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RESPONSE OF OSSIMI SHEEP TO DEHYDRATION OR/AND STARVATION FOR DIFFERENT PERIODS UNDER SUMMER CONDITIONS OF EGYPT

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ABSTRACT

Seven Ossimi rams were used in this study to evaluate their responses to dehydration or/and starvation for one, two or three days, and their reactions to refeeding after each deprivation period (4 days) during summer season. Changes in live body weight, water and feed intake and body temperatures were determined during all deprivation and refeeding periods. Results indicated that dehydration of animals for one (WD1), two (WD2) and three (WD3) days or/and starvation for one (WFD1), two (WFD2) and three (WFD3) days significantly ($P<0.05$) reduced the body weight by about 8, 11, 20, 11, 16 and 18%, respectively. Most weight loss significantly ($P<0.05$) occurred on the 1st day of each deprivation period, being almost significantly ($P<0.05$) higher during dehydration and starvation than during dehydration only. Increasing deprivation periods markedly decreased feed intake during the 2nd day of WD2 (59%) and WD3 (67%), while the animals stopped their feed intake during the 3rd day of WD3. During the 1st day of refeeding periods, most of the animals (71-100%) firstly drank more amount of water in one drinking during the first minutes of refeeding, being the highest after WD3 (9.7 liters) showing the highest drinking time (2.3 minutes) and the lowest amount of water per unit time (4.3 liters/min). The opposite was observed in animals after WFD1 (3.2 liters, 0.57 min and 5.6 liters/min, respectively). Dehydrated animals regained their weight loss during the 1st day of refeeding (106-109% of the original weight), while, those exposed to water and feed deprivation failed to restore their weight loss during the 1st day of refeeding (82-85% of the original weight), but they regained their weight loss on the 3rd day for WFD1 (103%) and the 4th day for WFD2 (104%) and WFD3 (100%). Dehydration or/and starvation for different periods resulted in significant increase in rectal temperature (RT) and skin temperature (ST) of all animals. During WD1 and WD2, animals showed significantly the highest increase in RT (2.5 and 2.2%, respectively) and the lowest increase in ST (1.5 and 1.6%, respectively), as compared to the other deprivation periods, which did not differ significantly.

The present study may indicate that the native Ossimi sheep show adaptability to hot environmental conditions and have the ability to withstand water or/and feed shortage. This lead to a possibility of raising Ossimi sheep in the newly-reclaimed areas in Egypt.

Keywords: Ossimi sheep, dehydration, starvation, weight loss, body temperature

INTRODUCTION

Ambient temperature and availability of water or/and feeds may influence the ecological physiology of animals maintained in a region. Introducing some species to the newly-reclaimed desert areas of Egypt, necessitates the determination of its tolerance to high ambient temperature and lack of water and feed, in order to evaluate water and feed economy in hot climate and, in turn, its ability to survive in arid or semi-arid conditions.

Sheep and goats have adapted themselves to most environmental conditions and have evolved relatively great water economies and have the ability to withstand water shortage (Terill, 1968). In Egypt, some studies concerned with the adaptive mechanisms governed the tolerance of local and crossbred sheep to starvation (Madian, 1989) and dehydration (Abdel-Fattah, 1988) were carried out for different periods during summer and winter. However, no available information were found on the effects of both dehydration and starvation on the local sheep under high ambient temperature.

Therefore, the aim of the present study was to evaluate the reactions of Ossimi sheep to water or/and feed deprivation for different periods under hot condition during summer season in Egypt, regard to changes in live body weight, water and feed intakes, and body temperature.

MATERIALS AND METHODS

The experiment was carried out at El-Gemiza Research Station, Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture in cooperation with Department of Animal Production, Faculty of Agriculture, Mansoura University during the period from July to September, 2001.

Seven mature Ossimi rams having 59.6±3.1 kg live body weight and 14-16 months of age were used in this study. Animals were maintained in semi-open pens and were fed on clover hay (CH) and concentrate feed mixture (CFM) once daily, while water was available all day during refeeding periods., Water or/and feeds were not provided during water or/and deprivation periods. Water was offered to the animals in buckets in order to measure their water intake.

The experimental duration involved one control period, six deprivation and six refeeding periods. At the beginning of the experiment, animals were exposed to a control period of four days, followed by water deprivation periods either of one (WD1), two (WD2) or three (WD3) days, and water and feed deprivation periods either of one (WFD1), two (WFD2) or three (WFD3) days. After each deprivation period, animals were offered water and feeds for four days as a refeeding period (R1, R2... R6).

Live body weight of rams was daily recorded to determine body weight changes during deprivation and refeeding periods. Animals were weighed before morning feeding or watering during refeeding periods or at 9:00 h during deprivation periods. Also, rectal (RT) and skin (ST) temperatures were daily measured at 12.00 h using digital thermometer (Fisher, USA) including special tool for each of RT and ST. Minimum and maximum ambient temperatures and relative humidity (%) were daily recorded at the same time during the experimental periods.

On the first day of each refeeding period, total amount of feeds or water intake as a first choice was recorded at the first five minutes of refeeding periods. Also, duration of water consumption during the first minutes of drinking was individually recorded. Thereafter, percentage of animals drinking water as a first choice was calculated.

Data of body weight during deprivation or refeeding period were statistically analyzed as one way analysis of variance, however, data of RT or ST were statistically analyzed as a factorial design using the least squares methods described by Linkelhood SAS program (1990). The differences among means were tested using Duncan's new multiple range test (1955).

RESULTS AND DISCUSSION

Meteorological data

During the experimental period, the minimum and maximum values of ambient temperature and relative humidity (RH%) were 24.5 - 34.7°C and 46.7- 83.9 %,respectively.

Deprivation periods

Changes in body weight and feed intake

Data presented in table 1 revealed that actual weight loss of the deprived animals increased ($P<0.05$) by increasing water deprivation from one up to three days, or water and feed deprivation only from one to two days. Weight loss as a proportion of original body weight, however, increased ($P<0.05$) by increasing water or/and feed deprivation from one up to three days. Similar trends were obtained in different breeds of sheep as reported by Esmail Eman *et al.* (1996), who observed that body weight gradually declined ($P<0.05$) with the advance of dehydration period from one up to three days.

Table (1): Weight loss and feed intake of Ossimi rams during different periods of water or/and feed deprivation.

Deprivation period	Live body weight(kg)		Weight loss		DM intake
	Original	Final	Kg	%LBW	Kg/h/d
WD1	59.3	54.5	4.8^{d}	8.1^{d}	1.49
WD2	59.5	53.0	6.5^{c}	10.9^{c}	1.01
WD3	59.3	47.6	11.7^{a}	19.7^{a}	0.69
WFD1	59.9	53.4	6.5^{c}	10.8^{c}	-
WFD2	59.5	49.8	9.7^{b}	16.3^{b}	-
WFD3	59.9	48.9	11.0^{ab}	18.4^{a}	-
±MSE	2.7	2.4	0.49	0.59	-

A,b,c and d Means having different superscripts in the same column are significantly different at P<0.05.

It is of interest to note that the actual and proportional weight losses were almost higher ($P<0.05$) during WFD1 and WFD2 than that during WD1 and WD2. Meanwhile, they did not differ significantly during WFD3 and WD3, showing the highest values during these periods (Table 1).

Different reduction levels in body weight were reported for animals as affected by water or feed deprivation and period of deprivation as well. Loss of body weight was 5% of the initial body weight in goats deprived of feed for one day (Dahlborn and Karlberg, 1986). However, it ranged between 13.7 to 17.9% in Ossimi, Rahmani and their crosses with Finnish Landarace sheep deprived of feed for seven days during summer (Madian, 1989). On the other hand, with the same breeds, water deprivation for eight days during summer caused a reduction in body weight by 26-29% (Abdel-Fattah, 1988). Meanwhile, it was found to be 9.5% in Barki sheep dehydrated for three days (Esmail Eman *et. al.*, 1996), 16.3% in Dorper rams dehydrated for four days (Degen and Kam, 1992), 27.5% in German Mutton Merino sheep and 21.0% in Awassi sheep at the end of 60 days water restriction period (Degen, 1977). In general, amount of weight loss is found to be affected by breed (genetic make up), ambient temperature and period of deprivation (Esmail Eman *et al.*, 1996).

The significantly ($P<0.05$) higher weight loss during WFD1 or WFD2 than those during WD1 and WD2 were mainly related to that weight loss was caused mostly by loss of body water in dehydrated animals (El-Hadi, 1986 ; Dalhborn and Holtenius, 1990; Degen and Kam, 1992 and Esmail Eman *et al.* 1996) or by loss of water and tissue substances (Schmidt-Nielsen *et al.*, 1956) and/or body solids (Degen, 1977) in animals deprived of water and feed. In addition, negative water balance and body weight losses were reported in dehydrated camel (Dill *et al.*, 1980) and goats deprived of feed (Dahlborn and Karlberg, 1986).

Animals continued to eat concentrate and hay during WD1 period at a level similar to the control period. However, during WD2, they showed marked reduction by about 32% in DM intake. Yet, they showed sharp decrease in DM (54%) intake during WD3 as compared to their control intake (100%) (Table 1).

During WD1and WD2, deprived animals continued to eat (Table 1). So, the higher weight losses were expected to occur during WD1 and WD2 than those during WFD1 and WFD2.Hence, the insignificant differences in weight loss during WD3 and WFD3 may be attributed to the marked decrease in feed intake of dehydrated animals for three days.

Daily changes in body weight and feed intake

Results in table 2 reveal that the highest daily weight as actual or proportional weight loss occurred during the 1st day of all deprived animals. These losses were always higher ($P<0.05$) during water and feed deprivation than during dehydration periods, but did not differ significantly between the 1st day of water or/and feed periods. On the 2nd day of water or/feed deprivation periods, actual and proportional losses were almost lower ($P<0.05$) than that on the 1st day (Table 2).

It is of interest to note that actual loss did not differ significantly between the 2nd and 3rd day of water or/and feed deprivation, but the proportional loss was higher ($P<0.05$) on the 3rd than the 2nd day only in animals deprived of water and feed (Table 2).

It is worthy noting also that weight loss mostly occurred on the 1st day of each deprivation period. During WD2 and WFD2, weight loss during the 1st day represented nearly similar values as a percentage of total loss during each period (69% and 67%, respectively). The corresponding percentage was lower during WD3 (44%) than that during WFD3 (60%). This was related to the higher ($P<0.05$) weight loss during the 3rd day of WD3 than WFD3 (Table 2).

Table (2): Daily weight loss and average daily DM intake of deprived animals.

Deprivation period	Body weight (kg)		Weight loss		Feed intake (kg/h/d)
	Original	Final	Kg	%LBW	
WD1:	59.3	54.5	4.8^{b}	8.1^{b}	1.49
WD2:					
The 1st day	59.5	55.0	4.5^{b}	7.6^{bc}	1.47
The 2nd day	55.0	53.0	2.0^{cd}	3.6^{e}	0.61
WD3:					
The 1st day	59.3	54.1	5.2^{b}	8.8^{b}	1.56
The 2nd day	54.1	50.6	3.5^{c}	6.5^{cd}	0.51
The 3rd day	50.6	47.6	3.0^{c}	5.9^{d}	0.00
WFD1:	59.9	53.4	6.5^{a}	10.9^{a}	-
WFD2:					
The 1st day	59.5	53.0	6.5^{a}	10.9^{a}	-
The 2nd day	53.0	49.8	3.2^{c}	6.0^{d}	-
WFD3:					
The 1st day	59.9	53.3	6.6^{a}	11.0^{a}	-
The 2nd day	53.3	50.5	2.8^{cd}	5.3^{d}	-
The 3rd day	50.3	48.9	1.6^{de}	3.2^{e}	-
±MSE	2.9	2.6	0.41	0.54	-

A,b...... e, Means having different superscripts in the same column are significantly different at $P<0.05$.

Concerning feed intake of dehydrated animals, nearly similar DM intake was observed during the 1st day of each deprivation period. During the 2nd day, animals markedly decreased their intake by about 59 and 67% during WD2 and WD3 periods, respectively. However, during the 3rd day of WD3, they stopped their intakes as results of sever dehydration (Table 2).

A close relationship between the quantities of feed and water consumed by ruminants was reported by More and Sahni (1981). In Sudanese desert sheep, El-Hadi (1986) found that the decline in the percentage of dry matter intake at the end of three days dehydration was 26.0%. However, in Awassi sheep dehydrated for five days, the corresponding value was 97% (Laden *et al.*, 1987). The reason of animal to stop their intake was mainly related to that when the dehydration become sever on the 3rd day of WD3 (18% body weight loss), animals gradually loss appetite and soon stop their intake (Schmidt-Nielsen *et al.*, 1956). By dehydration above one day, eating dry feeds was difficult or impossible (Dill *et al.*, 1980). This finding was observed in dehydrated camels, when they lost 20% of their original body weight (Schmidt-Nielsen *et al.*, 1956).

Refeeding period

Behaviour of deprived animals

During the few minutes of refeeding, some observations were worthy noting. When water and feeds were offered, five of seven animals (71%) after WD1 (R1) drank water as a first choice versus 100% of animals after WD3 (R3). The other two animals (29%) firstly chose feed as a first choice and fed a little amount of hay (20-30g DM). However, reversible situations were observed in animals deprived of water and feed, where 100% of animals after WFD1 and 71% of those after WFD2 (R5) and WFD3 (R6) drank water as a first choice (Table 3).

During the first minutes of refeeding, there was marked variation in amount of water and time of drinking. Animals during R3 after WD3 showed the highest amount and time of drinking, followed by those after WD2 (R2) and both WD1 (R1) and WFD3 (R6) periods. While, the lowest values were obtained after WFD1 (R4) and WFD2 (R5). However, in term of amount of water per minute, animals after WFD1 (R4) showed the highest values, followed by those after WD1 (R1). While, the lowest values were observed in animals after WFD2 (R5).

Table (3): Water intake and animals behaviours during the first drinking of refeeding periods.

Refeeding period	Animals firstly chose water %	Time of drinking (min)	Water intake			
			Liter	Liter/min	%LBW*	% first day**
R1	71	1.13±0.10	6.0	5.3	11.0	45
R2	100	1.80±0.16	8.3	4.6	15.6	48
R3	100	2.28±0.14	9.7	4.3	20.4	54
R4	100	0.57±0.14	3.2	5.6	6.0	25
R5	71	1.02±0.18	3.9	3.8	7.8	28
R6	71	1.57±0.23	6.3	4.0	12.9	45

* Water intake as a percentage of the original live body weight

** Water intake as a percentage of daily water intake during the first day of refeeding.

After WD3 period (R3), animals drank amount of water in one drinking representing the highest percentages of their live body weight (20%) and of their drinking during the first day of refeeding (54%). However, the corresponding lowest values were obtained by those after WFD1 (R4) and WFD2 (R5) (6.7% and 25.28%, respectively). These results revealed more effect of dehydration than water and feed deprivation periods on animal behaviour during the first minutes of refeeding periods. The present results are nearly similar to that of MacFarlane (1964) found that after losing 25-31% of body weight, dehydrated sheep drank 4.5 liters water in one minute. Also, Esmail Eman *et al.* (1996) reported that rate of water intake following the first drinking after dehydration of three days was 1.9, 2.3 and 2.1 liters/min for Suffolk, Barki sheep and their crosses, respectively. These amounts are less than those reported herein.

The present higher capacity of water intake in short time may reflect the efficiency of Ossimi sheep to take its requirement in short time. Consequently, this is of great benefit for surviving particularly in dry areas in which water sources are limited and/or during competition of animals for drinking (Esmail Eman *et al.*, 1996). The present observation indicated that replenishing of water losses is rapid in sheep (Adolph, 1982).

Inspite of the lower amount of water intake of animals deprived of water and feed than those deprived of water only, water intake per minute was higher after all water and feed deprivation periods than WD1 and WD2. However, it was nearly similar in animals deprived of water or/and feed for three days. It is worth to note that amount of water intake per minute showed a negative relationship with weight loss of animals deprived of water or/and feed.

Changes in body weight, and water and feed intake

On the first day of refeeding, when water and feeds were offered after different deprivation periods, all animals deprived of water (R1, R2 and R3) replaced as much as those lost during the deprivation periods. Meanwhile, animals deprived of water and feed replaced only 82-85% of their weight loss. The complete replacement of weight loss was on the 3rd and 4th day of refeeding periods after WFD1 (R4), and both WFD2 (R5) and WFD3 (R6), respectively (Table 4).

It was observed that daily water intake of the deprived animals on the 1st day of refeeding exceeded there control intakes (7.5 liters/d). Water intake increased in animals deprived of water or/ and feed for two and three days than one day. Generally, water intake was higher in animals deprived of water than water and feed for the same period. Amount of water decreased gradually to reach their usual at the end of refeeding (the 4th day). Water intake was nearly similar in all deprived animals as average daily water intake in deprived animals for the same period (Table 4).

Regarding the feed intake, all deprived animals continued to eat after the first drinking. Average daily DM intake was nearly similar during all deprivation periods.

Body temperature

Data in Table 5 show that all deprivation periods caused significant increase in rectal temperature (RT) and skin temperature (ST) of deprived animals. The effect of dehydration was more pronounced on increasing RT (from 0.65 to 0.97°C) than that on ST (from 0.57 to 0.73°C). However, the opposite was observed for water and feed deprivation (from 0.42 to 0.48°C for RT and from 0.79 to 0.92°C for ST). The pronounced rise in RT of animals during all deprivation periods could be attributed to the reduction in evaporative cooling, as a result of a shortage in the amount of water needed for evaporation from the respiratory tract and skin (Degen, 1977).

Table (4): Live weight, and feed and water intake of deprived animals during different refeeding periods (each of 4 days).

Refeeding period	Live body weight (kg)*				Water intake (liter)**				Water intake liter/h/d	DM intake Kg/h/d
	1st day	2nd day	3rd day	4th day	1st day	2nd day	3rd day	4th day		
R1	59.6 (100%)	59.4 (102%)	59.3 (100%)	59.5 (104%)	13.4 (25%)	9.8 (18%)	8.7 (16%)	8.4 (14%)	10.1 (18.5%)	1.73
R2	60.1 (109%)	60.3 (112%)	60.0 (107%)	59.3 (98%)	17.3 (33%)	11.3 (21%)	8.5 (16%)	8.6 (16%)	11.4 (21.5%)	1.74
R3	60.3 (109%)	60.6 (111%)	59.7 (103%)	59.9 (105%)	17.9 (38%)	10.2 (21%)	7.1 (15%)	7.6 (16%)	10.7 (22.5%)	1.88
R4	58.7 (82%)	59.3 (91%)	60.1 (103%)	59.5 (94%)	12.6 (24%)	9.7 (18%)	9.2 (17%)	8.6 (16%)	10.0 (18.7%)	1.83
R5	57.9 (84%)	59.1 (96%)	59.3 (98%)	59.9 (104%)	13.9 (28%)	10.1 (20%)	9.9 (20%)	9.0 (18%)	10.7 (21.5%)	1. 81
R6	58.3 (85%)	58.8 (90%)	58.7 (89%)	59.9 (100%)	14.0 (28%)	11.8 (24%)	10.3 (21%)	9.0 (18%)	11.3 (23.1%)	1.67

* Values between parentheses represents the percentages of body weight replacement by drinking.

** Values between parentheses represents water intake as percentage of initial live body weights.

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Table (5): Ambient temperature and rectal and skin temperatures of animals during different deprivation and refeeding periods.

Deprivation Period	Ambient temperature			Rectal temperature (°C)			Skin temperature (°C)	
	Deprivation	Refeeding	Deprivation	Refeeding	±SEM	Deprivation	Refeeding	±SEM
WD1	34.3±0.0	34.5±0.95	39.44[a]	38.47	0.08***	38.21[b]	37.81	0.10*
WD2	33.5±0.0	34.3±0.25	39.36[a]	38.53	0.07**	38.23[b]	37.69	0.13*
WD3	35.0±0.9	35.0±1.00	39.00[b]	38.45	0.07**	38.65[a]	37.92	0.12*
WDF1	34.0±0.0	35.8±1.30	39.09[b]	38.61	0.10*	38.77[a]	37.85	0.12**
WFD2	33.0±0.0	35.0±2.2	38.91[b]	38.49	0.12*	38.75[a]	37.79	0.15**
WFD3	33.7±1.8	35.8±1.6	38.96[b]	38.49	0.07**	38.54[a]	37.75	0.15*
±SEM	-	-	0.08	0.07	-	0.10	0.11	-

* Significant at P<0.05   ** Significant at P<0.01   *** Significant at P<0.001

a,b Means having different superscripts within the same column are significantly different at P<0.05.

In accordance with the present results, Madian (1989) reported that RT was affected mainly by ambient temperature, and starvation had slight effect on RT. However, Khalifa (1996) reported that the local sheep tolerate water deprivation by reducing water losses, whereas, RT increased from 0.3 to 0.8°C. Also, Abdel-Fattah (1988) found that after 8 days of dehydration during summer, Ossimi, Rahmani and their crosses with Finnish Landrace sheep showed higher RT and ST than the controls.

Furthermore, it was found that three days dehydration caused a linear increase in RT of goats (Kamel, 1991) and a progressive increase in RT of Indian native and crossbred sheep deprived of water during summer condition (Singh *et al.*, 1982). Also, Esmail Eman *et al.* (1996) reported significant increase of about 1.3, 1.1 and 0.9% in RT of Suffulk, Barki and their crosses, respectively, subjected to three days water deprivation.

In comparing the differences in body temperatures among deprivation periods, significantly ($P<0.05$) RT was higher and ST was lower during WD1 and WD2 than during WFD1 and WFD2 periods (Table 5). These differences may be related to lower metabolic rates of animals deprived of water and feed than those dehydrated only. On the other hand, the insignificant differences in RT and ST between WD3 and WFD3 periods may be related to the marked reduction of feed intake of animals dehydrated for three days. Skin temperature is an expression of equilibrium status generated by body temperature, energy loss from the skin and other heat loss pathways (Khalifa, 1996).

Generally, the behaviour of sheep after dehydration or/and starvation indicated that RT could be considered as an adaptive mechanism to conserve water. It is worthy noting that during all refeeding periods, values of RT and ST nearly returned to their normal levels during the refeeding periods. Similar trends were reported by Esmail Eman *et al.* (1996) on sheep dehydrated for three days.

Results of the present study indicated that Ossimi rams deprived of water or/and feed under high ambient temperature during summer season in Egypt show pronounced changes in body weight and body temperature. The magnitude of changes increased by advancing deprivation period, being higher for deprivation of both water and feed than water alone for one or two days. However, subjecting animals to water or/and feed for three days resulted in similar changes.

The present study may indicate that the native Ossimi sheep show adaptability to most environmental conditions and have the ability to withstand water or/and feed shortage. This lead to a possibility of raising Ossimi sheep in the newly-reclaimed areas in Egypt.

REFERENCES

Abdel-Fattah, M. Sh. (1988). Adaptability of sheep under different environmental conditions. M. Sc. Thesis, Anim. Prod. Dept., Fac. Agric., Al-Azhar Univ.

Adolph, E. F. (1982). Termination of drinking: Satiation Federation Proc., 41: 2533-2535.

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

Dahlborn, K. and B. E. Karlberg (1986). Fluid balance during food deprivation and after intraruminal loads of water or isotonic saline in lactating and anoestral goats. Q. J. Exp. Physiol. 71: 223-233.

Degen, A. A. (1977). Response to dehydration in native Fat-tailed Awassi and improved German Mutton Merino sheep. Physiol. Zool., 50: 284-298.

Degen, A. A. and M. Kam (1992). Body mass loss and body fluid shift during dehydration in Dorper sheep. J. Agric. Res. Comb., 119: 419-422.

Dill, D. B.; M. K. Yousef ; R. C. Cox and G. R. Barton. (1980). Hunger *vs* thirst in the Burro (*Equus Asinus*). Physiological Behaviour., 24: 975-978.

Duncan, D. B. (1955). Multiple Range and Multiple F-Test. Biometrics, 11: 1-42.

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

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

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

Khalifa, H. H. (1996). The adaptive responses of local and Finn crossbred sheep. Symposium on use of exotic breeds in improving sheep production, Finn. sheep as a case study. Egypt, April 22-23, pp. 140-147.

Laden, S.; L. Nehmadi and R. Yagil, (1987). Dehydration tolerance in Awasi Fat-tailed sheep. Candian J. Zool., 65: 363-367.

MacFarlane, W. V. (1964). Terrestrial animals in dry heat: ungulates. In *Handbook of Physiology Environment*. pp. 509-539, Washington. D.C. American Physiology Society.

Madian, A. H. (1989). Effect of starvation on some physiological parameters in sheep. M. Sc. Thesis, Anim. Prod. Dept., Fac. Agric., Al-Azhar Univ.

More, T. and K. L. Shani. (1981). Effect of water intake on feed digestibility. World Rev. Anim. Prod., 17: 33-40.

SAS (1990). SAS User's guide: Statistics. SAS Inst., Inc., Cary NC.

Schmidt-Nielsen, B.; K. Schmidt-Nielsen ; T. R. Houpt, and S. A. Jarnum (1956). Water balance of the Camel. Amer J. Physiol., 185: 185-194.

Terill, C. E. (1968). Adaptation of sheep and goats. In *Adaptation of Domestic Animals*. Ed. E.S.E. Hafez, Lee and Feberiger, Philadelphia, pp. 247-262.

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. Agric Sci. Camb., 99 : 525 - 528.

استجابة الأغنام الأوسيمي للتعطيش أو التجويع مع التعطيش لفترات مختلفة تحت ظروف الصيف في مصر

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استخدم في هذا البحث سبع كباش أوسيمي لدراسة استجابة أغنام الأوسيمي للتعطيش فقط أو التعطيش مع التجويع لمدة يوم أو يومين أو ثلاثة أيام متتالية ، وتلي كل فترة حرمان فترة شرب و أكل لمدة أربع أيام. وخلال الفترة التجريبية تم قياس التغيرات في وزن الجسم – كمية الماء والغذاء المأكول ودرجات حرارة الجسم (المستقيم والجلد) .

أكدت النتائج أن:

تعطيش الحيوانات لمدة يوم (الفترة الأولى) ، يومين (الفترة الثانية) ،ثلاثة أيام (الفترة الثالثـة) أو التجويع مع التعطيش لنفس المدد (الفترة الرابعة والخامسة والسادسة على التوالي) أدى إلى نقـص معنـوي (عند مستوى ٥%) في وزن الجسم بمعدل (٨ %،١١ %،٢٠ %،١١ %،١٦ % و١٨%) أثنـاء الفـترات الستة على الترتيب .

معظم الفقد في وزن الجسم حدث معنويا خلال اليوم الأول من كل فترة حرمان ، وكان أعلـى معنويا أثناء فترات التجويع مع التعطيش عن التعطيش فقط .

زيادة فترة التعطيش أدت إلى انخفاض في الغذاء المأكول خلال اليوم الثاني فـي الفـترة الثانيـة بحوالي ٥٩% ، وخلال الفترة الثانية بحوالي ٦٧% من كمية الغذاء بينما توقفت الحيوانات عن التغذية فـي اليوم الثالث خلال الفترة الثالثة .

خلال فترة إعادة التغذية (عليقه + ماء) اختارت أغلبية الحيوانات الماء كاختيـارا أول (٧١-١٠٠%) وتناولت كمية كبيرة من الماء خلال الدقائق الأولى من إعادة التغذية ، وكانت هذه الكمية أكبر فـي الحيوانات المعطشة لمدة ثلاثة أيام (٩,٧ لتر/حيوان) خلال ٢,٣ دقيقة ، ومثلت أقل كمية/وحدة زمنيـة (٤,٣ لتر/دقيقة) . وأظهرت الحيوانات المعطشة مع التجويع لمدة يوم واحد عكس القيم السابقة (٣،٢ لـتر خـلال ٥٧, دقيقه, ٥,٦ لتر/دقيقة, على الترتيب) .

استطاعت الحيوانات المعطشة أن تستعيد وزنها المفقود خلال فترة الحرمان أثناء اليوم الأول مـن فترة إعادة التغذية ، بينما الحيوانات المعطشة مع التجويع لمدة يوم واحد استعادت وزنها خلال اليوم الثـالث ، بينما الحيوانات المعطشة مع التجويع لمدة يومين أو ثلاثة استعادت وزنها المفقود خلال اليوم الرابع من فـترة إعادة التغذية .

أدى تعريض الحيوانات للتعطيش أو التعطيش مع التجويع إلى زيادة معنوية في درجة حرارة كـل من المستقيم و الجلد ، وخلال الفترة الأولى و الثانية من التعطيش أظهرت الحيوانات أعلى زيادات معنوية في حرارة المستقيم (٢,٢-٢,٥ درجه مؤويه) وأقل الزيادات في حرارة الجلد (١,٥-١,٦درجه مؤويه) وذلـك بالمقارنة بالفترات الأخرى من الحرمان و التي لم تختلف فيها الزيادة معنويا في كل من حرارة المسـتقيم أو الجلد .

وتوضح الدراسة المقدمة أن أغنام الأوسيمي المحلية تتأقلم على الظروف البيئية المختلفـة والتـي تتغير فيها درجات الحرارة و ينقص فيها الماء و الغذاء مما يمكنها من المعيشة فـي المنـاطق المسـتصلحة حديثا في مصر.