Research Article

Biochemical Indices of Male *Camelus dromedarius* during Breeding and Non-Breeding Season under Farming System

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Abstract | The current study was planned to know the effect of breeding season on blood biochemicals of dromedary male camel in Pakistan. The clinically healthy male Marecha camels (n=5) from five to ten years old were investigated in non-breeding "August" and breeding "February" months. They were housed in half-opened pens, TMR, 6-8 hours browsing and twice-watering was performed. Blood biochemicals were studied by using standard kits through biochemistry analyzer. The glucose, cholesterol and triglyceride values (P<0.05) were found to be 136.68±5.46, 57.12±4.44, 35.18±3.26 and 142.62±4.38, 59.32±4.26, 36.97±3.63 mg/dl respectively in August and February, being elevated in rut-camels. The total protein, urea and creatinine concentrations varied non-significantly among animals. While the calcium and phosphorus concentration (P<0.05) was found to be 9.88±1.16, 4.77±0.8 and 9.06±1.18, 4.06±0.9 mg/dl respectively in August and February, lower in rut-camels. Such biochemical investigations are evident of the importance of serum bio-gram which has pronounced effect on sexual behavior and may be used for detection of rutting and non-rutting males.

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Introduction

The dromedary camel is vital domestic economically important animal of the tropical environment, where the harsh and hostile climatic conditions adversely affect the survival of other livestock species (Faye, 2014; Kadim, 2013; Faraz, 2020, 2021). The camel provides milk and meat in this environment (Osman *et al*., 2015; Faraz *et al*., 2019a, b, c).

The camels are found to be seasonal breeders with breeding season in cooler months with endocrinological, behavioral and biochemical change during rut (Yagil and Etzion, 1980; Marai *et al*., 2009). The rut in males may go 2-3 months (Tibary and Anouassi, 1997) while remained quiescent for rest year. Regarding serum biochemicals, small changes observed as affected by age, sex and seasonal effects. So, these could be used as indirect tool to assess the rutting condition in the males.

The blood constituents as health mirrors (Momenah, 2014) could provide valuable information regarding general health and physiological condition of animals (Aichouni *et al*., 2013). Mostly the camel research is survey based in Pakistan (Faraz *et al*., 2021), so the previous studies not justify requirements of the subject. Current study covers biochemical parameters in reference to breeding season about Marecha camel

reared under farming system in Thal desert, will add the primary database of camel science.

Materials and Methods

The trial was attained at CBRS which is located in desert Thal. A number of 5 healthy Marecha males were sampled. Animals were dewormed and vaccinated by injection Ivermectin and Trypamedium-Samorine, respectively. The concentrate (4-5 kg) of DM-90.32, CP-18.06, NDF-29.09, ADF-14.41, TDN-70 and ME-2.41 Mcal/kg DM was fed with *Cicer arientinum* (5kg) as TMR in manger beside 6-8 hours browsing. Water was offered twice a day; salt lumps and 90-110 grams minerals-mixture was also offered on daily basis.

Blood samples were drained by jugular puncture for biochemical analysis by using standard kits in DL-9000-Italy biochemistry analyzer. The digested sample was used for determination of calcium and phosphorus in atomic absorption spectrophotometer at High Tech Lab, University of Agriculture-Faisalabad (Faraz *et al*., 2018). The data was analyzed statistically by applying t-test (Gecer *et al*., 2016).

Results and Discussion

Energetic parameters

The mean values of glucose, cholesterol and triglycerides were differed significantly (P<0.05) between two group males, slightly higher in rut camels (Table 1) may be due to the metabolic overactivity. Current study results support the findings of Al-Harbi (2012) who also reported higher values in rutting males and further suggested that these indications could be used for the detection of rutting behavior and condition of male camels. Osman and Al-Busadah (2003) reported elevated lactic-acid contents in camel blood and this may be the reason of increased glucose level in camels which is also supportive of the present results. Alike glucose values were reported by Faye and Bengoumi (2018) as 60-140 mg/dl.

Reported concentration of glucose was 65.55±3.86 mg/dl in nomadic Sudanese camels (Babeker, 2013). Eltayeb *et al*. (2015) reported mean glucose concentration as 82.3±14.1, 106.7±26.6, 79.7±8.2 mg/dl respectively in groups with regular water provision, no water for 48h and 4hr after water provision. These results support the present study findings, as glucose concentration was found being increased in stress condition, so it is evident of the fact that in rutting season the animal observes hormonal stress, so due to the reason the blood glucose concentration was found to be elevated.

Table 1: *Blood biochemical profile of male Marecha camel (n=5) non-breeding and breeding season.*

Parameters	Non-rut (August)	Rut (February)
Glucose (mg/dl)	136.68±5.46 [a]	142.62±4.38[b]
Cholesterol (mg/dl)	57.12±4.44 [a]	59.32±4.26 [b]
Triglycerides (mg/dl)	35.18±3.26 [a]	36.97±3.63 [b]
Total Protein (g/dl)	7.20±1.48	7.08±1.24
Urea (mg/dl)	46.28±2.68	45.80±2.44
Creatinine (mg/dl)	1.51±0.07	1.49±0.09
Calcium (mg/dl)	9.88±1.16 [a]	9.06±1.18[b]
Phosphorus (mg/dl)	4.77±0.8 [a]	4.06±0.9[b]

Means having different superscript in columns are significantly different (P<0.05).

Contrary to current findings, Abdalmula *et al*. (2019) reported lower values of glucose, cholesterol and triglycerides as 87.83±9.95, 34.81±2.88 and 29.41±2.00 mg/dl in male camels. Elitok and Cirak (2018) reported glucose and cholesterol concentrations as 114.33±3.2, 22.03±0.52; 108.03±2.45, 21.80±1.30; 103.32±2.76, 16.89±1.34 and 118.70±1.25, 24.99±1.88 mg/dl in male dromedary camels in pre-rut, rut, post-rut and non-rut season respectively. While creatinine concentrations also varied significantly in their study and these variations from present results may be due to the geographical, breed and nutritional factors.

Hamad *et al*. (2018) reported glucose, cholesterol and triglycerides concentrations as 6.90±1.48, 0.86±0.41, 0.23±0.1; 6.38±0.87, 0.80±0.11, 0.17±003; 6.26±0.26, 0.91±0.05, 0.17±0.03 mmol/l in winter (January-March), spring (April-June) and summer (July-September) season respectively, in Algerian dromedary male camel.

Protein parameters

The mean values of total protein, urea and creatinine were found to differ non-significantly in male camels in non-rut and rut season (Table 1). The present study findings are in normal range and support the results of Al-Harbi (2012) while different from the findings of Elitok and Cirak (2018). Reported serum total protein concentration was 7.31±0.27 and 7.20±0.16 mg/dl in dromedary male camel during non-rut and rut season respectively (Al-Harbi, 2012). Elitok and

Cirak (2018) reported creatinine and blood urea nitrogen concentrations as 1.48±0.41, 30.50±0.16; 1.53±0.47, 30.20±0.22; 1.57±0.65, 30.80±0.19 and 1.45±0.66, 30.20±0.14 mg/dl in male dromedary camels in pre-rut, rut, post-rut and non-rut season, respectively.

According to the results reported by Eltayeb *et al.* (2015), the mean total protein (g/dl) and urea, creatinine (mg/dl) concentrations were 5.1±0.3, 27.4±4.1, 1.5±0.3; 6.8±0.8, 36.4±0.9, 2±0.3; 5.3±0.2, 28.1±5.1, 1.5±0.3 respectively, in groups with regular water provision, no water for 48h and 4hr after water provision. These results are contrary to present study findings, as these concentrations were found to be increased in water deprivation stress condition, but in current study these concentrations were found to be lower in breeding season.

Hamad *et al.* (2018) reported urea (mmol/l) and creatinine (µmol/l) concentrations as 10.20±3.03, 167.34±43.7; 11.73±1.93, 182.63±4.12; 15.34b±0.69, 181.83±7.27 in winter (January-March), spring (April-June) and summer (July-September) season respectively, in Algerian dromedary male camel. Reported values of total protein and urea were to be 8.2 g/dl and 25.04 mg/dl in Bangladeshi dromedary camels (Islam *et al.*, 2019).

Minerals

The mean values of calcium and phosphorus were found to be differed significantly ($P<0.05$) as higher in non-rutting males (Table 1). Moreover, it has been documented that mineral levels have been found elevated in rutting and green season (Al-Harbi, 2012). Calcium metabolism is related to hormonal regulations of thyroid and parathyroid which becomes more active in stressed condition (El-Khasmi *et al.*, 2000). In dromedaries, an increase was found in calcium and phosphorus concentrations in wet season due to the availability of plants richer in minerals (Amin *et al.*, 2007), this also confirms the current results as the availability of feeding is same to non-rutting and rutting males, but the rutting animals showed decreased calcium and phosphorus values may be due to hormonal stress condition.

Other authors recorded an increase in calcium but decrease in phosphorus concentrations in summer season (El-Harairy *et al.*, 2010). Reported concentrations of calcium were 11.61±0.70 mg/l in Sudanese nomadic camels (Babeker, 2013). Contrary to this, in female camels, Elitok and Cirak (2018) reported calcium and phosphorus mean concentrations as 9.0±0.1 and 3.8±0.5 mg/dl, while 2.22±0.08 and 1.70±0.11 mmol/l in Egyptian she-camel (Ebissy *et al.*, 2019).

Conclusions and Recommendations

Blood biochemicals study provides ample information about health condition and physiological stress generally. The elevated levels of serum biochemicals like glucose, cholesterol and triglycerides in response to rutting condition affect the general physiological state and functions including sexual performance. This increase may be attributed to metabolic state overactivity or hormonal stress and these parameters could be used to detect rutting male.

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Novelty Statement

Camel put an indispensible role in economy of marginal areas, but still it is ignored in Pakistan. So, an initiative is taken to illustrate different parameters of camel husbandry under natural milieus. Present study is the series of same which will plot footprints to develop database line for pastoral community.

Author's Contribution

Asim Faraz and Muhammad Shahid Nabeel: Conducted research and write-up.
Abdul Waheed and Nasir Ali Tauqir: Helped in analysis and review.

Conflict of interest

The authors have declared no conflict of interest.

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