



Short communication

A note on the time budget and social behaviour of densely housed horses

A case study in Arab breeding mares

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Abstract

We observed a high-density herd (200 mares/ha) of 44 Arab breeding mares, while in a bare paddock in Tunisia. Twenty-minute animal focal samples and scan sampling were used to determine the time budget of the mares during the period from 9 a.m. to 3 p.m. and study their social behaviour. The data obtained reveal restricted behavioural repertoires with missing behaviour like rolling, allogrooming and lying down; unusual time budgets with a high frequency of locomotion that constitutes the most frequent activity ($27.9 \pm 19.47\%$) of the mares. Social interactions were restricted to agonistic interactions but despite the high stocking density, aggressions were not that frequent among mares.

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1. Introduction

The assessment of animal welfare is still a highly debated issue in domestic animals as is the question of behavioural indicators of responses to fear or pain inducing experiences (Mench and Mason, 1997). Poor environmental conditions on a daily basis may lead to more “chronic”

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effects that may be expressed through physiological (e.g. depression of immune functions; Moberg, 1985) and behavioural (time budget and behavioural repertoire; Waran, 1997) reactions. It has been assumed that a restricted repertoire as compared to the behavioural repertoire expressed in the wild would be an indicator of poor welfare as would strong differences in time budget (Cooper and Albertosa, 2005).

In a first approach, we studied the behaviour of horses living in *a priori* unfavourable conditions (high density, large group size, low foraging opportunities) and compared this repertoire and time budget to those described in other studies, both in feral or domestic horses but more appropriate living conditions.

2. Methods

2.1. Subjects and housing conditions

The observations were made on a group of 44 pure-bred Arab mares, aged 3–22 years ($\bar{x} = 9.65 \pm 5.82$) at the national stallion breeding facility of Sidi Thabet, located 20 km from Tunis. Mares are brought to this facility every year in order to breed with the stallions housed there. The observed mares had been present at the stud for at least 8 weeks and at most 5 months, and 26 mares were at the early stages of pregnancy at the time of the observations. Three pairs of mares, two groups of four mares and one group of three mares came from the same farm. They were housed in individual boxes at night where they received pellets (4 kg/day) and hay every morning and evening. They were released in a common paddock (bare soil, 2200 m²) every day from 9 a.m. to 3 p.m. No food was available then but some freshly cut grass was distributed on the ground at approximately 12 a.m. every day. It was totally consumed in less than 30 min. The ambient temperature at that time of year was about 45 °C. Shelter was provided only by three trees (eucalyptus; the only vegetation) and water was provided *ad libitum*. The mares' density was very high: 200 mares/ha. These were the usual conditions in this facility and were not designed for the research purpose.

2.2. Data collection

Observations were made from the 28th of June to the 4th of July 2004 between 9 a.m. and 3 p.m. Observations were performed for each individual mare using both focal and scan samplings (Altman, 1974). Each mare was observed once for 20 min, using focal sampling, to record all social interactions and scan sampling every 2 min (total = 11 scans) to record the activity of the focused mare, the distance and identity of the closest neighbour. Distance from the closest neighbour was measured in “horse-lengths” (contact, 0.5, 1, 2, 3 horse-lengths from any part of the body of the focal animal). When this distance was over 3, the mare was considered as “isolated”. The whole group of mares was observed continuously for 20 min twice a day, during which all social interactions and rare behaviour like rolling, eliminating, and vocalisations were recorded (*ad libitum* sampling).

A total of 14 group observations, 44 focal samplings and 484 scan samplings were performed. Recorded behaviour was locomotion (exploratory or active walk, trot), feeding, resting, standing alert, drinking, self-grooming and social interactions (avoidance, retreat, flight, head threat, kick threat, bite threat, bite, kick). Time budget for each behaviour was determined as the recorded numbers of scans of each behaviour divided by the total recorded number of all the scans. Preferential social partners were identified as the most frequently closest neighbours using Chi square tests ($p < 0.05$).

3. Results

Some behaviour commonly described in domestic groups were totally missing during scan sampling, focal samplings and group observations such as lying down, urinating or defecating,

Table 1

Time budget of observed mares: mean percentage of scans spent in the different activities \pm S.D.

Behaviour	Mean \pm S.D.
Locomoting	27.90 \pm 19.47%
Feeding	25.83 \pm 26.80
Stand-resting	24.17 \pm 27.79
Alert standing	14.88 \pm 18.83
Drinking	4.75 \pm 7.19
Self-grooming	1.03 \pm 3.51
Social interactions	0.83 \pm 2.64
Others ^a	0.62 \pm 2.05

^a Includes pawing, sniffing own faeces, eating own faeces or sand.

while others, such as rolling or resting, standing on three feet, were very rarely observed (one and three times, respectively). Social interactions were totally restricted to agonistic behaviours: no positive social interactions and especially no allogrooming were ever seen, whether in the group or individual observations.

The mares spent most of their time (27.90 \pm 19.47%) in locomotion and especially in active walk (18 \pm 10.22%). Feeding and resting occupied, respectively, 25.83 \pm 26.80% and 24.17 \pm 27.79% of the time. Only 0.83% of the time was spent in social interaction (Table 1). A total of 110 agonistic interactions were recorded during the focal sampling (480 min), i.e. 2.5 \pm 1.4 interactions per mare per hour. Distances from the closest neighbour were mostly between 0.5 and 1.5 horse-lengths with up to 11 individuals at less than 3 horse-lengths from the focal animal. However, when considering only the closest neighbour, only 10 mares out of 44 were found to have a preferential social partner. These 10 mares had only one partner with whom they tended to spend more than 70% of their time. They were not related and only two mares came from the same farm.

4. Discussion

Mares observed in this study showed a restricted behavioural repertoire including (a) an unusual time budget with an especially high amount of time spent in locomotion, (b) an altered social organisation with a low level of motivation for social interaction and (c) a total absence of positive social behaviour. Restriction of the behavioural repertoire involved an absence of maintenance behaviour such as lying down and rolling. Lying down has been observed from 0.4 to 5% of the time in wild and domestic conditions during the day (Salter and Hudson, 1979: 5%; Kownacki et al., 1978: 3.6%; Boyd, 1988: 0.4%). The absence of lying down and rolling might be due to spatial restrictions (Waring, 2003) and/or bedding preferences of individual horses (Haupt, 2005; Kownacki et al., 1978). It has also been shown that horses, like sheep and cattle, do not perform this behaviour in stressful situations (Haupt, 2005; Kim et al., 1994; Raussi et al., 2005). Finally the lack of elimination behaviour was more surprising given the observed values in other studies (once every 3–4.5 h for urination and once every 2–5 h for defecation (Kownacki et al., 1978; Boyd, 1988; Waring, 2003). While urination may have been affected by the very high temperature, defecation may be affected by the lack of forage as the passage rate of the old digesta in the duodenum is affected by feed intake (Van Weyenberg et al., 2006). Further investigations are still needed here.

One of the most striking results was the total absence of any positive social behaviour. Although social interactions were restricted to agonistic ones, the rate of agonistic interactions

was comparable to those found in other studies (Clutton-Brock et al., 1976; Wells and von Goldschmidt-Rotschild, 1979) including in the wild (Boyd, 1988; Keiper and Receveur, 1992). This finding is in contrast with hypotheses stipulating that aggressive as well as non-aggressive interactions will increase when horses are in close proximity (Hogan et al., 1988). Overall, the social organisation was poor and it appeared that the mares had few preferred partners. This is in contrast with reports of social behaviour from other studies of horse groups where preferred partners have been reported among the general characteristics of individual animals (e.g. Sigurjónsdóttir et al., 2003). This may, to some extent, explain the absence of allogrooming, as it is generally performed by close associates (e.g. Van Dierendonck et al., 2004). Severe density and/or space restriction have been considered responsible for a decrease in non-aggressive social behaviour in pigs (Meunier-Salaun et al., 1987) and an apparent lack of social structure in laying hens (Hughes et al., 1997). On the contrary, the high density did not prevent the mares from a high level of locomotion; 27.9% of their time with 18% active walk which is high compared to other observations in wild and domestic horses (2–14.1% of time) (Kownacki et al., 1978: 3.5%; Boyd, 1988: 8.5–14.1%; Duncan, 1980: 8–11%; Duncan, 1985: 5.2–12.7%) and this higher level of locomotion could be a sign of agitation (Haupt and Haupt, 1989). On the other hand, feeding time ($25.83 \pm 26.8\%$) was lower compared to the observations from other studies for free-ranging and domestic horses (Kownacki et al., 1978: 69.6%; Duncan, 1980: 54–63%, Duncan, 1985: 55–63%, Boyd, 1988: 48–59%.) This can, of course, be explained by the lack of foraging opportunities in the paddock. As the time spent stand-resting by mares ($24.17 \pm 27.79\%$) was rather comparable with those reported for feral horses (Duncan, 1980: 16–23%; Duncan, 1985: 11–21%; Salter and Hudson, 1979: 20% of day time), it seems that the remaining time was devoted to active walking.

The results show important differences in the behavioural repertoire and time budgets of these horses as compared to reports in both natural and other domestic situations. The low level of social interactions and their restriction to agonistic behavioural displays may indicate that poor welfare conditions might prevent the motivation for social interaction in the horse. Although based on a single case study, these results bring further insights to the question of possible behavioural indicators of welfare and new research lines such as the relation between well-being and social relations.

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