition as certain biochemical profiles are low [2].
Perusal of literature revealed that no systematic studies were carried out on repeat breeding syndrome in Graded Murrah buffaloes and relationship among haematological, biochemical parameters in repeat breeding buffaloes were found to be scanty. Hence, the present study was undertaken to evaluate the changes in haematological and biochemical status in repeat breeding Graded Murrah buffaloes.

Material and methods
The present study was conducted in Graded Murrah buffaloes which were presented to the large animal obstetrical unit, Department of Veterinary Gynaecology and Obstetrics, NTR College of Veterinary Science, Gannavaram, Veterinary Hospitals (Allapuram, Indupalli and Kankipadu) in and around Gannavaram Mandal in Krishna District of during the period from October 2017 to May 2018; A total of 60 repeat breeder buffaloes of different parity were utilised in this study. Blood samples were collected from each animal in a vacutainer with EDTA and clot activator from all the repeat breeder and normal cyclical Graded Murrah buffaloes for estimation of haematological and biochemical parameters. Haematological parameters such as haemoglobin and packed cell volume were estimated as per the standard procedures described by Jain (1993) [3]. The biochemical parameters (glucose, calcium, phosphorus, total protein and cholesterol) were estimated as per standard procedures. The statistical analysis of the data was done as per the procedures described by Snedecor and Cochran (1994) [4].

Result and discussion

Changes in levels of haematological and biochemical parameters in blood are shown in Tables 1 and Plate 1 & 2.

The present investigation showed that the mean haemoglobin concentration (g/dl) recorded in the repeat breeder and normal cyclical buffaloes were 8.61±0.20 and 9.43±0.16, respectively (Tables 1 and Plate 1). The mean Hb concentration was within the normal reference range in normal cyclic buffaloes in the present study and in agreement with the reports of Sunilkumar *et al*. (2015) [5]. Significantly (P<0.05) lowered level of Hb was observed in repeat breeder buffaloes when compared to normal cyclical buffaloes. The lowered level of mean haemoglobin recorded in the present study was in agreement with the findings of Shrivastava and Kharche (1986) and Awasthi and Kharche (1987) [6, 7], who recorded the mean haemoglobin in repeat breeder as 7.86 and 8.98 g/dl in buffaloes and cows, respectively. The lowered levels of haemoglobin in repeat breeding buffaloes of the present study might be due to the effect of long term energy, protein or mineral deficiencies and influence of tissue oxygenation of reproductive tract which in turn affected the cyclicity [6], though the importance of haemoglobin level was not directly implicated to reproductive disorders, yet a decrease in Hb value was indicative of nutritional deficiencies which could indirectly affect the functional activity of the reproductive organs [8, 9].

The present investigation showed that the mean packed cell volume (%) recorded in the repeat breeder and normal cyclical buffaloes were 35.21±0.99 and 39.13±0.48 per cent, respectively (Tables 1 and Plate 1). The mean PCV level was within the normal reference range in normal cyclic buffaloes which was in agreement with the findings of Kumar *et al*. (2014) [10]. Significantly (P<0.05) lowered level of PCV was observed in the repeat breeder buffaloes when compared to normal cyclical buffaloes. The lowered level of mean PCV level of repeat breeder of the present study was agreement with the findings of Ashwani kumar *et al*. (2015) [11] who reported that the mean PCV in repeat breeder buffaloes was 34.16±0.79 per cent. A decreased PCV in repeat breeding buffaloes of present study might be due to variety of reasons leading to nutritional deficiencies as opined by Hedoo *et al.* (2008) [8].

The present investigation recorded the mean serum glucose concentration (mg/dl) recorded in the repeat breeder and normal cyclic buffaloes as 48.26±2.83 and 61.65±0.94 mg/dl, respectively (Tables 1 and Plate 2). The mean serum glucose concentration was within the normal reference range in normal cyclical buffaloes, which was in agreement with the findings of Patel *et al.* (2007) [12]. Significantly (P<0.05) lowered level of mean glucose concentration was observed in the repeat breeder buffaloes when compared to normal cyclical buffaloes. The low level of mean glucose concentration of repeat breeders was agreement with the observation of Shrivastava and Kharche (1986) who reported mean glucose concentration in repeat breeder was 48.15 mg/dl in buffaloes. The variation in the mean serum glucose levels observed in the present study might be due to variations in the production levels of the buffaloes as glucose was chiefly utilized for lactation. Hypoglycemic condition was linked to cyclicity and fertility, as reduction in ovarian activity was due to the effect of hypoglycemic state which impaired the release of gonadotropins from hypothalamus [13].

The present investigation recorded the mean serum calcium concentration (mg/dl) in the repeat breeder and normal cyclical buffaloes as 7.21±0.18 and 9.16±0.13 mg/dl, respectively (Tables 1 and Plate 2). The mean serum calcium concentration was within the normal reference range in normal cyclical buffaloes which was in agreement with the observation of Shrivastava and Kharche (1986) and Chandrahar (2003) [6, 14] in buffaloes and crossbred cows, respectively. Significantly (P<0.05) lowered levels of mean serum calcium concentration was observed in the repeat breeder buffaloes when compared to normal cyclical buffaloes. The lowered levels of mean serum calcium concentration of repeat breeder buffaloes of the present study were agreement with earlier reports [15, 16]. Calcium was associated with improvement of the number and size of the preovulatory ovarian follicles and also increased the ovulation rate [17]. Synthesis of ovarian steroids like estrogen and progesterone hormones were under the control or modulation of gonadotropic hormone (FSH and LH) regulation in which the inorganic calcium ions play a major role [18]. Further, it was also suggested that inorganic calcium ions were involved in the regulation of gap junctions with respect to their numbers between cumulus cells resulting in disruption of cohesiveness of cumulus cells, which contributed to the process of ovulation [18].

The present study reported the mean serum phosphorus concentration (mg/dl) in the repeat breeder and normal cyclic buffaloes as 4.44±0.12 and 5.38±0.08 mg/dl, respectively (Tables 1 and Plate 2). The mean serum phosphorus concentration was within the normal reference range in normal cyclical buffaloes, which was in agreement with the findings of Shrivastava and Kharche (1986) [6]. Significantly (P<0.05) lowered levels of mean serum phosphorus concentration was observed in the repeat breeder buffaloes when compared to normal cyclical buffaloes. The lowered levels of mean serum phosphorus concentration of repeat breeder buffaloes of the present study were in agreement with earlier reports [15, 16]. Interference in ovulation process and pituitary-ovarian axis could be caused by disturbed calcium-phosphorus ratio [18].

The mean serum total protein concentration (g/dl) recorded for repeat breeder and normal cyclical Graded Murrah buffaloes was 6.57±0.09 and 8.43±0.10 g/dl, respectively (Tables 1 and Plate 2). The mean serum total protein concentration was within the normal reference range in normal cyclic buffaloes which was in agreement with the findings of Shrivastava and Kharche (1986) and Amle *et al*. (2014) [6, 18] in buffaloes and crossbred cows, respectively. Significantly (P<0.05) lowered levels of mean serum total protein concentration was observed in the repeat breeder when compared to normal cyclical buffaloes. The lowered level of mean serum total protein concentration of repeat breeder in the present study was in agreement with the earlier report [19]. On the contrary, there was no significant difference in serum total protein concentration between repeat breeder and normal cyclical cows and buffaloes [20]. Lowered level of serum proteins resulted might have due to deficiency of certain amino acids which were required for the biosynthesis of gonadotropins and gonadal hormones might have caused reproductive hormonal disturbances which culminated to repeat breeding in buffaloes [21].

The mean serum cholesterol concentration (mg/dl) recorded in the repeat breeder and normal cyclical buffaloes was 85.57±1.90 and 129.45±1.37 mg/dl, respectively (Tables 1 and Plate 2). The mean serum cholesterol concentration was within the normal reference range in normal cyclic buffaloes

which was in agreement with Shrivastava and Kharche (1986) and Amle *et al.* (2014) [6, 18] in buffaloes and crossbred cow, respectively. Significantly ($P<0.05$) lowered levels of mean serum cholesterol concentration was observed in the repeat breeder buffaloes when compared to normal cyclical buffaloes. The lowered levels of mean serum cholesterol concentration of repeat breeder buffaloes of the present study were in agreement with the earlier reports [18, 22]. Cholesterol was the precursor of all steroid hormones including ovarian steroid hormones such as, estrogen and progesterone, which reflects the reproductive status of the animal. The variations in the levels of serum cholesterol of the present study might be due to variations in quality of feed, energy status of the animal and the level of milk production as opined by Ashwani kumar *et al.* (2015) [11].

Table 1: Haematological and biochemical parameters in repeat breeder Vs normal cyclical Graded Murrah buffaloes

Parameters	Repeat breeder buffaloes (n=60)	Normal cyclic buffaloes (n=15)
Haemoglobin (gm%)	8.61±0.20^{b}	9.43±0.16^{a}
Packed Cell Volume (%)	35.21±0.99^{b}	39.13±0.48^{a}
Glucose (mg/dl)	48.26±2.83^{b}	61.65±0.94^{a}
Calcium (mg/dl)	7.21±0.18^{b}	9.16±0.13^{a}
Phosphorus (mg/dl)	4.44±0.12^{b}	5.38±0.08^{a}
Total protein (g/dl)	6.57±0.09^{b}	8.43±0.10^{a}
Cholesterol (mg/dl)	85.57±1.90^{b}	129.45±1.37^{a}

Group with superscripts (a, b) in a row differed significantly ($P<0.05$)

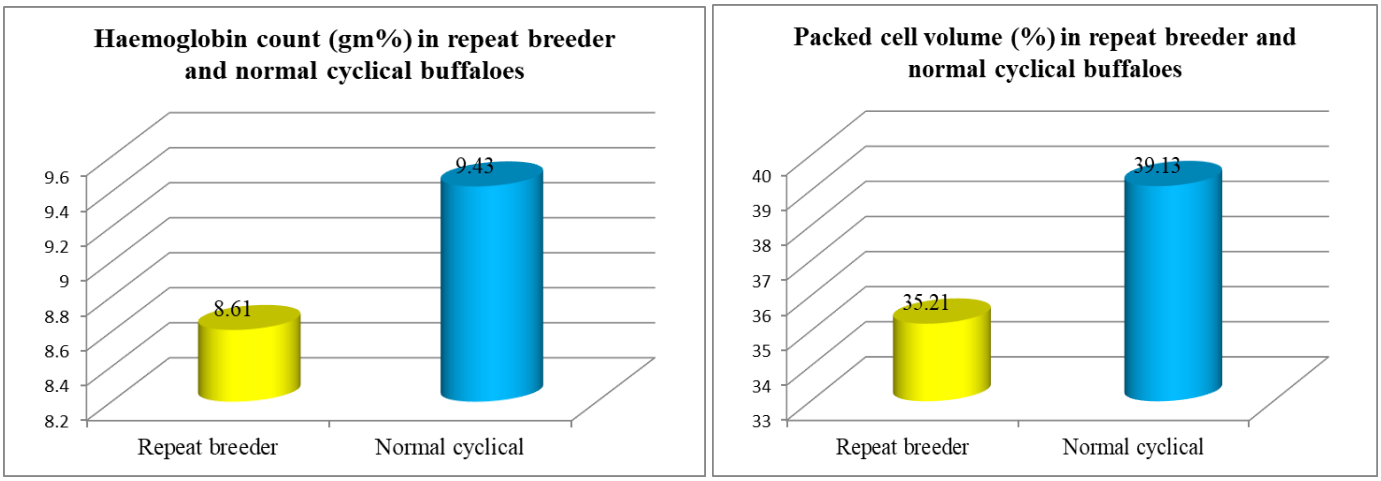
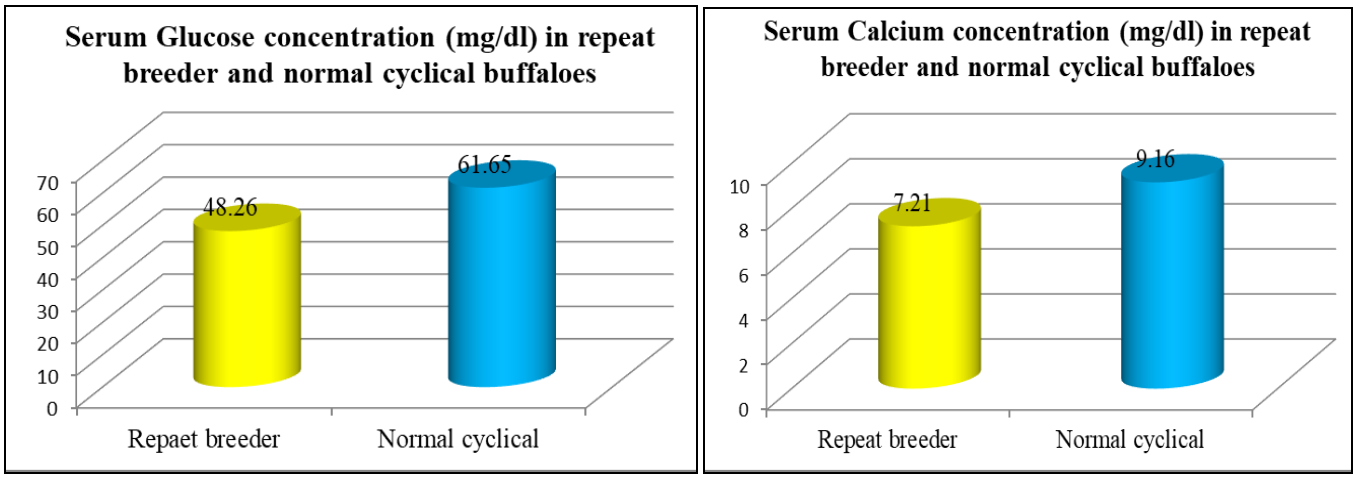
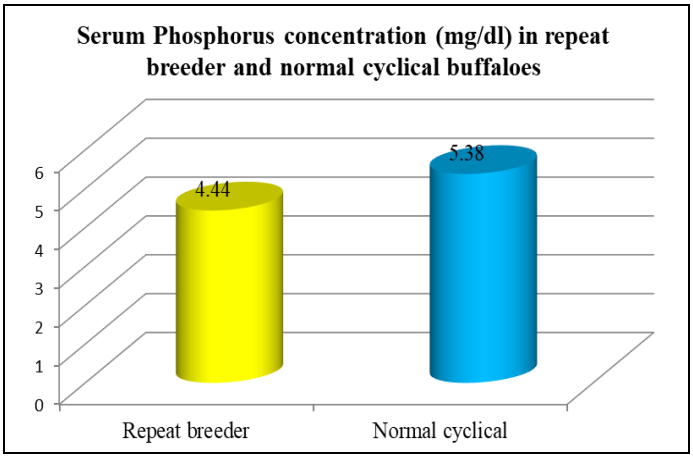
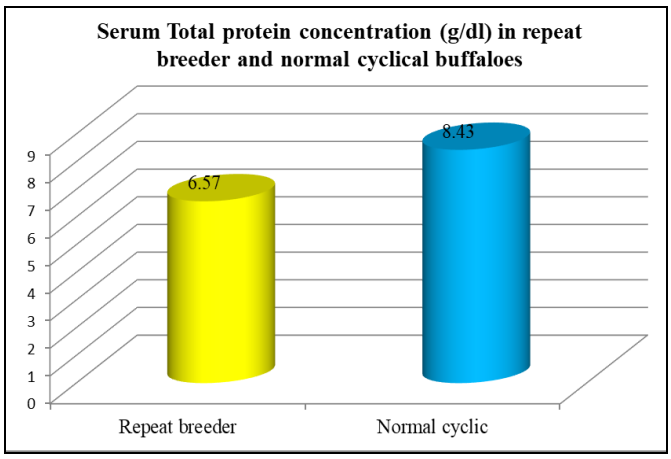


Plate 1: Haematological parameters in repeat breeder and normal cyclical Graded Murrah buffaloes







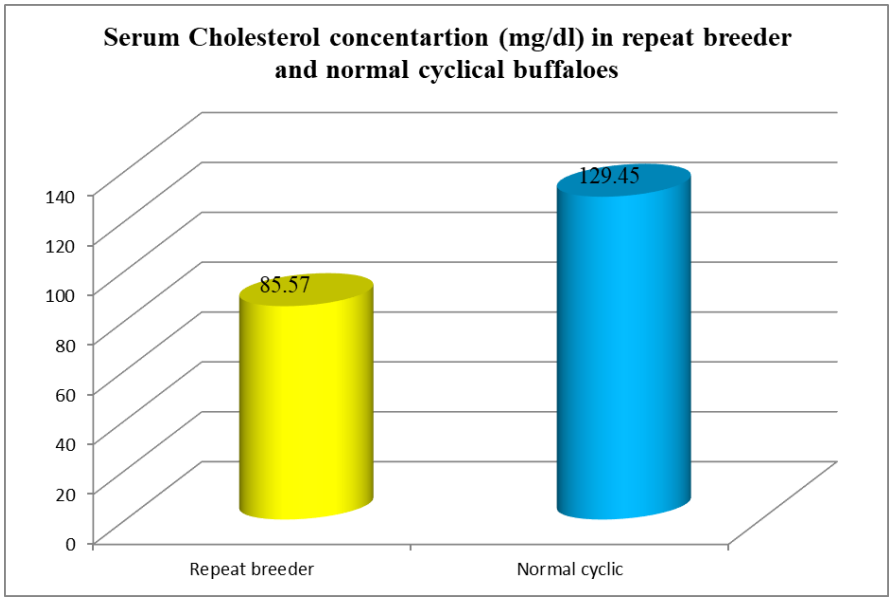


Plate 2: Biochemical parameters in repeat breeder and normal cyclical Graded Murrah buffaloes

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