

# BLOOD PROFILE OF KACHCHHI CAMEL DURING EXERCISE

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## ABSTRACT

The study was conducted on five adult clinically healthy Kachchhi camels (B. wt 450-550 kg) to assess the effect of different payloads ( $L_1$  - 1500kg,  $L_2$  - 2000kg and  $L_3$  - 2500kg), seasons ( $S_1$  - summer,  $S_2$  - hot humid and  $S_3$  - winter) and work rest cycles ( $WR_1$  : 2h (W) - 1h (R) + 2h (W) - 1h (R) + 2h (W) - 1h (R) and  $WR_2$  : 1h (W) - 15 min (R) - 1h (W) - 15 min (R) - 1h (W) - 1h (R) - 1h (W) - 15 min (R) - 1h (W) - 15 min (R) - 1h (W)) on the blood profile like glucose (mg/dl), urea (mg/dl), uric acid (mg/dl), creatinine (mg/dl), Hb (g%) and PCV (%). The per cent rise in blood glucose (mg/dl) level was 19.17 and 10.22 & 16.85 and 12.40 and 18.06 and 20.81 during  $S_2$ ,  $S_3$  and  $S_1$  season in  $WR_1$  and  $WR_2$ , respectively during  $S_1$ ,  $S_2$  and  $S_3$ . The levels of Urea (mg/dl) were 58.01 and 59.40 & 45.73 and 51.63 & 50.11 and 50.67 in  $WR_1$  and  $WR_2$ , respectively. The concentration of Uric Acid (mg/dl) was 0.25 and 0.29 & 0.34 and 0.34 & 0.39 and 0.32 in  $WR_1$  and  $WR_2$ , respectively during  $S_3$ ,  $S_2$  and  $S_1$ . The creatinine (mg/dl) level before the start of work was 1.062 and at the end of work was 1.224. The value of Hb (g%) was 13.01 and 12.85 & 12.73 and 12.96 & 12.73 and 12.90 in  $WR_1$  and  $WR_2$ , during  $S_1$ ,  $S_2$ , and  $S_3$  respectively. This indicated that camel can work comfortably under  $WR_1$  as compared to  $WR_2$ .

**Key words:** Blood profile, Kachchhi camel, payloads, seasons, work rest cycles

Haematological and biochemical analysis of blood can often provide valuable information regarding health status of animal. It also plays an important role to determine the normal state from the state of stress, which can be nutritional, environmental or physical (Aderemi, 2004). It is well known that a variety of factors such as species, breed, sex, age, nutrition, illness, stress, exercise, transport and seasonal variations can affect the blood profile (Jain, 1998). Not much attention is paid to either stress and nor to the health of the animal though that may alter the physiological status of the camel (Kataria *et al*, 2000).

The present study aims to record the deviations in the blood chemistry of the Kachchhi camels and the impact of work rest cycle, payload and seasonal variation.

## Materials and Methods

### Experimental Animals and Management

This study was conducted on five adult clinically healthy Kachchhi camels of 450-550 kg body weight and 7-8 years of age during hot dry, hot humid and winter season. The camels, camel carts and drivers were hired from the local market. The camel was acclimatised for route of transport. The camels were given the feed as per the ICAR guideline (1985).

### Duration of experiment

The present experiment was conducted in three seasons namely  $S_1$  - hot dry (15<sup>th</sup> May -30<sup>th</sup> June),  $S_2$  - hot humid (1<sup>st</sup> Sept - 15<sup>th</sup> Oct) and  $S_3$  - winter (1<sup>st</sup> Dec - 15<sup>th</sup> Jan).

### Work rest cycle and Total loads

The camels worked for 6 hrs daily from morning 08.00 hrs to 16.00 hrs in two work rest cycles viz.  $WR_1$ : 2h (W) - 1h (R) + 2h (W) - 1h (R) + 2h (W) - 1h (R) (Singh, 1996) and  $WR_2$ : 1h (W) - 15 min (R) - 1h (W) - 15 min (R) - 1h (W) - 1h (R) - 1h (W) - 15 min (R) - 1h (W) - 15 min (R) - 1h (W) (Traditional) on straight tar road of about 5.2 km/round. Three loads ( $L_1$  - 1500 kg,  $L_2$  - 2000 kg and  $L_3$  - 2500 kg) were placed on the camel cart. The total load was the sum of payload + weight of cart + weight of driver. The bags filled with gravels and concentrate mixture were used to fix the pay loads on the cart. The camel worked with three pay loads in two work rest cycles for six days (two days for each pay load).

### Blood and Biochemical profile

Approximately 10ml of blood was collected aseptically in EDTA vacutainers and 10ml was collected in test tube without using coagulant for serum separation by puncturing the jugular vein of

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animals daily in the morning before the start of the work and at the end of the work in the evening. The plasma samples were separated from whole blood by centrifugation at 3000 rpm for 15 minutes, and stored at -20°C for estimation of the blood profile like glucose (mg/dl), urea (mg/dl), uric acid (mg/dl), creatinine (mg/dl), Hb (g%) and PCV (%).

### Statistical analysis

The data were presented as mean ± standard error (SE). All means and SE were estimated as per the procedure outlined in SPSS® 11.00 statistical packages (2001). The level of significance was set at 95% confidence interval at P < 0.05. The significance between means and their combined interaction effect of different treatment effect were assessed using the multi-factorial completely randomised design (CRD) procedures (Snedecor and Cochran, 1980).

### Results and Discussion

The glucose level was significantly (p < 0.05) lower during S<sub>1</sub> as compared to S<sub>2</sub> and S<sub>3</sub> which was at par in both the work rest cycles (Table 1). The per cent rise in blood glucose level was observed to be 19.17 and 10.22 and 16.85 and 12.40 during S<sub>2</sub> and S<sub>3</sub> season in WR<sub>1</sub> and WR<sub>2</sub>, respectively as compared to S<sub>1</sub>. The per cent reduction in glucose level at the end of work was 18.06 and 20.81 in S<sub>1</sub> in WR<sub>1</sub> and WR<sub>2</sub>. The corresponding values during S<sub>2</sub> and S<sub>3</sub> season were 14.46 and 21.08 and 16.85 and 16.51, respectively. The blood glucose level was significantly (p < 0.05) affected by season and session of work but there was no effect of payload and work rest cycle inter actions. There was marked significant (p < 0.05) reduction in blood glucose level at the end of work in all seasons of both the work rest cycles except S<sub>2</sub> season in WR<sub>1</sub>.

**Table 1.** Effect of Work Rest Cycles on glucose (mg/dl) of Kachchhi camel.

Pay Load	Season												Mean	
	Summer				Hot - Humid				Winter				WR <sub>1</sub>	WR <sub>2</sub>
	WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>			
	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW		
L <sub>1</sub>	97.20 ±7.07	87.80 ±5.06	103.00 ±6.36	89.00 ±6.98	104.40 ±2.44	93.60 ±5.94	102.40 ±2.11	85.40 ±5.77	104.80 ±2.08	99.60 ±8.58	111.20 ±4.71	98.80 ±7.74	97.90 ±2.39	101.63 ±2.98
L <sub>2</sub>	99.80 ±4.66	80.20 ±5.73	94.60 ±5.90	77.80 ±5.91	111.00 ±8.31	89.60 ±6.38	110.60 ±3.21	85.20 ±4.98	120.60 ±6.89	94.00 ±3.44	106.80 ±3.89	92.60 ±5.01	102.53 ±3.32	94.60 ±3.07
L <sub>3</sub>	97.20 ±4.73	73.00 ±5.13	108.20 ±3.98	71.80 ±4.23	106.60 ±3.61	92.60 ±3.79	111.40 ±2.34	85.00 ±3.88	102.60 ±8.74	93.80 ±9.87	115.60 ±2.98	86.60 ±3.00	99.30 ±4.12	96.43 ±4.14
Mean (Se)	98.06 ±3.67 <sup>B</sup>	80.33 ±5.12 <sup>A</sup>	101.93 ±4.68 <sup>B</sup>	79.53 <sup>A</sup> ±6.23 <sup>A</sup>	107.33 ±4.68 <sup>A</sup>	105.26 ±3.71 <sup>A</sup>	108.13 ±3.98 <sup>B</sup>	91.86 ±3.12 <sup>A</sup>	112.66 ±5.31 <sup>B</sup>	95.80 ±3.55 <sup>A</sup>	111.20 ±5.00 <sup>B</sup>	92.66 ±3.01 <sup>A</sup>		
Mean (S)	89.20±2.73 <sup>a</sup>		90.73±3.30 <sup>a</sup>		106.30±3.19 <sup>b</sup>		100±3.10 <sup>b</sup>		104.23±3.23 <sup>b</sup>		101.93±3.63 <sup>b</sup>			

Season Mean with different superscripts (a, b) in row differ at p < 0.05

Work sessions mean with different superscripts (A,B) in row differ at P<0.05

Abbreviations used: Work Rest Cycle 1 (WR<sub>1</sub>), Work Rest Cycle 2 (WR<sub>2</sub>), Before work (BW), After work (AW)

**Table 2.** Effect of Work Rest Cycles on urea (mg/dl) of Kachchhi camel.

Pay Load	Season												Mean	
	Summer				Hot - Humid				Winter				WR <sub>1</sub>	WR <sub>2</sub>
	WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>			
	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW		
L <sub>1</sub>	55.29 ±4.03	65.30 ±8.01	52.83 ±2.35	60.43 ±4.98	32.85 ±8.40	39.09 ±7.31	59.11 ±3.39	61.21 ±2.78	46.70 ±4.61	47.56 ±3.81	48.72 ±3.76	50.19 ±2.99	47.80 ±3.05 <sup>a</sup>	49.37 ±2.18 <sup>a</sup>
L <sub>2</sub>	49.86 ±1.52	57.53 ±3.23	54.91 ±3.46	58.75 ±4.69	44.47 ±6.92	47.72 ±4.93	40.50 ±6.44	43.58 ±7.09	49.29 ±3.11	52.40 ±1.93	48.73 ±2.07	52.98 ±3.34	50.21 ±1.68 <sup>a</sup>	53.45 ±1.65 <sup>b</sup>
L <sub>3</sub>	55.47 ±5.27	64.59 ±4.30	63.11 ±6.46	66.37 ±5.44	54.11 ±2.24	56.17 ±3.91	50.87 ±5.22	54.49 ±5.18	51.32 ±5.04	52.41 ±4.53	47.16 ±3.79	52.26 ±6.45	55.84 ±1.78 <sup>b</sup>	58.87 ±2.16 <sup>c</sup>
Mean (Se)	53.54 ±2.21 <sup>A</sup>	62.47 ±3.12 <sup>B</sup>	56.95 ±2.66 <sup>A</sup>	61.85 ±2.85 <sup>B</sup>	43.81 ±4.14 <sup>A</sup>	47.66 ±3.51 <sup>B</sup>	50.16 ±3.43 <sup>A</sup>	53.09 ±3.44 <sup>A</sup>	49.10 ±2.54 <sup>A</sup>	51.12 ±2.00 <sup>A</sup>	48.69 ±1.65 <sup>A</sup>	52.65 ±2.66 <sup>A</sup>		
Mean (S)	58.01±2.06 <sup>c</sup>		59.40±1.96 <sup>b</sup>		45.73±2.69 <sup>a</sup>		51.63±2.40 <sup>a</sup>		50.11±1.53 <sup>b</sup>		50.67±1.58 <sup>a</sup>			

Season Mean with different superscripts (a, b) in row differ at p < 0.05

Load Mean with different superscripts (a, b, c) in coloum differ at p < 0.05

Work sessions mean with different superscripts (A,B) in row differ at P<0.05

Abbreviations used: Work Rest Cycle 1 (WR<sub>1</sub>), Work Rest Cycle 2 (WR<sub>2</sub>), Before work (BW), After work (AW)

**Table 3.** Effect of Work Rest Cycle -1 (WR<sub>1</sub>) and 2 (WR<sub>2</sub>) on uric acid (mg/dl) of Kachchhi camel.

Pay Load	Season												Mean	
	Summer				Hot - Humid				Winter				WR <sub>1</sub>	WR <sub>2</sub>
	WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>			
	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW		
L <sub>1</sub>	0.390 ±0.08	0.378 ±0.07	0.398 ±0.12	0.748 ±0.53	0.388 ±0.01	0.304 ±0.07	0.380 ±0.09	0.416 ±0.12	0.300 ±0.06	0.326 ±0.08	0.358 ±0.07	0.300 ±0.02	0.348 ±0.03	0.433 ±0.09
L <sub>2</sub>	0.702 ±0.30	0.460 ±0.19	0.098 ±0.03	0.188 ±0.04	0.366 ±0.09	0.382 ±0.06	0.230 ±0.05	0.352 ±0.09	0.210 ±0.10	0.212 ±0.08	0.252 ±0.08	0.242 ±0.06	0.389 ±0.07	0.227 ±0.03
L <sub>3</sub>	0.244 ±0.05	0.218 ±0.08	0.292 ±0.11	0.250 ±0.08	0.250 ±0.05	0.404 ±0.05	0.414 ±0.09	0.290 ±0.11	0.262 ±0.14	0.230 ±0.07	0.278 ±0.06	0.322 ±0.15	0.268 ±0.03	0.308 ±0.04
Mean (S)	0.399±0.06		0.329±0.09		0.349±0.02		0.347±0.04		0.257±0.04		0.292±0.03			

**Table 4.** Effect of Work Rest Cycle -1 (WR<sub>1</sub>) and 2 (WR<sub>2</sub>) on creatinine (mg/dl) of Kachchhi camel.

Pay Load	Season												Mean	
	Summer				Hot - Humid				Winter				WR <sub>1</sub>	WR <sub>2</sub>
	WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>			
	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW		
L <sub>1</sub>	1.34 ±0.24	1.43 ±0.17	1.34 ±0.26	1.26 ±0.20	0.86 ±0.17	1.46 ±0.13	0.86 ±0.15	1.14 ±0.17	1.06 ±0.11	1.12 ±0.12	1.14 ±0.06	1.08 ±0.13	1.212 ±0.07	1.217 ±0.08
L <sub>2</sub>	1.24 ±0.22	1.22 ±0.34	1.10 ±0.22	1.38 ±0.11	0.86 ±0.16	1.28 ±0.09	1.12 ±0.10	1.28 ±0.06	0.88 ±0.12	1.02 ±0.09	0.96 ±0.11	0.72 ±0.11	1.083 ±0.08	1.113 ±0.07
L <sub>3</sub>	1.20 ±0.08	1.30 ±0.14	0.86 ±0.15	1.46 ±0.10	1.00 ±0.11	1.30 ±0.17	1.00 ±0.17	1.48 ±0.10	0.84 ±0.10	0.98 ±0.18	0.80 ±0.18	1.02 ±0.19	1.103 ±0.06	1.130 ±0.08
Mean (Se)	1.261 ±0.11	1.321 ±0.13	1.321 ±0.15	1.401 ±0.04	0.911 ±0.83	1.352 ±0.07	0.991 ±0.08	1.302 ±0.07	0.931 ±0.07	1.042 ±0.07	0.971 ±0.08	0.941 ±0.09		
Mean (S)	1.288±0.08 <sup>c</sup>		1.360±0.09 <sup>c</sup>		1.127±0.07 <sup>b</sup>		1.147±0.06 <sup>b</sup>		0.983±0.05 <sup>a</sup>		0.953±0.057 <sup>a</sup>			

Season Mean with different superscripts (a, b) in row differ at p<0.05

Session mean with different superscripts (1, 2) in row differ at p < 0.05

Interaction Mean (S X Se) with different superscripts (A, B) in column differ at p<0.05

Abbreviations used: S= Season, Se= Session of work

The present findings are well supported by Bhatia (1986), Mehrotra and Gupta (1989) and Al-Qarawi (1999) where as reported values are lower than the values reported by Yadav and Bissa (1998). However, it is higher than the values reported by Sultan (2003).

The urea level was significantly (p < 0.05) higher during S<sub>1</sub> (58.01±2.05) followed by S<sub>3</sub> (50.11±1.53) and S<sub>2</sub> (45.73±2.69) in WR<sub>1</sub> whereas in WR<sub>2</sub>, the urea level observed in S<sub>2</sub> (51.63±2.40) and S<sub>3</sub> season (50.67±1.58) was at par but differed significantly (p < 0.05) from the value observed during S<sub>1</sub> (59.40±1.96) (Table 2). The urea level was at par under L<sub>1</sub> and L<sub>2</sub> pay load in WR<sub>1</sub> but differed significantly (p < 0.05) from L<sub>3</sub> pay load whereas, the urea level observed under L<sub>1</sub>, L<sub>2</sub> and L<sub>3</sub> pay load differed significantly (p < 0.05) from each other in WR<sub>2</sub>. The per cent rise in urea level was 16.64 and 5.51, 10.03 and 6.17 and 3.42 and 7.51 at the end of work during S<sub>1</sub>, S<sub>2</sub> and S<sub>3</sub> season, respectively in WR<sub>1</sub> and WR<sub>2</sub>. The Urea level was significantly (p < 0.05) affected by season, loads, session of work and

interaction of Season x Load. There was not much rise in Urea level in WR<sub>2</sub> except in S<sub>3</sub>. The urea level differed significantly (p < 0.05) at the end of work in S<sub>1</sub> season only in both the work rest cycles and remained at par in S<sub>2</sub> and S<sub>3</sub> season.

The minimum concentration of uric acid (mg/dl) in Kachchhi camel was observed during S<sub>3</sub> (0.25±0.035) season followed by S<sub>2</sub> (0.34±0.02) and S<sub>1</sub> (0.39±0.06) in WR<sub>1</sub>. The corresponding values for WR<sub>2</sub> were 0.29±0.03, 0.34±0.03 and 0.32±0.09 (Table 3). The uric acid concentration in blood of Kachchhi camel were not influenced either by season, work rest cycles, loads, sessions of work and their interaction effects. The Al-Qarawi (1999) reported the values of uric acid (mg/l) in black, brown and white camels during S<sub>3</sub> and S<sub>1</sub> but the values observed under present investigation are quite low than reported by Al-Qarawi (1999).

The creatinine levels before the start (1.062±0.11) and at the end of work (1.224±0.337) indicated that it

**Table 5.** Effect of Work Rest Cycle -1 and 2 on Hb (g %) of Kachchhi Camel.

Pay Load	Season												Mean	
	Summer				Hot - Humid				Winter				WR <sub>1</sub>	WR <sub>2</sub>
	WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>			
	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW		
L <sub>1</sub>	14.00 ±0.12	13.78 ±0.14	13.62 ±0.17	13.26 ±0.16	12.50 ±0.22	13.10 ±0.10	13.00 ±0.00	13.00 ±0.00	12.40 ±0.24	12.80 ±0.20	13.00 ±0.00	13.00 ±0.00	13.09 ±0.13 <sup>b</sup>	13.14 ±0.06 <sup>b</sup>
L <sub>2</sub>	13.20 ±0.48	12.80 ±0.46	13.32 ±0.33	13.06 ±0.29	12.40 ±0.24	13.00 ±0.00	12.80 ±0.20	13.00 ±0.00	12.80 ±0.20	13.00 ±0.00	12.60 ±0.24	12.80 ±0.20	12.86 ±0.12 <sup>b</sup>	12.93 ±0.10 <sup>a</sup>
L <sub>3</sub>	12.20 ±1.05	12.08 ±1.02	12.00 ±1.00	11.88 ±1.02	12.40 ±0.24	13.00 ±0.00	13.00 ±0.00	13.00 ±0.00	12.60 ±0.24	12.80 ±0.20	13.00 ±0.00	13.00 ±0.00	12.51 ±0.24 <sup>a</sup>	12.64 ±0.24 <sup>a</sup>
Mean (S)	13.01±0.28		12.85±0.26		12.73±0.09		12.96±0.03		12.73±0.08		12.90±0.06			

Load Mean with different superscripts (a, b) in coloum differ at p < 0.05.

**Table 6.** Effect of Work Rest Cycle -1 and 2 on PCV (%) of Kachchhi Camel.

Pay Load	Season												Mean	
	Summer				Hot - Humid				Winter				WR <sub>1</sub>	WR <sub>2</sub>
	WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>		WR <sub>1</sub>		WR <sub>2</sub>			
	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW		
L <sub>1</sub>	33.60 ±0.51	31.40 ±0.60	32.60 ±0.68	31.40 ±0.68	27.80 ±0.49	27.60 ±0.68	27.60 ±0.68	27.60 ±0.68	27.80 ±0.37	27.60 ±0.40	27.80 ±0.49	28.00 ±0.32	29.30 ±0.48	29.16 ±0.44
L <sub>2</sub>	33.00 ±0.45	30.60 ±0.24	33.40 ±0.24	31.80 ±0.20	27.00 ±1.05	27.80 ±0.20	28.00 ±0.45	28.40 ±0.40	27.80 ±0.37	28.00 ±0.32	28.00 ±0.32	28.00 ±0.32	29.03 ±0.44	29.60 ±0.42
L <sub>3</sub>	32.40 ±0.48	31.20 ±0.58	31.80 ±0.37	30.40 ±0.24	27.60 ±0.24	27.80 ±0.20	27.60 ±0.24	27.80 ±0.24	27.80 ±0.20	27.80 ±0.20	27.80 ±0.20	27.80 ±0.20	29.10 ±0.38	28.80 ±0.33
Mean (Se)	33.00 ±0.29 <sup>B</sup>	31.06 ±0.28 <sup>A</sup>	32.60 ±0.31 <sup>B</sup>	31.20 ±0.28 <sup>A</sup>	27.47 ±0.37 <sup>A</sup>	27.73 ±0.23 <sup>A</sup>	27.73 ±0.27 <sup>A</sup>	27.80 ±0.28 <sup>A</sup>	27.80 ±0.17 <sup>A</sup>	27.80 ±0.17 <sup>A</sup>	27.86 ±0.19 <sup>A</sup>	27.93 ±0.15 <sup>A</sup>		
Mean (S)	32.0±0.27 <sup>b</sup>		31.90±0.24 <sup>b</sup>		27.60±0.22 <sup>a</sup>		27.67±0.19 <sup>a</sup>		27.80±0.12 <sup>a</sup>		27.90±0.12 <sup>a</sup>			

Season Mean with different superscripts (a, b) in row differ at p < 0.05.

Session Mean with different superscripts (A, B) in coloum differs at p < 0.05.

increased by 15.25% at the end of work irrespective of seasons, payloads and work rest cycles (Table 4). The creatinine level recorded at the beginning and at the end of work differed significantly (p < 0.05) during S<sub>2</sub> and S<sub>3</sub> in WR<sub>1</sub> whereas it differed only during S<sub>2</sub> in WR<sub>2</sub>. Data showed that creatinine level increased only during S<sub>2</sub> after the end of work. Whereas, it remained at par during S<sub>1</sub> and S<sub>3</sub>. The lowest creatinine values observed were during S<sub>3</sub> in both the work rest cycles followed by S<sub>2</sub> and S<sub>1</sub>. The creatinine level recorded at the beginning of work and at the end of work differed significantly (p < 0.05) during S<sub>2</sub> and S<sub>3</sub> in WR<sub>1</sub> whereas it differed only during S<sub>2</sub> in WR<sub>2</sub>. When S X Se interaction showed that creatinine level increased only during S<sub>2</sub> after the end of work. Whereas it remained at par during S<sub>1</sub> and S<sub>3</sub>. The Al-Qarawi (1999) reported the values of creatinine (mg/l) in black, brown and white camel during S<sub>3</sub> and S<sub>1</sub> are quite similar to the values reported by Al-Qarawi (1999).

The Hb (g%) of camel reduced significantly (p < 0.05) when worked under L<sub>3</sub> as compared to L<sub>2</sub> in

WR<sub>1</sub> where as Hb (g%) did not decrease significantly when animal worked either under L<sub>2</sub> or L<sub>3</sub> pay load in WR<sub>2</sub> (Table 5). The Hb (g%) did not influence by season, work rest cycles and sessions of work but significantly (p < 0.05) influenced by loads and its interaction with season.

The PCV (%) was observed to be maximum during S<sub>1</sub> in both work rest cycles which dropped down significantly (p < 0.05) by 13.83 and 13.26 % when camel worked in S<sub>2</sub> in WR<sub>1</sub> and WR<sub>2</sub>, respectively (Table 6). The PCV (%) did not influence either by work rest cycle or payload but was significantly (P < 0.05) influenced by seasons and sessions of work. The PCV (%) under L<sub>1</sub> and L<sub>3</sub> in WR<sub>1</sub> and WR<sub>2</sub> remained at par but declined significantly (p < 0.05) under L<sub>2</sub> in WR<sub>1</sub> as compared to WR<sub>2</sub>.

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