

An investigation on food habits of persian gazelle in Cheshmeh Gol reproduction station of Khorasan province, Iran

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Abstract

Persian gazelle (*Gazella subgutturosa*) is one of the most important wild species in Iran. This species prefers plain and low hill habitats which are dominated by sagebrush (*Artemisia sieberi*). However, due to extensive hunting and habitat destruction, the populations of gazelle were declined and this valuable species was recorded as threatened species in 2006. To rehabilitate the habitats of gazelle and improve their productivity, Cheshmeh-Gol captive reproduction station with an area of 50 hectares was established. To provide more reliable information on diet requirements of gazelle, direct observation and cafeteria feeding on captive animals were employed. For direct observation, through watching tame animals of both sexes, minutes of forage consumption were recorded. For cafeteria feeding, captive animals were fed with known amounts of native and introduced species (e.g. *Poa bulbosa*, *Artemisia sieberi*, and *Atriplex canescens*) which were clipped and brought to the feeding fence. The consumed quantities of forage were determined by weighing the forage before and after presenting to the animals. By using the same animals, experiments were conducted in different seasons. The average daily consumption was estimated 1kg per day per gazelle. The result of cafeteria feeding was shown that the amounts of forage consumption affected by season and the quality of the gazelle's food, changed in different seasons. Gazelle's metabolic energy was lowered in summer compare to other seasons and were different for both sexes. To manage the rangelands properly, forage production was calculated about 6815 kg DM per year, so the capacity of study area was estimated 19 heads. As the number of gazelles were increased to 50 head and more, the area of station should be extended.

Keywords: cafeteria feeding; direct observation; carrying capacity; food habit; Persian gazelle

Introduction

Persian gazelle (*Gazella subgutturosa*) is one of the most important ungulates which lives in arid plains with low hills mostly dominated with sagebrush (*Artemisia sieberi*). Global distribution of the gazelle restricted to Iran, Pakistan, Saudi Arabia, Mongolia, and Turkey (Farhadinia *et. al.*, 2009; Hemammi and Behbash, 2007). Recent decades, due to habitat destruction and extensive hunting, gazelle populations have been decline most parts of Iran and joined to threatened species in 2006.

Rangelands have a major role in providing nutritional requirements of gazelles. Thus, determination the diet of Persian gazelle and the quality of their food in rangelands, seems necessary to identify their biological and protecting condition.

To restore gazelle populations and study nutritional requirements of this species, the Environment Department of Iran has established reproduction stations in captive such as "Cheshmeh Gol station" with an area of 50 hectares. We studied Persian gazelle's diet in breeding, reproduction and release station of Cheshme Gol.

Study Site and Methods

Study area:

About 20 hectares of Cheshmeh Gol Plain is fenced for reproduction of gazelle in captive located at 15 km of Torbate-Jam city in Khorasan Province, Iran.

This arid steppe receive 170 mm precipitation annually and vegetated by *Artemisia sieberi*, *Astragalus squarrosus*, *Launaea acanthodes*, *Alhagi camelorum*, *poa bulbosa* and introduced shrubs of *Atriplex canescens*.

direct observation grazing and Cafeteria methods:

The quality and quantity of Persian gazelle's diet, studied by direct observation of grazing using chronometer and the cafeteria method (Bagherirad, *et al.*, 2014: 2015) For each case, a male and a female gazelle selected. The studies conducted during three seasons of spring, summer and fall and at 3 days in each season and the duration of grazed plant species were recorded by chronometer. In cafeteria method, certain amount of important forage species of the station, clipped and offered to gazelles in plastic buckets. Daily consumption of different range plant species measured for three seasons with two sex of gazelle and results compared through factorial experiments.

Results and Discussion

The results of Cafeteria showed that forage consumption of Persian Gazelle affected by season and forage consumption in fall is more than spring. In addition, the average daily consumption of every Persian Gazelle estimated for 1 kg. The results showed that quality and preference of the Gazelle's diet, changes between seasons and between different plant species. *Atriplex canescens* had most preference in all seasons for the gazelles (Table 1). Data processing revealed that amounts of dry matter consumption were significantly different in two seasons of spring and fall ($p < 0.05$), but was not significant for two sexes ($p > 0.05$). Quality of diet is higher in spring for males compared to females in all season. Gazelle needs lower metabolic energy in summer than other seasons and it is lower in females than males.

Annual forage production of Cheshme Gol measured by harvest (for grasses and forbs) and Adelaide methods (for shrubs) and the estimated production was 6814.37 kg for the station. Considering average daily consumption of Gazelle (1 kg *per capita*), grazing capacity of station estimated 19 head of gazelle.

Table 1. Diet composition (%) of gazelles in one hour feeding in three seasons at Cheshmeh Gol station (dry matter)

species	Season		
	Spring	Summer	fall
<i>Atriplex canescens</i>	38.8 ^a	42.9 ^a	46.7 ^a
<i>Haloxylon aphyllum</i>	4.1 ^c	10.7 ^b	4.0 ^c
<i>Populus euphratica</i>	4.6 ^c	3.4 ^{bc}	4.3 ^{dc}
<i>Artemisia sieberi</i>	11.4 ^{bc}	4.8 ^{bc}	9.4 ^c
<i>Sophora patchycarpa</i>	25 ^{ab}	5.4 ^{bc}	
<i>Astragalus squarrosus</i>	9.6 ^{bc}	7.6 ^{bc}	
<i>Phragmites commonis</i>	3.0 ^c	2.7 ^c	
<i>Convolvulus eremophilus</i>	2.7 ^c	4.4 ^{bc}	
<i>Alhagi camelorum</i>		3.2 ^{bc}	23.0 ^b
<i>Tamarix sp.</i>		3.2 ^c	5.0 ^{de}
<i>Polygonum sp.</i>		4.0 ^{bc}	
<i>Peganum harmala</i>		4.6 ^{bc}	
<i>Ceratocephalus falcata</i>		1.9 ^{bc}	
<i>Ephedra intermedia</i>			7.6 ^{cd}

Conclusions

Although there is no significant difference between the two sexes in amount of food, but quality of the male's diet is higher than that of the female, which probably related to the higher metabolism level of males. Gazelles consume the least amount of food in the summer season, which is due to their lower activity and walking in this hot season. During most days of summer, they rest in the shelter of bushes or any other shady place. On the contrary, in autumn due to beginning of the mating season, their activity increases and they consume significantly more food.

However, because Cheshme Gol is located in a desert and hot area, many native bushes of this area grow in early summer; therefore, the variety of species fed by gazelles is also higher in summer.

Observations show that many plants used by gazelles are not palatable for sheep. Therefore, we can conclude that the simultaneous grazing of gazelles and sheep in rangeland will not lead to severe competition except during severe foliage shortage, which occurs during droughts.

Finally, as a management recommendation, it is necessary to carefully determine and observe the grazing capacity of Cheshme Gol station in order to prevent the destruction of vegetation in this area.

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