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PHYSIOLOGICAL RESPONSES OF BALADI AND GABALI GOAT BUCKS AND THEIR CROSSBRED TO WATER DEPRIVATION

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ABSTRACT

Eight bucks (1.5-2.5 years old) of each Baladi, Gabali and their crossbred were exposed to water deprivation during winter and summer seasons at Maryout Research Station, which belongs to the Desert Research Center and located 35 km southwest of Alexandria. Exposure of Baladi, Gabali and their crossbred goats to four days water deprivation in both summer and winter seasons reduced body weight, free water intake and feed intake. The reduction in body weight was the highest in crossbred (16.6 %) followed by Baladi (14.2%) and Gabali (9.7%) and it was higher in summer (15.4%) than in winter (11.6%). Likewise, total dry matter intake decreased by 29.4, 27.6 and 25.5% in crossbred, Gabali and Baladi goats, respectively and was pronounced in summer (29.7%) compared to winter (25.3%). After rehydration, animals returned to consume more feed. Water deprivation resulted in an increase of RT and a decrease of both RR and PR. These effects were obvious during summer. Blood and plasma volumes were decreased ($P<0.01$) in dehydrated animals indicating hemoconcentration particularly in Gabali bucks compared to the other two breeds. Meanwhile, PCV percentage was the highest in the crossbred bucks. Blood glucose decreased ($P<0.01$) due to dehydration in Baladi followed by Gabali and crossbred bucks.

Keywords: Goats, water deprivation, season, physiological responses.

INTRODUCTION

Water scarcity is often encountered by livestock, particularly in desert areas during summer and throughout transportation. This requires that the animal's water conservation mechanism is strong enough to overcome the periods of water scarcity or deprivation. This would come at a physiological cost by the animal for the maintenance of homeostasis (Sihag *et al.*, 1998).

Under arid and semi-arid conditions, sheep and goats have adapted themselves to most environmental conditions and have evolved relatively greater water economy, which in turn increased their ability to withstand water shortage. Crossbreeding with exotic breeds was carried out to improve the genetic potential of our native breeds to increase their productivity. Information concerning physiological responses of the local and imported goat breeds at various environmental conditions and their ability to withstand water deprivation are of practical importance in their adaptation. The aim of this study was to compare the reactions of Baladi, Gabali goat bucks and their crossbred to water deprivation during summer and winter seasons.

MATERIALS AND METHODS

The experiment was carried out at Maryout Research Station which belongs to the Desert Research Center and is located 35 Km southwest of Alexandria. Twenty-four adult bucks in three groups each of eight bucks; Baladi (B), Gabali (G) and crossbred (B×G) were used during January and July months representing winter and summer seasons of 2001. The Gabali bucks originally from Syria and were used for the first time in 1997. Animals were 1.5 to 2 years old with initial body weight of 26.6 ± 0.85; 37.9 ± 0.65 and 30.5 ± 0.48 kg for Baladi, Gabali and Baladi × Gabali crossbred at the beginning of the experiment. Animals were confined in semi-open pens (that provided enough shade and ventilation in summer and protection from air draft and rain in winter. They were fed on berseem (Trifolium alexandrinum) hay *ad libitum* and concentrate mixture at the rate of 400g/head/day according to NRC (1975).

The experiment involved three phases; in the first; animals were watered daily for 4 d. (control, T_1); in the second; animals were watered once every four days for consecutive seven cycles (water was withheld while feed supply continued, T_2) and in the third phase animals were left recovery for 4 d (T_3). Body weight was measured daily to the nearest 50 g in the morning before feeding and drinking. Dry matter intake (DMI) of roughage and concentrates in addition to free water intake were recorded daily for each group. Rectal temperature (RT) (using clinical thermometer), respiration rate (RR) (by counting the flank movement /minute) and pulse rate (PR) (using stethoscope) were measured two times daily (at 8.00 and 15.00 hr) during the experimental period.

Daily blood samples were collected from the jugular vein in the morning before access to feed and water. Blood samples, using EDITA, were used for the erythrocytes (RBC's, 10^6/ cmm) and leucocytes (WBC's, 10^3/ cmm) counts by using hemocytometer (Kolmer *et al*, 1951). Heparinized whole blood samples were also used for the determination of packed cell volume (PCV), hemoglobin (Hb) concentration and blood glucose (Hyvarinen and Nikkila, 1962). Blood and plasma volumes were determined after blood samples collection; once for T_1 and T_3 and three times for T_2 using Evan's blue (T1824) dye dilution technique (Hawk *et al.*, 1976).

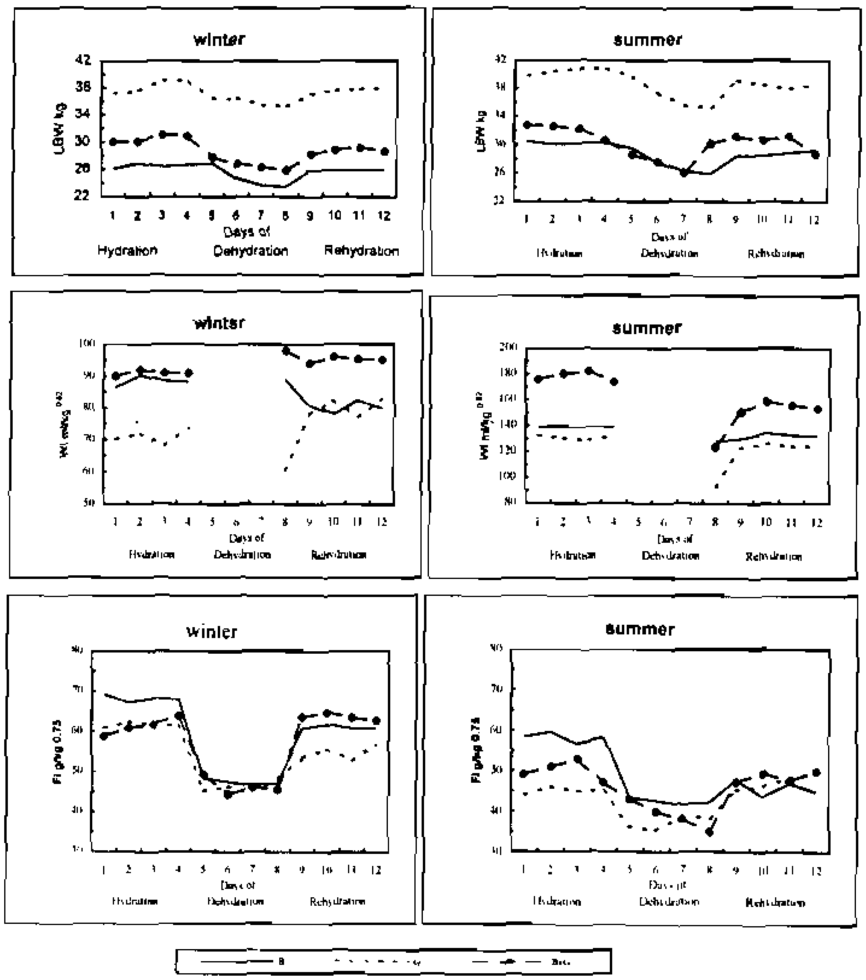
During the experimental period, the minimum and maximum ambient temperatures were found to be 9.5 and 20.7 °C during winter and 26.4 and 36.8 °C during summer while the relative humidity was 70.3 and 65.2 % for winter and summer, respectively.

Data were analyzed as split-plot repeated measurements. The analysis was conducted using Generalized Linear Model (GLM) Procedures on SAS (1998).

RESULTS AND DISCUSSION

Body weight differed significantly ($P<0.01$) among breeds as well as season of the year, where the overall mean was higher in summer (34.3 ± 3.7 kg) than in winter (31.6 ± 2.8 kg). Body weight of all hydrated bucks declined (P<0.01) sharply with the advance of water deprivation while it increased gradually during rehydration period (Fig. 1). After four days of dehydration, the loss of body weight was found to be 16.6, 14.2 and 9.7 % of the initial body weight of crossbred, B and G, receptively (Table 1).

Figure (1): Changes in live body weight, water and feed intake through hydration, dehydration, and rehydration cycle



The differences could be attributed to the effect of the genetic make up on their response to water deprivation. Khalifa (1999) reported a significant reduction in body weight of shorn and unshorn Barki ewes by about 15-20% as a result of 4-days dehydration. Degen and Kam (1992) reported 16.3% (4 0% daily) reduction in body mass of Dorper rams during four days of dehydration. Badawy *et al.* (1999) reported a reduction of 18.3%

in Baladi goats during 84 hours of water deprivation. The present results were in harmony with those reported by Ismail *et al.* (1996) on *Barki, Suffolk and their crossbred.* Results revealed that the body weight reduction was the least in Gabali bucks followed by Baladi and then by the B x G crossbred either during winter or summer seasons. Body weight loss due to dehydration was higher in summer than in winter (15.4 and 11.6 % respectively). These results agreed with the findings of Badawy *et al.* (1999) on Baladi goats, Gawish *et al.* (1999) on Barki sheep and Ismail *et al.* (1996) on Barki, Suffolk and their crossbred sheep. During dehydration period, the marked decrease in daily weight of all breed groups was mainly due to either body water deficit or the reduction of feed intake. This agreed with those results of Dahlborn and Holtenius (1990); Degen and Kam, (1992); Badawy *et al.* (1999) and Gawish *et al.* (1999), since there is a close relationship between the quantities of feed and water consumed by ruminants (EL-Nouty *et al.,* 1990). However, the body water deficit seems to be the main factor causing body weight loss, because most animals can restore their initial body weight after rehydration (Fig1). Other investigators attributed the weight loss to either the reduction in total body water (Shkolnik *et al.*, 1980; El-Sherif *et al.*, 1995; and Ismail *et al.*, 1996) or to the loss in body solids which resulted from the marked reduction in feed intake during water deprivation (Degen and Kam, 1992).

Table 1: Body weight change, water intake (ml/ kg$^{0.82}$) and feed intake (g/ Kg $^{0.75}$/day) of different goat groups

Parameters	Baladi		Gabali		Baladi x Gabali	
	W	S	W	S	W	S
Body weight changes:						
Initial BW (kg)	26.6	30.5	37.9	40.2	30 5	32.5
End of dehydration	23.4	25.5	34.8	33 0	26.3	26.2
Change (kg, %)	3.2 (12.0)	5.0 (16 4)	3.1 (8.9)	7.2 (10.4)	4.2 (13.8)	6.3 (19.4)
End of rehydration	25.5	31.0	36.5	39.5	28 5	31.8
Overall mean	25.2 a	29.0 b	36.4 c	37.6 c	28.5 a	30.2b
Free water intake (ml / kg $^{0.82}$ / day)						
Hydration	88.4	139.4	71.1	130.4	91.0	178.2
Dehydration	47.7	147.9	65.2	110.8	106.2	147.3
Rehydration	77.5	111.8	78.5	117.8	89.2	140.4
Overall mean	87.9 a	135.7 b	71 8 a	119.6 b	95.5 a	155.3 b
Dry matter intake (g / kg $^{0.75}$ / day)						
Hydration	68.2 a	58.5 b	61 6 a	45 0 c	63.8 a	50.0 b
Dehydration	47.5 b	42.5 c	46.2 b	37 2 d	46 4 b	39 0 c
Change (%)	23.5	27.4	25	30.2	27 3	31.5
Rehydration	61.9	45 8	54 7	47.3	63.7	48.5
Overall mean	60.8	48.9	54.2	42.0	58.0	45.8

W; winter season S; summer season

Results presented in Table 1 and Fig. 1 showed that during hydration period there were significant ($P<0.05$) differences among breeds in water intake. The crossbred bucks consumed more water (134.6 ml/kg$^{0.82}$/day) than

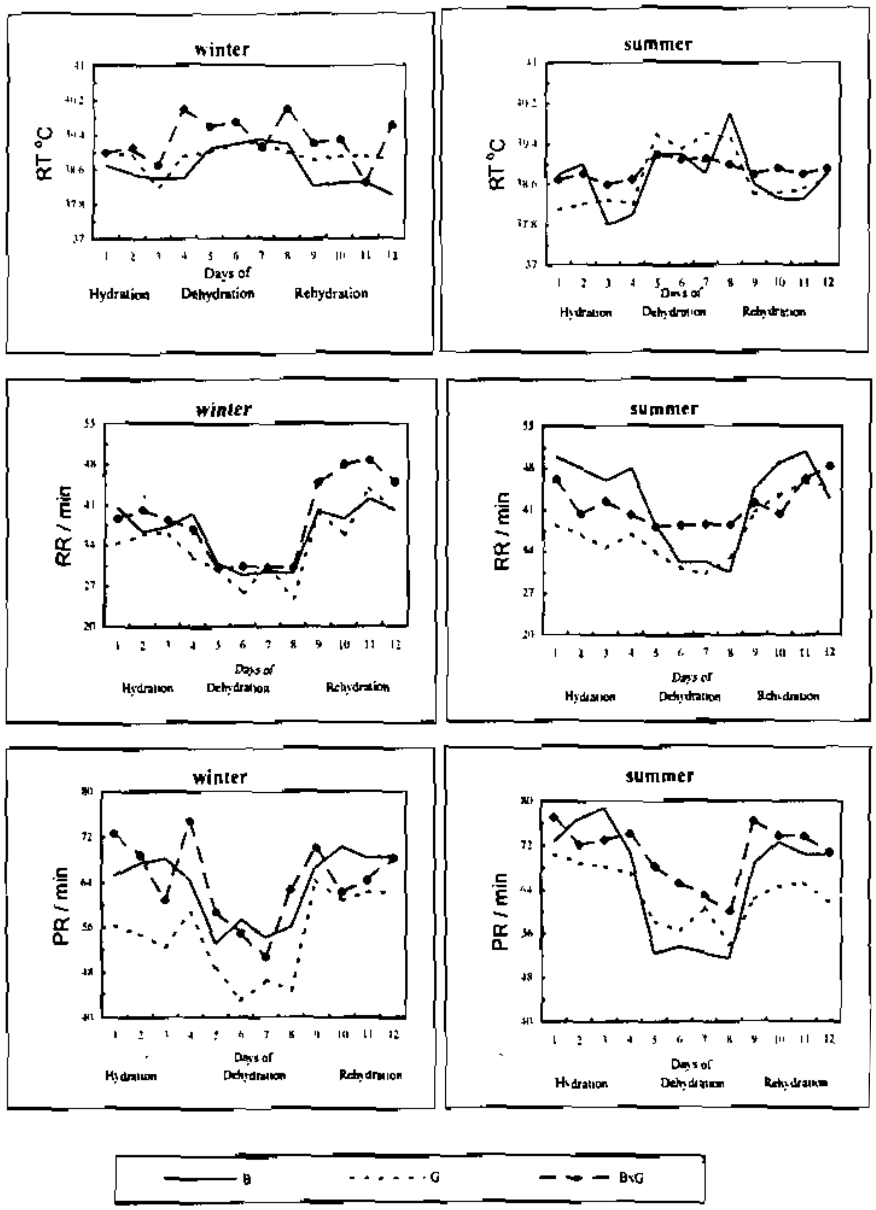
B and G breeds (113.9 and 100.8 ml/kg $^{0.82}$/ day, respectively). Total water intake was significantly (P>0.01) higher during summer than in winter (136.9 and 85.0 ml/kg$^{0.82}$ /day), respectively.

This trend was in harmony with the previous findings of Gupta and Acharya (1987), Ismail *et al.* (1996), Badawy *et al.* (1999) and Gawish *et al.* (1999). The increase in water intake during summer is most probably to compensate for the requirements for evaporative cooling under solar radiation. Measuring the rate of drinking at the first drinking after water deprivation indicated that G had the lowest rate followed by the crossbred and B (1.6, 2.1 and 2.3 L/min., respectively). These results seemed to be proportional to the body weight loss, where Gabali bucks scored the least reduction in body weight (10.4 and 8.9%) followed by Baladi (16.4 and 12..0 %) and Baladi x Gabali bucks (19.3 and 13.8 %) during summer and winter respectively, indicating the superiority of Gabali to cope with water deprivation under semi arid conditions in both summer and winter seasons. On the other hand, Ismail *et al.* (1996) reported that the rate of drinking great amount of water in short time by native Barki ewes was of a great benefit for surviving particularly in dry areas in which water resources are limited and / or during competition of animals for drinking comparing with Suffolk and their crossbred.

Results presented in Fig. 1 indicated that during hydration phase (control), Baladi bucks consumed more dry matter than both crossbred and Gabali bucks (63.4, 53.3 and 56.9 g/kg$^{0.75}$ / day, respectively). Water deprivation of animals induced a significant (P<0.05) decline in dry matter intake, being the highest in crossbred followed by Gabali and Baladi bucks. The corresponding reduction rate of the three breeds were 29.4, 27.6 and 25.5% respectively. The observed percentage decline in dry matter intake due to water deprivation was close to those reported by El-Hadi (1986) on Sudanese desert sheep and goats at the end of three days dehydration period (25.0 and 18.0%, respectively) and below to those reported by Ismail *et al.* (1996). The reduction in dry matter intake and body weight due to water deprivation revealed that although B bucks reduced their feed intake more than the crossbred and G bucks yet their reduction in body weight was lower than crossbred and G breed. The reduction in dry matter intake was higher during summer (29.7 %) than in winter (25.3%) although dry matter intake was higher in winter than in summer (57.7 vs. 45.6 g/kg $^{0.75}$ / day).

Analysis of results presented in Fig. 2 indicated a breed difference (p<0.01) in RT, RR and PR. Crossbred bucks had higher RT (39.1 ± 0.3°C) and RR (40.1 ± 15.1 breath/ min) than that of B (38.7 ± 0.22 °C, 36.1 ± 12.8 breath/min) and G (38.8 ± 0.3°C, 35.7 ± 11.4 breath / min). However, pulse rate was lower in G (58.9 beats/min) than both B (66.4 beats/min) and crossbred (67.0 beats/min). Additionally, there was a significant (p<0.01) season × breed interaction between RT, RR and PR, and this was during the highest increase in RT, RR and highest decreases in PR in G than in B and BxG crossbred from winter to summer season.

Figure (2): Changes in rectal temperature (RT), respiration rate (RR) and pulse rate (PR) through hydration, dehydration, and rehydration cycle



Four days of water deprivation caused a significant (P>0.01) increase in RT that amounted to 1.8, 2.5 and 0.9 % for G, B and crossbred goats, respectively (Table 2). Meanwhile, water deprivation caused a significant (P<0.01) reduction in RR and PR values. The reduction in RR was about 26.6, 15.7 and 15.4% for B, G, and crossbred, respectively while PR were reduced by 32.4, 17.2 and 14.3% for G, B and their crossbred, respectively. These results agreed with those of Badawy *et al.* (1999) on Baladi goats and Khalifa (1999) on Barki sheep. They found a progressive increase in RT and a decrease in RR during three days of water deprivation in summer. Also, Kamel (1991) found that three days water deprivation of three breeds of goats caused a linear increase in RT and a linear decrease in both RR and PR. The rise in RT in water deprived animals could be due to the reduction in evaporative cooling. The total body water of dehydrated animals decreases markedly which cause a shortage of water needed for evaporation from the respiratory tract and skin (El-Sherif *et al.*, 1995). On the other hand, the reduction in RR and PR might be necessary for water conservation, where animals try to be adapted to lower water intake by reducing water loss from the respiratory tract as well as by urinary and fecal water loss.

After rehydration (T3), there was a gradual decrease in RT and gradual increase in RR and PR. The values almost returned to the normal levels of each breed (Fig. 2). If the extent of increase in RT is taken as an indicator of heat tolerance, this indicates that dehydration (T2) would decrease the test tolerance of the G comparing with the other two breeds. This result agreed with Aboul-Ezz (2000) on Gabali goats.

Table 2: Physiological parameters of different goat groups during the experimental period

Parameters	Baladi		Gabali		Baladi x Gabali	
	W	S	W	S	W	S
Rectal temperature (°C)						
Hydration	38.5 a	38.4 a	38.5 a	38.2 a	39.2 a	38.7b
Dehydration	39.2 b	39.1 b	39.1 b	39.5 b	39.6 a	39.1b
Change (%)	1.8	1.8	1.6	3.4	1.0	0.8
Rehydration	38.2	38.5	38.8	38.5	39.1	38.9
Overall mean	38.6	38.7	38.8	38.7	39.2	38.9
Respiration rate (Breaths / min.)						
Hydration	38.4a	48 b	34.1a	36.7 a	38.5 a	42.3 a
Dehydration	29.8 b	33.2 c	27.7 b	32.1b	30.2 b	38.4 b
Change (%)	22.4	30.8	18.8	12.5	21.6	9.2
Rehydration	40.2	46.8	39.8	43.6	44.4	44.2
Overall mean	43.2	42.7	33.9	37.5	37.7	41.6
Pulse rate (Pulse / min)						
Hydration	66.4 a	74.8 b	55.6a	68.6b	66.9 a	74.1 a
Dehydration	55.2 b	62.5 a	45.7b	57.3 c	56.8 b	64.1 b
Change .	16.9	16.4	17.8	16.5	15.1	13.5
Rehydration	68.5	70.5	62.4	36.41	66.2	73.6
Overall mean	63.4	69.3	54.6	63.1*	63.3	70.6

W: winter season S: summer season.

Blood and plasma volumes were significantly (P<0.01) affected by season with no breed differences. Results indicated that exposure of animals to four days water deprivation caused a significant (P<0.01) reduction in blood and plasma volumes. This reduction in PV was higher in G (32.3 and 22.7 %) than in B (24.0 and 25.0%) and in their crossbred bucks (28.6 and 25.6%) in summer and winter seasons, respectively. The magnitude of changes in blood (19.2 vs. 10.2%) and plasma volumes (28.3 vs. 26.6%) due to water deprivation was higher in summer than in winter. Decreases in blood and plasma volumes during water deprivation are mainly due to the reduction of total body water (Degen and Kam, 1992; El-Hadi 1986 and Khalifa *et al.*, 2000). The great reduction in plasma and blood volumes due to water deprivation in G breed particularly during summer compared with B and crossbred bucks indicated that the native breed and its crossbred is more adapted to water lack conditions. Blood analysis showed that there were significant (P<0.1) breed differences in Hb concentration, PCV values, leucocyte counts and glucose concentration (Figures 3 and 4). Baladi bucks had higher values of all hematological parameters than both G and crossbred bucks, except for leucocyte count (Table 3).

Since hemoglobin content in the blood might be used as an indicator of the adaptability to the tropical conditions (Bahga *et al.*, 1980), the higher Hb concentration obtained in blood of B (9.7 g/dl) than in G (9.1 g/dl) and crossbred bucks (8.8 g/dl) indicates more adaptability of the B bucks relative to the other two breeds. During water deprivation, there were gradual increases (p 0.01) in Hb concentration, RBC's count, PCV values and leucocyte counts (Fig. 3), while there was gradual decrease (P<0.01) in blood glucose concentration (Fig. 4). In the recovery period, most of the parameters returned to their control values. The magnitude of changes was lower in B than that in both G and crossbred. Increases of blood constituents following water restriction were reported on Merino sheep, crossbred sheep and on Sudanese sheep and goats (Macfarlane *et al.*, 1961, Singh *et al.*, 1982 and El-Hadi, 1986, respectively). The increase in the values of Hb, RBC's count and PCV during dehydration were related mainly to hemo-concentration as a consequence reduction in plasma volume, blood volume and total body water.

Leucocyte counts increased significantly in water deprived animals particularly in G (34.6%) and crossbred (34.7%) bucks where the rate of changes in B bucks was (25.1 %). This response was attributed to the increase in blood osomolarity, which might activate the adrenal cortex to secrete glucocorticoids (El-Banna *et al.*, 1981). However, Igbokwe and Ajuziegu (1991) found that dehydration of Yankasa sheep for four days caused a significant decrease in leucocyte counts.

Figure (3): Hematological changes through hydration, dehydration, and rehydration cycle

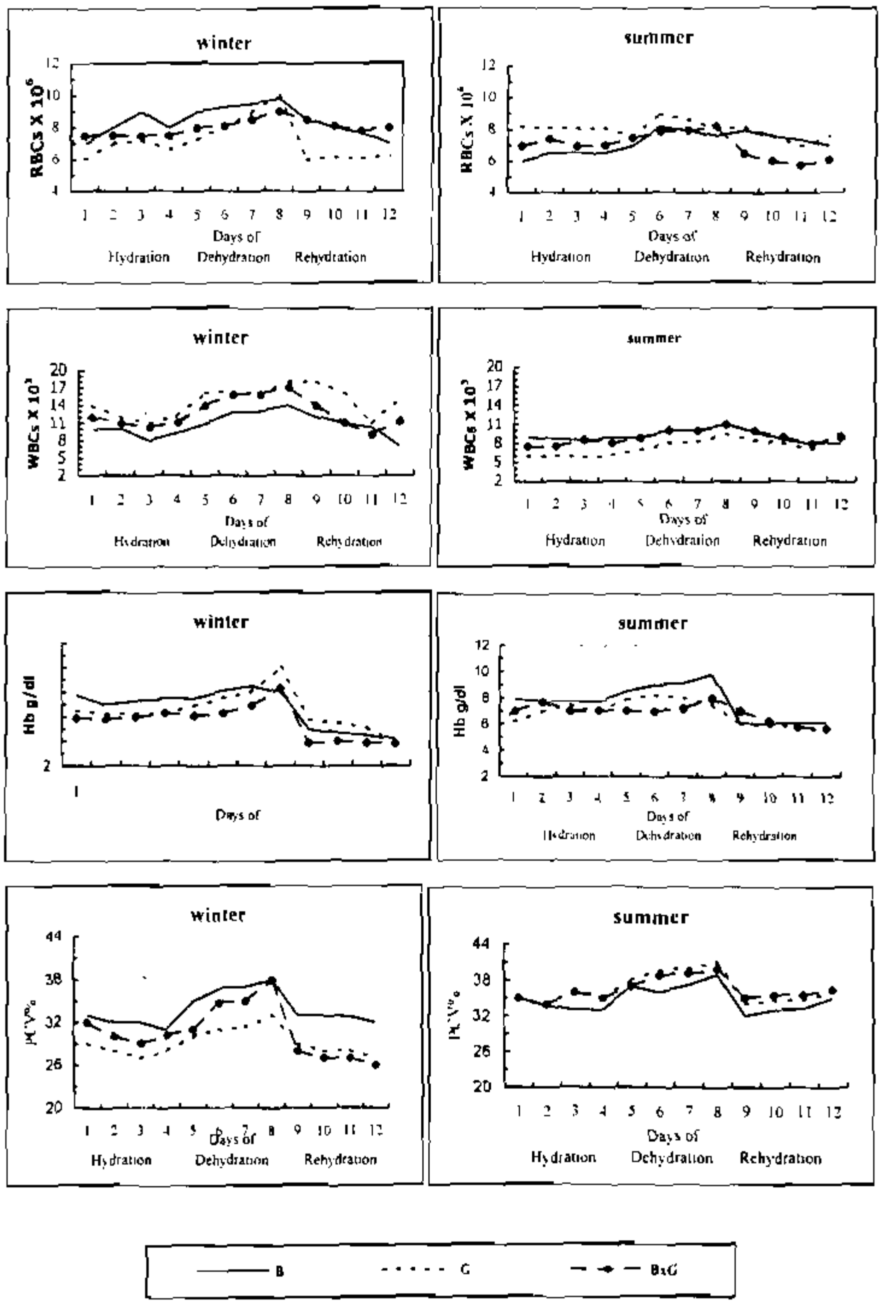


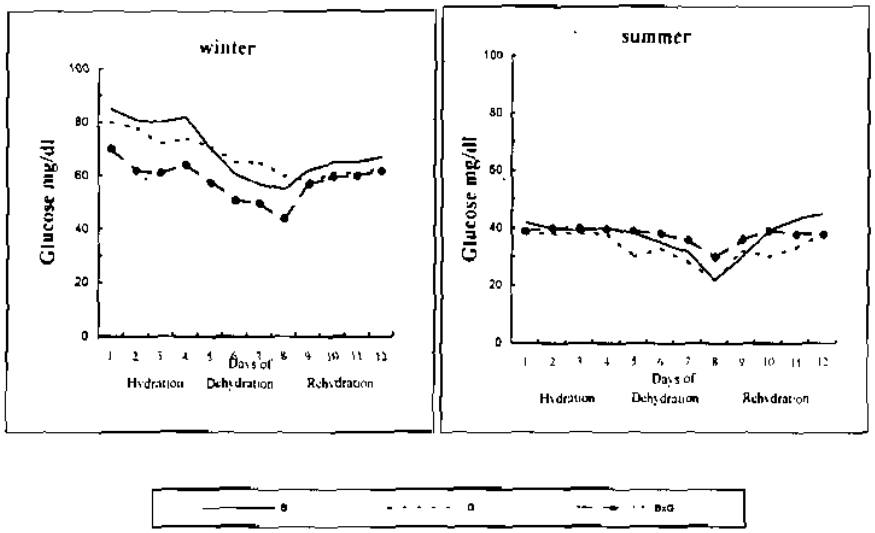
Table 3: Hematological parameters of different goat groups during the experimental period

Parameters	Baladi			Gabali			Baladi x Gabali			Overall
	W	D	R	W	D	R	W	D	R	
Packed cell volume (%)										
Winter	32	36.7	32.7	28	31.3	28	30.5	34.7	27	31.2
Summer	33 7	37.3	33.3	35	39.7	34.8	35	38.7	35.7	35.9**
Overall mean	32.9 a	37.0 b	33ab	32.0 a	35.5 b	31.4 ab	32.7 a	36.7 b	31.4 c	33.6
Hemoglobin (g/dl)										
Winter	7.4	8.0	4.6	6.3	8.1	5.1	5.9	6.9	3.9	6.2
Summer	7.8	9.1	6.1	6.9	7.9	5.8	7.2	7.3	6.2	6.5
Overall mean	7.6 a	8.6 b	5.4c	6.6 a	8.0 b	5.5 c	6.6 a	7.1b	5.1c	6.4
White blood cells (x 10^{3})										
Winter	9.3	12.7	10.2	12.3	16.3	15	11.0	15.7	11.3	12.6
Summer	8.8	10	8.6	6.0	8.2	7.8	7.9	10.0	10	8.6 **
Overall mean	9.1a	11.4b	9.4 ab	9.2 a	12.3 b	11.4 c	9.5 a	12.9 b	10.2 c	10.6
Red blood cells (x 10^{6})										
Winter	8.0	9.4	7.8	6.7	8.1	6.1	7.5	8.5	8.1	7.8
Summer	6.4	7.7	7.5	8.1	8.4	7.6	7.1	7.9	6.1	7.4
Overall mean	7.2 a	8.6 b	7.7ab	7.4 a	8.3 b	6.9 c	7.3a	8.2b	7.1ab	7.6
Glucose level (mg/dl)										
Winter	82.0	60.7	64.7	76.7	65.3	60.7	64.3	50.7	59.7	65.0
Summer	40.3	31.7	39.3	33.2	28.3	33.3	39.7	35.7	37.7	50.5**
Overall mean	61.2 a	46.2 b	52.0a	57.4 a	46.8b	47.0 a	46.8a	43.2a	48.7a	57.6
Plasma volume (% of body weight)										
Winter	8	6	8	7.5	5.8	7	7.8	5.8	7	7.0
Summer	7.5	5.7	7.6	6.2	4.2	6	7	5	6	6.1**
Overall mean	7.8a	5.9b	7.8ac	6.9a	5.0b	6.5ab	7.4a	5.4b	6.5ab	6.6
Blood volume (% of body weight)										
Winter	11	9	10.8	9.5	8	9.1	10.3	9.6	10.0	10.0
Summer	11.5	10	11	9.5	7	8.5	11	9	9.5	9.8
Overall mean	11.3a	9.5b	10.9ab	9.5a	7.5b	8.8ab	10.7a	9.3 a	9 8a	9.9

W; watered D; deprived R; rewatered periods

Results presented in Fig. 4 indicated that blood glucose decreased (P<0.01) during water deprivation and its reduction was higher in B breed (24.5 %) followed by Gabali (18.5 %) then by crossbred (7.7 %) at the end of water deprivation period. These results agreed with those reported by Singh *et al.* (1982) and Mokhtar *et al.* (1989) in sheep. The decline in glucose concentration during water deprivation might be due to the reduction in feed intake particularly during summer season. Reduction in feed intake was higher in B bucks than in G and crossbred (Fig. 1) and this was reflected on blood glucose. Additionally, reduction in blood glucose might be attributed to specific mechanisms by which the animals reduce their metabolic rate during water deprivation. Thus, the higher reduction in blood glucose of dehydrated B bucks compared with the other two breeds will benefit for this breed to withstand the adverse effect of water lack particularly during summer.

Figure (4): Changes in glucose concentration (mg/dl) through hydration, dehydration, and rehydration cycle.



Results of the present study indicated that exposure of bucks to water deprivation particularly in summer induce obvious changes in several physiological parameters including decreases of BW, DMI and PR while RT and RR were increased. Thus, there was an increase in Hb, PCV, RBC's and WBC's values in water deprived animals. Advancing water deprivation gradually decreased blood glucose. The magnitude of changes in several physiological parameters due to water deprivation was higher in G compared with B and their crossbred bucks. Therefore, the native B bucks and its crossbred are suitable for rearing in the newly reclaimed areas of Egypt in which the animals are subjected to a sparse vegetation, lack of water and extreme variation in environmental temperature particularly in summer season.

REFERENCES

Aboul-Ezz, S.S. (2000). Comparative study on thermo-respiratory responses between Syrian Gabali and Balady goats under semi arid conditions of the Egyptian northwestern coast. Minufiya J. Agric. Res., 25 (1):125-134.

Bahga, G.S., P.C.Gangwar; P.K. Srirastara and D.P. Dingra (1980). Effect of spray cooling and wallowing on blood composion in buffaloes during summer. Indian. J. Dairy Sci., 23 (3): 294-298.

Badawy, M.T.; A.A. Azamel; M.H. Khalil and H.T. Abdel-Bary (1999). Physiological responses and reproduction of Baladi goats suffering heat stress and dehydration under semi-arid conditions. Proceedings of workshop on livestock and drought; policies for coping with changes. Cairo, May 24-27: 31-39.

Degen. A. A and M. Kam (1992). Body mass loss and box fluid shifts during dehydration in Dorper sheep J. Agric. Res., Camb. 119 : 412 – 422.

Dahlborn, K. and K. Holteinus (1990). Fluid absorption from the rumen during rehydration in sheep. Exp. Physiol., 75: 45-55.

El-Banna, I.M.; F.D. El-Nouty and H.D. Johnson (1981). Plasma glucocorticoids levels in dehydrated camels under hot environment Alex. J. Agric. Res., 29: 531 – 543.

El-Hadi, H. M. (1986). The effect of dehydration on Sudanese desert sheep and goats. J. Agric. Sci. Camb., 106: 17 – 20.

El-Nouty, F.D.; A.A. Al-Haidary and S.M. Basmeel (1990). Physiological responses, feed intake, urine volume and serum osmolarity of Arabi Goats deprived of water during spring and summer. AJAS, 3: 331-336.

El-Sherif, M.A.; N.A. El-Sayed and A.A. Azamel (995). Water distribution in crossbred ewes suffering thirst during pregnancy. Egypt. J. Appl. Sci., 10 (11) : 21-35.

Gawish, H.A.; A.A. Azamel; H.T.Abdel-Bary and A.A. El-Sherbiny (1999). Physiological responses and reproductive performance of Barki ewes under heat, water deprivation and poor feeding stresses. In Proceedings of workshop on livestock and drought; policies for coping with changes. Cairo, May, 24-27: 40-48.

Gupta, U.D. and R.M. Acharya (1987). Heat tolerance in different genetic groups of sheep in semi-arid conditions. J. Anim Sci., 57 : 1314 – 1318.

Hawk, P.S.; B.L. Oser and W.H. Summersun (1976). Practical Physiological Chemistry 14th Ed. Plakiston Co. New York.

Hyvarinen A. and E. Nikkila (1962). Specific determination of good glucose by Otoluidine. Clin. Chem Acta., 7 : 140.

Igbokwe, I.O. and G.I. Ajuziegu (1991). The hematological effects of acute water deprivation in Yankasa sheep Vet. Res. Commu., 15 : 69-71.

Ismail, Eman; G.A. Hassan; Zahraa Abo-Elezz and Hamsa Abd El-Latif (1996). Physiological responses of Barki and Suffolk and their crossbred to dehydration. Egyptian J. Anim. Prod., 33 (2): 89-101

Kamel, I.K.. (1991). Water metabolism and requirements and effect of dehydration of Anglo-Nubian, Baladi and their crossbred goats. M. Sc. These Fac. Agric. Alex. Univ. Egypt.

Khalifa, H.H. (1999). Effect of water deprivation on thermoregulation of Barki ewes. In Proceedings of workshop on livestock and drought; policies for coping with changes. Cairo, May, 24-27: 40-48.

Khalifa, H.H.; A. A. El-Sherbiny and T.M.M. Abdel-Khalik (2000). Effect of exposure to solar radiation on some adaptive physiological mechanisms of Egyptian goats. Proc. Conf. Anim. Prod. In The 21 st: Challenge and prospects. 18-20 April. 297-305.

Kolmer, J.A.; E.H. Spaulding and H.W. Robinson (1951). Approved Laboratory Techniques. (5th Edition). Appleton-Century Crofts, Inc, New York. 118pp.

Macfarlane, W.V.; R.J.H. Morris; B. Howard; J. Macdonald and O.E. Butz-Olsen' (1961). Water and electrolytes changes in tropical Merino sheep exposed to dehydration during summer . Aust. J. Agric. Res., 12 : 889 – 912.

Mokhtar, M.M.; A.A. Azmel and A.A. Younis (1989). Response of desert Barki sheep to different environmental constraints. 3 rd Egyption – British conf. on animal, fish and poultry production. Alex. 7-10 Oct.

SAS USER's Guide (1998). Statistical analysis system Ver. 12.6. SAS Institute, Cary N.C.

Shkolnik A.; E. Maliz and S. Gordin (1980). Desert conditions and goats milk production. J. Dairy Sci., 63 : 1749 – 1754.

Sihag, S.S.; M.K. Rose; O.P. Nangia and S.K.Garg (1998). Effect of partial water restriction and subsequent rehydration on physiological parameters and body fluid compartments in buffalo calves. Indian J. of Agric. Sci., 68 (10) : 1087-1089.

Singh, K; T. More; A. K. Rai and S.A. Karim (1982). A note on the adaptability of native and crossbred sheep to hot summer conditions of semi arid and arid areas. J. Agic. Sci. Camb., 99: 525 – 528.

الاستجابات الفسيولوجية للتعطيش في ذكور الماعز البلدي والجبلي وخليطهما

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استخدم في هذه الدراسة أربعة وعشرون ذكر ماعز (ثمانية من كل نوع) من البلدي والجبلي وخليطهما بمحطة بحوث مريوط خلال شهري يناير ويوليه كشهور ممثلة للشتاء والصيف حيث قسمت التجربة إلى ثلاث فترات : الفترة الأولى : (أربعة أيام) تركت فيها الحيوانات تشرب يوميا كالمعتاد (كنترول) اما فى الفترة الثانية : عرضت الحيوانات للتعطيش لمدة ٤ ايام ثم تركت تشرب فى نهاية دورة التعطيش وتكررذلك لمدة ٧ دورات متتالية ثم فى الفترة الثالثة عادت الحيوانات لتشرب يوميا ولمدة ٤ ايام وتم تقدير المادة الجافة المأكولة وكمية الماء المشروب والتغير في وزن الجسم وتم قياس درجة حرارة المستقيم ومعدل التنفس والنبض مرتين / اليوم طوال التجربة وتم سحب عينات دم من الحيوانات لتقدير بعض مكونات الدم (هيماتوكريت- هيموجلوبين- كرات الدم الحمراء والبيضاء والجلوكوز) وذلك قبل الحقن بصبغة الايفان الزرقاء لتقدير كل من حجم الدم و بلازما الدم وقد أوضحت الدراسة أن التعطيش أدى إلى نقص ملحوظ في كل من وزن الجسم والغذاء المأكول وكذلك الماء المشروب وقد بلغ الفقد فى الوزن اعلاه في الخليط (١٦,٦%) ثم البلدي (١٤,٢%) وكان اقلهم الجبلي (٩,٧%) وكان الفقد أعلى في فصل الصيف (١٥,٤%) عن الشتاء (١١,٦) . كان الانخفاض فى المادة الجافة الماكولة ٤و٢٩ ، ٦و٢٧ ،٥و٢٥ % فى الخليط ثم الجبلي والبلدى على التوالى وكان الانخفاض اكثر وضوحا فى الصيف (٦و٤٥ جم/كجم ٠,٧٥) عن الشتاء (٥٧ جم/كجم ٠,٧٥). عادت معظم القيم الى حالتها الطبيعية بعد الشرب.

ادى التعطيش الى زيادة فى درجة حرارة المستقيم وانخفضت قيم معدلات التنفس ومعدل ضربات القلب وكان التاثير اكثر وضوحا فى الصيف عن الشتاء. ادى التعطيش الى انخفاض معنوى فى كل من حجم الدم والبلازما فى التيوس المعطشة خاصة بالنسبة للتيوس الجبلي عن البلدى والخليط بينما زادت قيم الهيماتوكريت فى التيوس الخليط. انخفض مستوى الجلوكوز فى الدم معنويا نتيجة للتعطيش وكان الانخفاض اعلى فى البلدى ثم الجبلي والخليط .

بناء على ماسبق فانة يمكن تربية الماعز البلدى وخلطانها مع الماعز الجبلى فى الاراضى حديثة الاستصلاح نظرا لتاقلمها للظروف البيئية الصعبة من نقص الغذاء والماء وكذلك التقلبات الجوية.