Applied Animal Behaviour Science 243 (2021) 105424

Contents lists available at ScienceDirect

Applied Animal Behaviour Science

journal homepage: www.elsevier.com/locate/applanim

Mismothering and remedying the mother-young relationship in stabled dromedary camels

Imen Hammadi [a,b,*], Mohamed Chniter [a,c], Marwa Brahmi [a,d], Moufida Atigui [e], Mohamed Dhia Bouzaida [f], Mouldi-Mabrouk Seddik [a], Raymond Nowak [g], Gustavo Adolfo María [f], Mohamed Hammadi [a,h]

[a] Institut des Régions Arides, 4100, Médenine, IRESA, Université de Gabès, Tunisie
[b] Faculté des Sciences de Gabès, Université de Gabès, Cité Erriadh, 6072, Gabès, Tunisie
[c] Institut National Agronomique de Tunisie, 43 Av. Charles Nicolle, 1082, Tunis, Tunisie
[d] Institut Supérieur Agronomique de Chott-Mériem, 4042, Chott Mériem, Sousse, Tunisie
[e] Ecole Supérieure d'Agriculture de Mateur, Université de Carthage, 7030, Mateur, Tunisie
[f] Facultad de Veterinaria de Zaragoza, Calle Miguel Servet, 177, 50013, Zaragoza, Spain
[g] Physiologie de la Reproduction et des Comportements, CNRS, IFCE, INRAE, Université de Tours, PRC, F-37380, Nouzilly, France
[h] Ecole Doctorale SIS, Université de Gabès, Cité Erriadh, 6072, Gabès, Tunisie

ARTICLE INFO

Keywords:
Parturition
Mismothering
Aggressive behaviour
Cortisol
Mother-young relationship
Stabled camels

ABSTRACT

This study aimed to characterize inappropriate maternal behaviours in stabled dromedary camels in order to detect the main causes of calf rejection, and to develop a suitable method to remediate mismothering. A herd of 45 pregnant females was under video surveillance to detect periparturient females. Twelve pregnant dromedary females (6 accepting their newborns and 6 rejecting them 1 h after calving) were selected as experimental subjects. A blood sample was collected during calving to determine cortisol levels. Maternal behaviour at the calving site was assessed during the first hour *postpartum*. Rejecting dams and their neonates were moved into a confinement enclosure to assess their maternal behaviour over a period of 30 min at 1 h, 6 h, 12 h, 24 h, 48 h, 72 h during confinement and at 7 d *postpartum*. Five IU of synthetic oxytocin were injected at 8:00, 12:00 and 16:00 to induce milk ejection in rejecting dams and one qualified person collected colostrum. The newborns were fed by holding the bottle of colostrum on the surface of the mother's udder and keeping body contact between the two animals. Results showed that the duration of parturition was longer in the mothers that rejected their calves ($P = 0.04$). Such females spent more time in standing position during the calving process ($P = 0.01$) compared to accepting mothers, had higher plasma cortisol levels ($P < 0.01$), and gave birth preferentially while standing. Rejecting mothers changed calving sites and displayed head-turning more frequently ($P < 0.01$ in both parameters) than accepting mothers. Two causes of rejection were identified: dystocia and presence of an alien calf at the birth site. Moreover, a female showed a case of repeated rejecters. During the first hour *postpartum*, rejecting mothers failed to express good maternal care and moved away from their neonates. In the confinement enclosure, they exhibited attack behaviour toward their calves, displayed low sniffing activity, and emitted mainly high-pitched grunt. Aggression diminished progressively and disappeared ($P < 0.0001$) on the 2nd day of confinement while sniffing behaviour increased steadily ($P = 0.001$). The number of high-pitched grunt decreased over time while the number of low-pitched grunt increased over the first 3 days before declining significantly at the end of the confinement period ($P < 0.0001$). In conclusion, rejecting mothers can be very aggressive towards their own newborns. However, three days of confinement and forced contact with the calf while bottle-feeding it with the mother's milk was sufficient to alleviate mismothering in dromedaries and establish proper mother-young relationships.

* Corresponding author at: Institut des Régions Arides, 4100, Médenine, IRESA, Université de Gabès, Tunisie.
E-mail address: imen.mohamed1290@gmail.com (I. Hammadi).

https://doi.org/10.1016/j.applanim.2021.105424
Received 16 June 2021; Received in revised form 10 August 2021; Accepted 13 August 2021
Available online 16 August 2021