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Interventions in social behaviour in a herd of mares and geldings

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ABSTRACT

Social dynamics and maintenance of social cohesion were studied by analysing social interventions in two groups of horses consisting of adult mares, their offspring, adult geldings and sub-adults. The animals were observed for a total of 1316 h. All relevant dyadic and triadic social interactions, including initial behaviour, possible intervention and outcome, were recorded. The main question was: do horses use interventions in affiliative interactions to safeguard their social network?

Horses were significantly more likely to intervene in allogrooming or play interactions that involved a preferred partner. The stronger the preferred association in allogrooming, the higher the likelihood the intervener took over allogrooming with an initial dyad member. Interveners originating from two newly introduced groups ($n=3$ and 5), intervened significantly more often when a member of their own group allogroomed with an unfamiliar horse. In play, no correlation with unfamiliarity was found. Overall, the intervening horses stopped more than half of the initial allogrooming interactions, and a third of all interactions. Therefore, social facilitation cannot sufficiently explain interference behaviour. This study shows that maintaining relationships with preferred partners is important to horses and has implications for equine husbandry and management.

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1. Introduction

Feral horses (*Equus caballus*) are social animals. However, in most husbandry systems domestic horses are kept confined and solitary (Holmes, 1839; Schimmel, 1914; Linklater, 2000; Waring, 2003; VanDierendonck and Goodwin, 2005). These domestic husbandry systems are often regarded as a way to assure individual physical health, because they facilitate individually adjusted

management procedures. However, these systems disregard the basic social and behavioural needs of horses, which may result in abnormal behaviour.

Horses that live in groups show affiliative as well as agonistic interactions within dyads or triads (three individuals). The two most important equine affiliative behaviours are allogrooming, performed by all horses, and play, mainly shown by males of all ages, but also, to a much lesser degree, by fillies and sub-adult mares (Monard and Duncan, 1996; Monard et al., 1996; McDonnell and Poulin, 2002; Sigurjonsdottir et al., 2003; Waring, 2003). Spatial proximity is also shown to have a passive acceptance component as well as an active preference to be close to certain individuals when grazing and resting (Sigurjonsdottir et al., 2003).

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Interventions in dyadic interactions are an intriguing aspect of social life. An animal may actively interfere in an ongoing dyadic interaction with the apparent aim of altering the interaction. Only after the initially approaching animal has actually become involved in the interaction between the other two, it is clear that the dyadic interaction has turned into a triadic one. This interference may be part of a deliberate strategy to gain an advantage or resource or may be a haphazard coincidence. Studies on triadic interactions amongst animals have predominantly involved non-human primates (Harcourt and de Waal, 1992). References to non-primates are sparse. Examples include studies of interventions in zebras (Schilder, 1990), coalitions and alliances among feral horses (Berger, 1986; Linklater and Cameron, 2000), and within-group alliances among dolphins (Connor and Whitehead, 2005). Handbooks on horse behaviour rarely refer to intervention behaviours (Mills and Nankervis, 1999; McDonnell, 2003; Waring, 2003; McGreevy, 2004; Zeitler-Feicht, 2004).

Fundamental knowledge on the importance of social bonds in domesticated horses is still lacking. Do domestic horses actively maintain their social networks by interfering in ongoing interactions that could jeopardize their current social bonds? Knowledge on the nature of bonds that horses form and their intervention behaviour can be used to improve animal welfare, optimise animal housing, and reduce the risk of injury. Although various aspects of the relationships between horses in a domestic setting have been studied intensively (e.g. review by Waring, 2003), investigations on interventions in domestic horses are lacking. We are only aware of one study on equine interventions (Schilder, 1990) which concerned zebras in semi-captivity. Competition around reproduction and food were important determining factors in zebra's. However, these factors can only be of minor importance for pastured domesticated horses.

In the present study we present a qualitative and quantitative account of the nature and structure of intervention behaviour in two groups of domestic horses. Our main question is: do domestic horses use interventions as a social instrument to maintain their own bonds within a network, i.e. to safeguard their social network. To this end, we identified the circumstances in which domestic horses use interventions, and whether they do so systematically. We also assess the hypothesis that social facilitation might be the cause of intervention behaviour. The results extend our knowledge on what matters to horses with respect to their social environment and help identify factors to be taken into account for stress reduction in horse husbandry and management.

2. Animals, materials and methods

2.1. Study site and period of study

During the foaling period, from the beginning of May to mid-June in 1997 and 1999, social and specifically intervention behaviour was studied in a pastured group of Icelandic horses. The animals under observation were part of a herd of 80–100 horses that free-ranged all year round in a mountainous area exceeding 1200 ha at Skaney Farm in the western part of Iceland. In winter and spring, adequate supplementary feeding was provided daily. To facilitate detailed observation, the animals under study were corralled within an 8-ha sub-enclosure, during the observation periods. Shelter within the sub-enclosure was provided by landscape

elements. Daily mean ambient temperatures ranged between 4 and 10 °C. Long daylight hours allowed night observations and in general it was possible to observe the horses continuously for 24 h a day, weather permitting. Observations covered 488 h in 1997 (from May 6 till June 11) and 828 h in 1999 (from May 3 till June 14).

2.1.1. Animals

In both years, approximately half of the herd consisted of breeding mares (most of them were pregnant at the beginning of the study) and the other half a combination of adult geldings, sub-adult mares, sub-adult geldings and yearling stallions (Table 1). During the study, 7 foals were born in 1997 and 13 in 1999. Of the 30 horses in 1997 and 31 horses in 1999 of 1 year and older, 18 individuals (including 11 of the adult mares) were observed in both years. In 1999, 8 animals (including 4 adult mares) from two separate neighbouring farms (3 horses (L group) and 5 horses (B group)) were added to introduce 'unfamiliarity' as a variable in social interactions. All horses, except one in 1997 and the eight animals introduced in 1999, were born in the resident herd and all adult mares were multiparous.

2.1.2. Observation methods

Data were collected by the method "All Occurrences" of predefined behavioural elements, which included affiliative, dominance and intervention elements (Tables 2 and 3). All data were recorded on a Psion handheld computer using 'The Observer' software[®] 5.0, (Noldus Information Technology, 2004) and transferred daily to a laptop computer. Regular inter-observer reliability sessions were performed. To prevent any systematic bias in recordings, the observers worked in 8-h shifts with one overlapping hour at each shift change, so that shift changes gradually changed over time. Some observation time was lost due to weather conditions (i.e. fog) or computer failure.

For each intervention, the animals and their roles were registered. The animal approaching a pair of horses that were socially engaged and initiated a triadic interaction was defined as 'intervener'. If the intervener aimed its behaviour clearly towards one of the two initial animals involved in an interaction, that animal was called the 'target' and the other one the 'recipient' (cf. Schilder, 1990). Interventions by a dam to stop other animals approaching her own newborn foal were not recorded. The main elements of the ethogram describing intervention behaviours are presented in Table 2. Other intervention behaviours included threaten to bite, bite, threaten to kick and kick without the intervener positioning him/herself between the two initial animals.

For analyses, social behavioural elements were categorised in six mutually exclusive groups (cf. Schilder, 1990) as shown in Table 3.

2.1.3. Data analyses

For each intervention, the sex, age and familiarity of the animals were registered as well as their specific role was determined (intervener, recipient, target). Interactions with foals as interveners were not included in the analyses.

An initial behaviour was considered to be 'taken over' when one of the initial animals was displaced and the intervener continued the initial behaviour with the other animal. An intervention was considered to have 'stopped' the initial behaviour when one of the following behavioural elements was recorded and the initial behaviour was not 'taken over': stop allogrooming, stop play, initiate new behaviour.

The mares were considered to be in oestrus when they showed at least two of the following behaviours within 24 h: sexual mounting, winking, presenting or copulation. The oestrus was considered to end on the last day one of these behaviours was recorded.

For each intervention the affiliative or associative strength (quantified by means of standardized residuals (SR)) of each horse with respect to

Table 1
Number of animals (present in each year)

	1997	1999
Adult mares, pregnant	12	14
Adult mares, barren	5	4
Adult geldings	5	5
Juvenile geldings	2	2
Juvenile mares	4	4
Juvenile stallions (<1 year)	3	1

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