

A Preliminary Study on the Behaviour of the Dromedary (*Camelus dromedarius*) in the Mid-western Region of Saudi Arabia

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ABSTRACT. The behaviours of camels were studied under partially guarded and unguarded conditions and when allowed to roam freely. None of the male or female camels in the present study showed many significant changes in their behavioural patterns as a result of variations in husbandry. Indeed, the only significant changes were increases in time allocated to non-social investigation and time allocated to threat behaviour between male and female camels in the partly guarded condition.

Introduction

The camel is an important component of the desert ecosystem, where the flora of marginal land only just meets human food and energy needs^[1,2]. The camel is known as the 'ship of the desert' as it traverses long distances on sandy stretches, carrying men and material. As the camel has considerable local importance, one can make a case for intensifying scientific research on this animal^[3]. The areas of behaviour, physiology, reproduction and socio-economic importance of camels have been identified as being most important where further information is urgently required. In spite of its importance, basic scientific information is sparse^[3] especially on behaviour^[4,2]. The objective of the present study is to move towards filling this gap in our knowledge.

Material and Methods

Animals

One-humped (dromedary) camels of similar age (around 7 years old) were studied. Two groups of camels (30-60 individuals in the present investigation) were compared and contrasted. These were:

1. Partly Guarded Camels

A herd of camels maintained in groups of mixed sex and left to roam freely each day from 08:00-15:00 hours local time at Wadi Briman during which time they chose their food from wild vegetation. In the afternoon (15:00 hrs), the camels returned to their enclosure which measured 100 square metres and was surrounded by metal wire extending one meter above ground level on all four sides. Water and food (tap water and dry grass) were supplied by the camel's owner.

2. Unguarded Camels

Camels in this group were left to roam each day at Wadies Briman and Al-Maharge (in the mid-western region of Saudi Arabia) again choosing their food from wild vegetation. The unguarded camels returned at regular intervals to a familiar well, where their encamped owners drew water for them and sometimes provided dry grass but these animals were not enclosed for periods of time.

Behavioural Studies

The camels were studied as groups of 10 male and 10 female subjects in the partly guarded or unguarded conditions. The behaviour of each subject was recorded using a coloured video-tape camera (Sanyo: Beta movie), for a ten minute period between 16:00 to 18:00 hours local time.

Subsequently, the tapes were analyzed in terms of times allocated to 9 broad categories of behaviour^[5,6], namely:

1. Social behaviour comprising: agonistic gestures, approaching, following, genital sniffing, grooming, mutual grooming, naso-nasal investigation, sexual interaction and partner sniffing;
2. Non-social behavior comprising: exploration, sniffing the enclosure ground and tail-moving;
3. Attack behaviour comprising: bite, cross-neck biting, ear-biting or pinching, front-wrestling, knee bite;
4. Threatening behaviour comprising: chase, blowing inflatable (ploodsak) from mouth, salivation and making sound by teeth grinding;
5. Defensive behaviour comprising: fleeing or running away, neck-away defensive and sideways defensive; raising tail up;
6. Displacement behaviour comprising: ground-kicking, lying, recumbent-scratching, scratch and self-grooming;
7. Resting behaviour comprising the time spent immobile by test camel during the

observation time at the enclosure;

8. Feeding behaviour: the time allocated to feeding; and

9. The number of feeds: i.e., the total number of times the test camel returned to food sources, watering behaviour.

The data was analyzed using Mann-Whitney 'U' tests^[7].

Results and Discussion

The median numbers of seconds (with ranges) allocated by camels in the partly guarded and unguarded conditions to broad categories of behaviour are given in Table 1. All values are given with ranges.

TABLE 1. Time allocated (in seconds) to different behaviour patterns by male and female camels [partly guarded (PG) and unguarded (UG)] in the mid-western region of Saudi Arabia. N.B. medians with ranges given.

Subject	Test Group	Time (in seconds) allocated to								Number of feeding bouts
		Social investigation	Non-social investigation	Attack	Threat	Defence	Displacement	Rest	Feeding	
Male	PG	5.0 0.0-41.0	322.0 0.0-508.0	0.0 0.0-25.0	+2.0 0.0-30.0	0.0 0.0-10.0	8.0 0.0-77.0	0.0 0.0-722.0	3.0 0.0-180.0	0.0 0.0-3.0
	UG	0.0 0.0-136.0	321.5 0.0-590.0	0.0 0.0-0.0	0.0 0.0-10.0	0.0 0.0-18.0	10.0 0.0-582.0	0.0 0.0-590.0	73.0 0.0-287.0	1.5 0.0-7.0
Female	PG	0.0 0.0-93.0	++ 545.5 0.0-600.0	0.0 0.0-5.0	0.0 0.0-62.0	0.0 0.0-62.0	0.0 0.0-62.0	0.0 0.0-600.0	0.0 0.0-325.0	0.0 0.0-3.0
	UG	0.0 0.0-28.0	446.5 186.0-600.0	0.0 0.0-0.0	0.0 0.0-0.0	0.0 0.0-0.0	0.0 0.0-136.0	0.0 0.0-0.0	58.0 0.0-411.0	3.0 0.0-9.0

* Differs from PG female $P < 0.04$ (Mann-Whitney 'U' test)

** Differs from PG male $P < 0.01$ (Mann-Whitney 'U' test)

Male and female camels in the different husbandry systems showed no significant differences in terms to time allocated to social investigation, attack, defence, displacement, resting and feeding. The numbers of feeding bouts were also similar. The only behavioural categories that significantly differed were the times allocated to non-social investigation by partly guarded *female* camels ($u = 17.5$, $P < 0.01$) compared to their partly guarded male camels and times allocated to threat behaviour by partly guarded *male* camels ($u = 27.5$, $P < 0.04$) compared to their partly guarded female camels. Most of the observation period was devoted to non-social behaviour (of the environment) by both male and female animals, which is what one would expect of animals from a harsh environment.

The increased non-social activity of females and the threat behaviour of males in the partly guarded situation seem likely to be consequences of the use of the encl-

sure. Females within the enclosure may be forced into closer proximity resulting in less investigation of group-mates. The partly guarded males may be more wary of their group-mates resulting in relatively high levels of threat behaviour in this category.

Baskin^[8] noted that rutting male camels in the Turkestan desert showed aggressive behaviour, when given extra food. These results differ from the present data where little aggression was seen. This might be a consequence of housing conditions, as Baskin^[8] used only the unguarded condition. It seems more probably, however, that the difference is accounted for by Baskin's^[8] study being carried out during the rutting season whereas the present study was conducted after that season was over. Mating behaviour differs throughout the year^[9] in this species and, as in many other animals, involves intense male competition.

Barker^[10] noted that rutting male camels pace in circles with the chin close to the ground, frothing at the mouth with the lips spread out laterally, but relatively few fights have been observed in the field^[11]. Lamoids tend to attack each other simultaneously by jumping^[11]. In the present study, this fight pattern was clearly observed only in young camels during play fighting^[11]. Adults showed only tentative behaviour. Direct observation suggested that our camels also worked their way to a lateral position, where each tried to lean with his chest to reach with his neck over the opponent's neck or back for leg biting.

More systematic studies should be carried out in the future on sexual social behaviour at different seasons, under varied housing conditions, as well as on different breeds or strains (there are more than 6 different strains of camels in Saudi Arabia each living in a different climatic condition or habitat).

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دراسة أولية على سلوك الإبل من ذات السنم الواحد (*Camelus dromedarius*)
في المنطقة الغربية الوسطى من المملكة العربية السعودية

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سنجلتن بارك ، سوانزي س ٢٤ ٨ ب ب ، ويلسز ، المملكة المتحدة

المستخلص . تمت دراسة سلوك قطيعين من الإبل الأول تحت ظروف حراسة جزئية والثاني غير محروس ، حيث سمح لها بحرية الرعي . ولم تدل النتائج على وجود اختلاف في السلوك بين المجموعتين من الإبل نتيجة للاختلاف في نوع الحراسة (الرعاية) . ولكن الاختلاف الوحيد الذي كان واضحاً هو زيادة في السلوك غير الاجتماعي والسلوك التهديدي بين الذكور والإناث تحت ظروف الحراسة الجزئية .