

PERFORMANCE ADAPTABILITY OF INDIAN DESERT GOAT UNDER WATER STRESS CONDITIONS

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Introduction

The higher concentration of goats in the tropical and sub-tropical areas of the world indicate that they are more heat tolerant than other animals. Keeping this in view, research work on various aspects of physiological adaptation is in progress at this institute for last 10 years and it has been revealed that Indian desert goats are decidedly more hardy than other species (cattle, buffaloes and sheep) of livestock of this region. In order to assess its production potential for augmenting the overall animal production of Indian arid zone, it has been considered necessary to examine the impact of water stress on the productive performance of the two predominant desert breeds namely the Parbatsar and Marwari. No systematic study has so far been done on this aspect.

Materials and Methods

The present investigation was carried out at Central Research Farm of this institute at Jodhpur (26°05'N, 73°01'E). The animals included in this study were of two breeds of goat from Thar desert namely Parbatsar and Marwari. They were maintained by grazing and browsing for about 8 hours everyday in a natural pasture of *Cenchrus ciliaris* grass containing bushes of *Zizyphus nummularia* and *Prosopis cineraria* trees.

Animals were subjected to three levels of water intake as detailed below for a period of 4 years (1980-1985):

(i) Control (daily watered) 16 does and 6 bucks each of Parbatsar and Marwari breeds were provided water *ad libitum* only once daily.

(ii) Treatment 1 (thrice weekly watered) equal number of does and bucks of both the breeds supplied with water once *ad libitum* on three fixed days per week (Monday, Wednesday

and Friday).

(iii) Treatment 2 (twice weekly watered) this group had similar number of animals which were offered water once *ad libitum* on two fixed days in a week (Tuesday and Saturday).

During this period the effect of water stress on the reproductive status of bucks, and does and on the productive traits of does of these two breeds was studied.

Results

The number of ejaculates obtained during 30 minutes and the time taken for them did not differ ($P > 0.05$) between watering treatments and breeds. All the physical, morphological and biochemical characteristics of semen of bucks of either breed were not affected ($P > 0.05$) by watering schedules. Fertility status of bucks was also not affected by the breed and watering treatments.

The incidence of oestrus, duration of oestrus and length of oestrous cycle were not affected ($P > 0.05$) by imposed treatment in either of the breed. The age and body weight at first conception were almost similar in all the three groups breed-wise. However, the body weight gain of pregnant does subjected to only two watering per week were significantly ($P < 0.05$) lower than those of their counterparts getting three waterings per week or being watered daily in both the breeds. Although the age at first kidding was not affected by watering treatments, the weights at first kidding and kidded weights in both breeds were significantly ($P < 0.05$) lower in does getting water biweekly than those in the other two groups. Other reproductive traits like length of gestation, kidding rate, post partum interval and inter-kidding period remained unaffected ($P > 0.05$) by the watering treatments and breeds.

The overall average daily milk yield was signi-

ificantly ($P < 0.01$) affected by breed and watering treatments. The Parbatsar does yield more milk at all stages of lactation. Similarly, the daily watered and thrice weekly watered does produced more milk in comparison to the twice weekly watered animals. The daily watered and thrice weekly watered does, however, did not differ significantly ($P > 0.05$) between them. The total milk yield during a lactation (180 days) was also significantly ($P < 0.01$) affected by both watering treatments and breed. The daily watered and thrice weekly watered groups which did not differ ($P > 0.05$) between them had consistently higher lactational yields than the twice weekly watered animals. The total milk yield was decidedly more in Parbatsar than in the Marwari breed indicating thereby that Parbatsar is better than Marwari as far as the milking traits are concerned.

The effect of water deprivation was significant ($P < 0.05$) on total solids, solids not fat and lactose which were higher in the twice weekly watered does. However, none of these constituents were significantly ($P > 0.05$) affected by the breed. The values of fat were slightly higher in Parbatsar does throughout the period of study.

Discussion

Significantly lower body weights during pregnancy and before and after kidding observed in present study are indicative of higher water requirements of these does during the period of pregnancy. These observations find support from similar studies on Somalian goats by Hunt (1951) and Lewis (1955).

The observed significant differences in the milk yield between the different treatment groups indicate that the water requirements of the lactating goats are higher. Maloiy *et al.* (1979) also reported that lactating goats need water more frequently than the non-lactating ones. Konar and Thomas (1970) and Maltz and Shkolnik (1980) also recorded significant reduction in the daily milk yields of water deprived goats. Shkolnik *et al.* (1972) stated that lactating Bedouin goat had 40 to 50 per cent more water turnover than non-lactating ones and this increased water turnover was not only due to the water content of the milk, but was due to higher demands of

increased metabolism of milk secreting goats.

The higher concentration of certain constituents in the milk of twice weekly watered does might be due to the decreased milk yield in this group. Little *et al.* (1978) also reported similar increases in total solids, solid not fat and lactose of water deprived.

It may be concluded from the results of this study that a productive goat in Thar desert can be safely be reared on three watering per week. About 50 per cent of water, which is a scarce commodity in desert can be economised by adopting this practice in other words double the number of goats can be raised on same amount of water.

(Key Words. *Cenchrus ciliaris*, *Zizyphus nummularia*, *Prosopis cineraria*)

Literature Cited

- Hunt, J.A. 1951. A General survey of the Somali land protectorate 1944-1950. *Harqelsa* pp. 174. Cited by Dahl and Hjort (1976) Having herds. Liber Tryek Stockholm.
- Konar, A. and P.C. Thomas. 1970. The effects of dehydration and intravenous infusion of Vasopressin on milk secretion in the goat. *British Vet. J.* 126:25-28.
- Lewis, I.M. 1961. A pastoral decocracy: A study of pastoralism and politics among the Northern Somali of horn of Africa. OUP, London, pp.58.
- Little, W., B.F. Sansom, R. Manston and W.M. Allen. 1978. The effects of reducing the water intake on lactating dairy cows by 40 per cent for 3 weeks. *Anim. Prod.* 27:79-87.
- Maloiy, G.M.O., W.V. Macfarlane and A. Shkolnik. 1979. Mammalian Herbivores. In: Comparative physiology of osmoregulation in mammals. Vol. 2. Academic Press, London, New York, San Francisco, 185-202.
- Maltz, E. and A. Shkolnik. 1980. Milk production in the desert. Lactation and water economy in the black Bedouin goat. *Physiological Zoology* 53:12-18.
- Shkolnik, A., A. Borut and J. Choshniak. 1972. Water use economy of the Bedouin goat. *Proceedings of the Symposium of the Zoological Society*, London 31:229-242.