Research Article

# Haematological and Biochemical Profile of Extensive Kept Male Barela (*Camelus dromedarius*) Camel during Breeding and Non-Breeding Season

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**Abstract** | This trial was undertaken to study the effect of breeding season on haematological and blood biochemical parameters of Barela male camel under extensive conditions in Desert Thal Pakistan. The clinically healthy male Barela camels (n=5) from 6-10 years old having mean bodyweight of 680±50 *kg* was studied in breeding and Non-breeding season. The camels were fed with gram-straws, natural vegetation and twice day water. Deworming was performed before the start of trial. Haematological and blood biochemical parameters such as haemoglobin (Hb), red-blood-cells (RBC) and white-blood-cells (WBC) count, packed-cell-volume (PCV), glucose, cholesterol, triglycerides, total protein, urea and creatinine concentrations were analyzed on haematology and biochemistry analyzer. The mean Hb concentration (P<0.05) was found to be 14.77±0.76 and 14.16±0.97 *g/dl* in non-breeding and breeding males, respectively. The hematological values of RBC, WBC and PCV were found to be varied (P<0.05) as higher in non-breeding animals, while the biochemical indices including cholesterol, triglycerides and total protein were also significantly (P<0.05) higher in non-breeding males except glucose concentration which was found higher in rutting males. Whereas the urea and creatinine non-significantly (P>0.05) varied between non-breeding and breeding males. These results were compared with available relevant literature and it showed that these parameters may be affected due to breeding stress in the male camels which could be the indication of high performance in the rutting season.

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## Introduction

The dromedaries are of unique importance especially in the tropical environment as they can survive and produce in harsh and hostile extreme conditions equally to other domestic livestock species (Kadim, 2013; Faye, 2014; Faraz *et al*., 2019). In order to adjust body functions with environment and physiological condition, the variations in physiological factors are seem to put solid effect on blood parameters (Badawy *et al*., 2008). The blood parameters both hematological and biochemical are health condition signals and their studies could provide ample clue about animal health and physiological condition generally (Momenah, 2014) in fact, may serve as a mirror (Faraz *et al*., 2018).

The camels are seasonal breeders having breeding/rutting season in cooler months of the year with different behavioral, endocrinological and biochemical changes during rut (Yagil and Etzion, 1980; Marai *et al*., 2009). The rutting in dromedary males may go up to 2-3 months (Tibary and Anouassi, 1997) while he remained quiescent for rest months of year. Regarding haematological parameters and 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 (Al-Harbi, 2012).

A very little research data is documented about the blood constituents of Pakistani dromedary male camel as affected by breeding season. This study covers haematological and biochemical parameters in context with breeding season about Barela male camel reared under extensive-management-system (EMS) in its natural habitat (Thal Desert).

## Materials and Methods

The trial was attained at Thal Desert. Five Barela males of 6-9 years, having 680±50 *kg* live weight raised in extensive system were sampled. The age was determined by dentition while body weight was calculated by using body measurements such as shoulder height, chest girth and hump girth in formula (Turki *et al*., 2007). Before the start of experiment, all animals were examined and only physically healthy having normal physiological norms were included in the trial. Animals were dewormed and vaccinated by injection Ivermectin and Trypamedium-Samorine, respectively. The animals were allowed jungle browsing for 10 hr daily and were fed 5 *kg* gram straws (*Cicer arientinum*) per head as manger feeding. Water was offered twice a day; salt lumps were placed in manger.

Blood samples were collected by jugular puncture into test tubes; with and without EDTA for serum separation. A total of 15 ml blood was drained from each camel; 10 *ml* used for serum separation and 5 ml for haematology. The blood parameters were analyzed using standard kits (Spin-react, Spain) method on haematology-analyzer (Mindray BC2300 Germany) and biochemistry-analyzer (DL9000 Italy) at Laboratory of CBRS (AOAC, 1997). Sampling was done twice a month (day 1 and 15 of month) total for three months and tests in duplicate. The collected specimen was used individually per male camel. The data collected was analyzed statistically by applying *t-test* (Gecer *et al*., 2016).

## Results and Discussion

*Haemoglobin*

The mean Hb concentration (P>0.05) was 14.86±0.76 and 14.16±0.97 *g/dl* respectively in non-breeding and breeding Barela males (Table 1). Al-Harbi (2012) reported Hb values as 14.49±1.46, 14.80±1.15, 15.20±1.40 and 14.20±1.55 g/dl in Arabian dromedary males in pre-rutting, non-rutting, post-rutting and rutting season. Lower Hb values were found in rutting season and this factor could be used for diagnosis of rut behavior provided that their normal values are known in non-rutting males. Reported Hb concentration was 14.8±1.2 and 14.2±1.5 *g/dl* during non-breeding and breeding season in male dromedary camels, respectively (Elitok and Cirak, 2018) whereas the Hb values were found as 14.86±1.28 and 14.26±1.12 *g/dl* in non-rutting and rutting Marecha dromedary male camels, raised in farming system at Thal desert (Faraz *et al*., 2021).

*RBC, WBC and PCV*

The RBC, WBC and PCV mean concentration was differed (P<0.05) between groups, being greater in non-breeding camels (Table 1). The mean concentration of RBC counts is comparable to those postulated by Al-Busadah and Osman (2000) and Al-Harbi (2012). On the other hand, values observed for RBC in current study are not in line with findings reported by some other researcher under diverse environment setups including the study of Amin *et al*.

(2007), Farooq *et al.* (2011) and Ghafoor *et al.* (2018). During current investigation, higher mean values were observed for RBC when compared with finding of the aforementioned authors. The factors like geography, climate and genetical variation influence these parameters as reported by Saeed and Hussein (2008).

**Table 1:** *Haematological and blood biochemical parameters of Barela male camel (n=5) during breeding and non-breeding season.*

| Parameters | Non-Breeding (August) | Breeding (February) |
|---|---|---|
| Haemoglobin (g/dl) | 14.77 [a] ±0.76 | 14.16 [b] ±0.97 |
| RBC ($10^6$/µl) | 9.85 [a] ±0.86 | 8.68 [b] ±0.82 |
| WBC ($10^3$/µl) | 29.76 [a] ±2.38 | 28.82 [b] ±2.73 |
| PCV (%) | 38.96 [a] ±2.64 | 36.34 [b] ±2.14 |
| Glucose (mg/dl) | 136.12 [a] ±6.46 | 138.82 [b] ±3.28 |
| Cholesterol (mg/dl) | 59.62 [a] ±2.64 | 58.62 [b] ±3.06 |
| Triglycerides (mg/dl) | 36.47 [a] ±3.36 | 35.39 [b] ±2.93 |
| Total Protein (g/dl) | 7.43 [a] ±1.46 | 7.06 [b] ±1.14 |
| Urea (mg/dl) | 46.57±3.82 | 45.68±2.34 |
| Creatinine (mg/dl) | 1.49±0.07 | 1.48±0.07 |

*Means having different superscript in columns are differed significantly (P<0.05); RBC: Red-Blood-Cells; WBC: White-Blood-Cells; PCV: Packed-Cell-Volume.*

Al-Harbi (2012) documented different values as affected by breeding season, RBC as 10.55±1.39, 10.90±1.04, 9.87±1.33, 8.90±1.45 *$10^6$/µl* and WBC as 10.30±1.68, 10.10±1.20, 9.70±1.48, 10.5±1.89 *$10^3$/µl* in pre-rutting, non-rutting, post-rutting and rutting season in dromedary males. Reported RBC values were 10.90±1.04, 8.90±1.45 *$10^6$/µl* during non-rutting and rutting season in dromedary males, respectively (Elitok and Cirak, 2018). Recently, Faraz *et al.* (2021) reported RBC *$10^6$/µl* 10.55±0.96, 8.80±0.88 and WBC *$10^3$/µl* 26.35±4.18, 29.31±2.93, respectively in non-rut and rut male Marecha dromedary camels under farming system.

Reported PCV concentrations were to be 38.20±2.29, 39.60±3.18 and 15.90±2.30 % during pre-rutting, non-rutting, post-rutting and rutting season, respectively in male dromedary camels (Al-Harbi, 2012). Elitok and Cirak (2018) reported PCV concentrations as 39.80±1.99 and 39.50±2.65 % in dromedary males of non-rutting and rutting season, respectively. Reported values of PCV were 38.36±2.34 and 35.24±1.45% in non-rutting and rutting male Marecha dromedary camels (Faraz *et al.*, 2021) and current study results also support these findings as RBC, WBC and PCV concentrations were observed lower in rut season here too.

*Energetic parameters*

The mean values of glucose, cholesterol and triglycerides were differed (P<0.05) among non-breeding and breeding male camels being normal but slightly higher in rutting animals. However, mean glucose value which was higher in rutting males in comparison with non-rutting male camels (Table 1). Current result about glucose concentration supported the findings of Al-Harbi (2012) who demonstrated higher values in rutting males and further suggested that these indications could be used for the detection of rutting behavior and condition 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 camels in pre-rutting, rutting, post-rutting and non-rutting season respectively whereas creatinine concentrations also varied significantly in their study pre-rutting, rutting, post-rutting and non-rutting season. These findings are not in line with current results, variations may be due to geographical, breed and nutrition 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 breeding season (Jan-Mar), spring (April-June) and summer (July-Sept) season respectively, in Algerian dromedary male camel.

*Protein parameters*

The mean values of total protein were varied (P<0.05) in male camels in non-breeding and breeding season while the values of urea and creatinine were differed (P>0.05) among groups (Table 1). The results support the findings of Al-Harbi (2012) and in contrast with Elitok and Cirak (2018). Al-Harbi (2012) documented serum total protein concentration was 7.31±0.27 and 7.20±0.16 *mg/dl* in dromedary male camel during non-rutting and rutting season respectively 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 camels in pre-rutting, rutting, post-rutting and non-rutting season, respectively.

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 breeding season (Jan-Mar), spring (April-June) and summer (July-Sept) season respectively, in Algerian dromedary male camel.

## Conclusions and Recommendations

The haematological and serum biochemicals variate in response to physiological status/ functions including sexual performance. In conclusion, these parameters may be used as a guide for the detection of breeding males very easily that could be used for mating and induction of ovulation in she-camels as they are induced ovulators.

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## Novelty Statement

Camels are the main pillars of pastoral economy in the world and Pakistan is not exception to this, where camel is imparting a prime position. Barela is the most famous breed regarding milk production. Here in this paper a very new investigation was performed regarding the haematological and biochemical parameters in extensively managed male camels during breeding and non-breeding season. This will definitely give an eminent picture of the profile for breeding stage detection as well as the data will serve as the primary guide for future investigations of relevant field.

## Author's Contribution

**Asim Faraz and Nasir Ali Tauqir:** Attained data and write-up.
**Abdul Waheed, Hafiz Muhammad Ishaq and Riaz Hussain Mirza:** Helped in analysis and write-up.
**Rana Muhammad Bilal and Muhammad Arslan Akbar:** Helped in write up.
**Muhammad Shahid Nabeel:** Helped in conduct of research.
**Syeda Maryam Hussain:** Reviewed the paper, helped in write-up and reviewed the paper.

*Conflict of interest*
The authors have declared no conflict of interest.

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