



Camelid Research

Aggressive sexual behavior of a dromedary bull causing sudden death in a male calf-camel



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ABSTRACT

Behavioral accidents affecting animals have been emphasized in previous studies. This article describes a case of aggressive sexual behavior by a dromedary bull against a male calf-camel which was suffocated to death. A 5-month-old male calf-camel (*Camelus dromedarius*) found dead with no clinical history, weighing approximately 90 kg, and was referred. Detailed history delineated that the animal was kept in a group pen with 7 camels of the same sex but different ages including 3 adult (weighing approximately 600 kg with heights of 1.8–2 m) and 4 calves. The death occurred on 5 December 2017, winter, at 8:00 in the morning. Complete gross necropsy was carried out at approximately 30 to 60 minutes after death. At necropsy and histopathology, no evidence of inflammatory, noninflammatory, infectious, and traumatic lesions was found. Based on the clinical and paraclinical examinations and necropsic and histopathologic findings of the calf, harassment from adult male dromedarian camel was suspected. Videotape recording confirmed the death of calf caused by aggressive sexual behavior of a male dromedarian camel. During the sexual aggression when the calf was in sternal position, the bull sat on the calf in a way that pressed the calf upper-body and head into the floor and therefore the calf was suffocated to death. Suffocation caused generalized hypoxia which consequently led to death in just a couple of minutes. Therefore, probable risk factors should be considered, and sufficient care should be provided for calves raised under intensive management systems.

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Introduction

Camels (*Camelus dromedarius*) are seasonal breeders and their breeding season occurs during the coldest winter months (Deen, 2008; Jalali et al., 2018). Depending on the health condition of the animal, geographical location, and environmental and nutritional status, the duration of the breeding season (also called the “rut”) ranges from 4 to 6 months (Fisher et al., 2009; Fatnassi et al., 2014a). Indeed, the periodicity of seasons and its effects on camel reproductive performance seems complicated (Al-Qarawi, 2005). Al-Qarawi (2005) stated that the onset and duration of the camel breeding season and the intensity of male sexual activity were influenced by meteorological parameters such as temperature and relative humidity. The breeding season of male camels has been

associated with the periods of low humidity, low temperature, and increased rainfall as those periods were marked by a significant increase in androgen level (Fatnassi et al., 2014a).

Behavioral accidents of animals have been emphasized in previous studies (Mainau et al., 2014; Tajik and Kheirandish, 2014). Sexual and social activities, the most important behaviors of large animals, depend largely on hormonal and physiological status (Bekele et al., 2011; Tateo et al., 2013; Tajik and Kheirandish, 2014). Some social behaviors in camelid include bleating, stamping feet and running to show displeasure, vomiting cud at a restrainer in a splashy fashion, snapping each other with or without biting, and taking care and protection of the calves. They always like moving in a single file and getting pleasure from scratching parts of their body with their front or hind limbs or with their incisors. They rub themselves against trees and are seen rolling in the sand. They are not usually aggressive with the exception of breeding males. However, there are generally considerable individual variations in normal social behavior (Nelson et al., 2015).

The seasonality of reproduction is also evident in variation of reproductive steroids and gonadotropin levels (Asa, 1986; Crowell-

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Figure 1. Presented carcass of a calf died due to aggressive sexual behavior by a dromedary bull.

Davis, 2007; Mahla et al., 2015). Preliminary investigations on circulating testosterone profiles during, prior, and after breeding season have been performed by various research in ram (Bernon and Shrestha, 1984; Pacheco and Quirino, 2010), bull (Chenoweth, 1983), camel-bull (Yagil and Etzion, 1980; Deen, 2008; Nath et al., 2016), and stallion (Pickett et al., 1977). Studies on circulating testosterone profiles and their correlation with sexual behavior in ensuing months were conducted to understand trends of reproduction and its association with endocrine profiles in male camels (Chenoweth, 1983; Pacheco and Quirino, 2010). Many sexual behaviors including restlessness, seeking, nosing, nudging, flehmen, pawing, splaying of hind legs, and mounting have been common in male livestock; however, behavioral differences may exist among breeds and/or individuals (Stellflug et al., 2006; Pacheco and Quirino, 2010). Extrusion of soft palate (dulla), copious frothing from mouth, and secretion of poll gland are specific sexual behaviors in dromedarian and Bactrian male camels (Nath et al., 2016).

It seems difficult to believe that an adult male dromedary engages in sexual aggression against a male calf-camel. This article describes a case of aggressive sexual behavior by a dromedary bull against a male calf-camel that was suffocated to death.

Case history

A 5-month-old male calf-camel (*Camelus dromedarius*) found dead with no clinical history, weighing approximately 90 kg, and was referred to the Veterinary Teaching Specialized Hospital of Shahid Bahonar University of Kerman. Detailed history delineated that the animal was kept in a group pen with 7 camels of the same sex but different ages including 3 adults (weighing approximately 600 kg with heights of 1.8–2 m) and 4 calves. They have been raised in the research farm of the Veterinary Medicine School of Shahid Bahonar University of Kerman, southeast of Iran (latitude 30°19'N

and longitude 52°07'E), at a height of 1756 meters above sea level and with the typical cold and dry winters. Housed camels underwent clinical and paraclinical checkups every week. All the clinical (including heart and respiratory rates, rectal temperature, capillary refill time, gastrointestinal motility, urination, defecation, respiration, and neurobehavioral signs) and paraclinical (including hematobiochemical, microbiological, and parasitological examination) parameters measured in weekly checkup were normal until 1 day before death. Two months before the calf death, all animals received albendazole (15 mg kg⁻¹, orally; Dieverm600, Razak Pharmaceutical Co, Tehran, Iran) and ivermectin (0.2 mg kg⁻¹, subcutaneously; Erfamectin1%, Erfan Pharmaceutical Co, Tehran, Iran) to control internal and external probable parasites. All camels were reared under the same husbandry and management conditions in the same group pen with free access to water and shade. The paddock lied in front of the stable where the stalls were located and measured about 250 m² (20 m long and 12 m wide). The ration included mainly alfalfa hay and corn silage. The diet met maintenance requirements as set by Laudadio et al. (2009). The death occurred on 5 December 2017, winter, at 8:00 in the morning. Using a weather tracker (Kestrel, 4000 Pocket Weather Tracker, Nielsen-Kellerman, USA) placed in the outdoor paddock, an ambient temperature ranging from -8 to -6°C, a relative humidity of 13 to 15%, wind speed of 13 km h⁻¹, ultraviolet index 0, and visibility of 9.7 km were recorded. The annual photoperiod on the date mentioned previously and for this location was approximately 10 h and 10 min.

According to the farm personnel's report, the calf was found dead in lateral recumbency and kicking trauma was suspected as the cause of death. Immediately after the event notice, the clinicians were present in the farm. The calf was in good general body condition (BCS = 3.5) according to Faye et al. (2001) (Figure 1). Apnea, pupillary mydriasis with no response to palpebral and corneal reflexes in both eyes, and anal dilation were observed. There was no evidence of traumatic lesion. Complete gross necropsy was carried out at approximately 30 to 60 minutes after death. At necropsy, no evidence of inflammatory (such as hyperemia, petechia, ecchymosis, and hemorrhage), noninflammatory (such as vitamin and mineral deficiencies and metabolic diseases), infectious, and traumatic lesions were found (Figure 2). Moreover, no macroscopic lesions were found in histopathologic evaluation of the lung, intestine, rumen, liver, kidney, brain, and heart.

Videotaped trials

A high-definition HDMI closed circuit television video camera (Canon Vixia HV30, Canon, Lake Success, NY, USA) has been

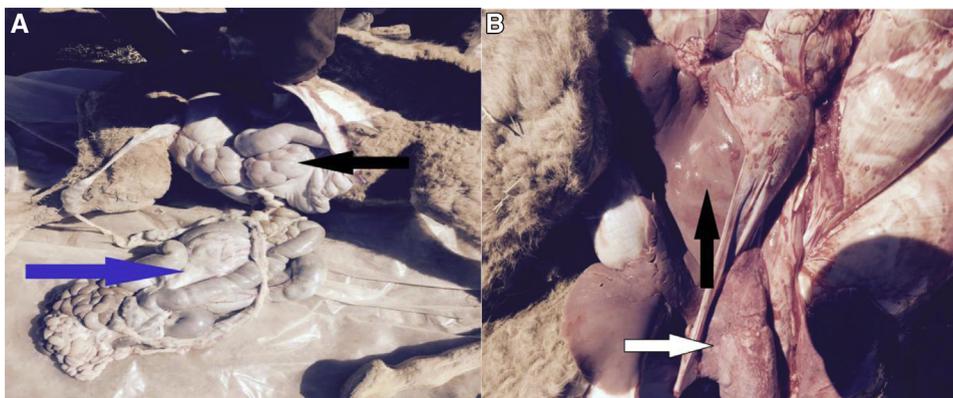


Figure 2. At necropsy, there is no evidence of inflammatory (such as hyperemia, petechia, ecchymosis, and hemorrhage), noninflammatory (vitamin and mineral deficiencies and metabolic diseases), infectious, and traumatic lesions in different parts of body. A) Gastrointestinal tract (blue arrows) and kidney (black arrows). B) Liver (black arrows) and lung (white arrows). (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

Table 1
Description of different phases of sexual behavior of the dromedarian bull against the calf during videotaped trial analysis

Phase	Time (AM)	Behavior	Definition		
Plateau	8:00:00	Aggression	Increased pacing, anxiety, and sound loading		
		Nudging	Flank, hip region of calf physically bumped by head and/or shoulder of camel bull		
		Pawing	Front leg movements by camel bull, usually associated with nudging		
		Splaying of hind limb	Hind legs spread and stand with open leg		
		Crouched posture	Hunching and arching the back		
		Pelvic oscillation	Pelvic lowered		
		Sitting posture	From standing posture to sternal recumbency		
		Tail flapping	The tail is held under the prepuce opening for a few seconds		
		Orgasm	8:02:12	Rubbing	Repeating movement of part of penis
				Intromission of penis	Penile insertion
Copulating	Thrusts and mating (mounting)				
Resolution	8:02:38	Vocalization	-		
		Changing posture	From sternal recumbency to standing posture		
		Standing position	Standing position and walking		
		Bleating	Grunting		
		Blatering	Emission of typical gurgling and roaring sounds		
		Noising	Nasal investigation on anal perineal region		
		Sniffing	-		
		Seeking	-		
		Biting	-		
		Kicking	-		

installed in the camel paddock to record the interactions between the animals. The author carefully watched the recorded video to find the cause of unexpected death in the calf-camel.

Results

Based on the clinical and paraclinical examinations and necropsic and histopathologic findings of the calf, harassment from adult male dromedarian camel was suspected. Videotape recording confirmed the death of calf caused by aggressive sexual behavior of a male dromedarian camel. During the sexual aggression, when the calf was in sternal position, the bull sat on the calf in a way that pressed the calf upper-body and head into the floor, and therefore, the calf was suffocated to death (Table 1).

Serum samples from the dromedary bull were analyzed for concentrations of testosterone and cortisol by radioimmunoassay and sandwich ELISA methods, respectively (Diaplus Inc., San Francisco, USA). Serum values of cortisol and testosterone, before and after the calf death, in comparison to reference ranges (Deen, 2008; Smith, 2015; Constable et al., 2017), have been presented in Table 2. Weekly serial serum analysis in the dromedarian bull until 1 week after the calf death shows that testosterone reached its peak levels (8736 pg mL⁻¹) in the week in which the calf death occurred and cortisol level (21 nmol L⁻¹) was also higher than the normal value.

Discussion

Camels are seasonal breeders and their breeding season is confined to late autumn/early winter in most countries of the world including Iran. The present case was occurred in Kerman, a city in Kerman province with low temperature and humidity in late autumn, especially in December. The libido of male dromedary

camels generally peaks from mid-December to February and thereafter decreases variably (Deen, 2008). Monthly variations of testosterone levels in the dromedary have been negatively correlated with temperature and humidity (Fatnassi et al., 2014a). Moreover, high ambient temperature has been associated with reduced testosterone production in the rams (Bernon and Shrestha, 1984). Low temperature and relative humidity stimulate pineal-mediated hypothalamic-hypophyseal axis (Deen, 2008). During the breeding season and rutting period, the male camels exhibit endocrinological, morphological, and behavioral peculiarities. They are extremely restless and anxious and become so aggressive toward other males and man that they cannot be easily handled (Deen, 2008; Abu-Zidan et al., 2012). Out of the breeding season, male camels lose their libido and do not copulate with females (Fatnassi et al., 2014a). The present dromedarian bull showed an endocrine surge of testosterone during winter months. Individual variation in the onset, duration, and cessation of surge was observed.

Camel husbandry is divided into three types including intensive, semi-intensive, and extensive. A feral camel bull would naturally roam over wide areas of land, moving over pastures with his herd of females (Al-Qarawi, 2005). Moreover, Fatnassi et al. (2014b) reported that a camel bull kept under intensive system without any mature female could show abnormal and aggressive behaviors. In the current report, male camels were generally reared under intensive conditions and kept in herds with no mature females. In the present case, the dromedarian bull showed severe aggressive sexual behavior under intensive condition. Nowadays, camel husbandry systems are shifting to more intensive ones where males are kept isolated in boxes or pens and used for programmed mating or for semen collection (Fatnassi et al., 2014a; Fatnassi et al., 2014b). However, male camels show earlier sexual behavior and higher

Table 2
Serum concentrations of cortisol and testosterone in the dromedarian bull measured in weekly serial analysis, in comparison to reference ranges

Parameters	Time (week)						Reference values ^a
	-3	-2	-1	0	1	2	
Cortisol (nm L ⁻¹)	18	20	19	21	20	22	13-21
Testosterone (pg mL ⁻¹)	8341	7934	8345	8736	7898	7981	616-8658

^a References: Deen, 2008; Smith, 2015; Constable et al., 2017.

mating ability under field conditions, compared with housed ones (Abdel-Rahim, 1997; Al-Qarawi, 2005).

Under intensive management, animals are in fact confronted with a wide range of potentially provocative environmental challenges (potential stressors) that may adversely affect their lives (Morgan and Tromborg, 2007). During stress periods, blood cortisol levels increase and this could negatively affect reproductive aspects such as libido and fertility (Deen, 2008). In the present report, the aggressive behavior (sexual violence) against the calf could be associated with higher-than-normal cortisol levels of the dromedarian bull. Captivity imposes different kinds of constraints on the animal (e.g., limited space and being kept in a group of the same age and/or the same sex particularly for a long period) that could affect its behavioral repertoire and welfare status (Fatnassi et al., 2014a; Fatnassi et al., 2014b) as seen in the current case in which the animals were kept in a group of the same sex in a limited space. Owing to this severe and unpredictable aggressiveness toward other animals and humans, rutting camels are traditionally reared tied with ropes in little pens and/or kept in single stalls (Abu-Zidan et al., 2012).

A combination of physiological and environmental factors such as hormonal variations and lack of sexual experience have been proposed as the probable causes of aggressive sexual behavior in adult male dromedarian camels toward younger members. It is believed that abnormal and aggressive sexual behavior is more common during sexual puberty, during breeding season, and in intensive management systems (Morgan and Tromborg, 2007).

Based on investigations performed to determine the cause of death reported here, compressive asphyxia was proposed as the main cause of calf-camel death. During the sexual aggression when the heavy bull sat on the camel-calf which was significantly smaller than the bull, as a result of trunk compression, the expansion of the lungs was limited, hence interfering with breathing. Suffocation caused generalized hypoxia which consequently led to death in just a couple of minutes.

The present report shows that, although severe sexual aggression against the calf by dromedarian bull is not prevalent, its occurrence is a life-threatening situation for calf. Therefore, probable risk factors should be considered and sufficient care should be provided for calves raised under intensive management systems.

Conflict of interest

The author declares that he has no competing interests.

Ethical considerations

All ethical considerations including utilizing animals were considered cautiously. Also, the trial convention was affirmed by the animal welfare committee of the Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran. All applicable international, national, and/or institutional guidelines for the care and use of animals were followed.

Supplementary Data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jveb.2019.01.001>.

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