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Research

The use of different objects during a novel object test in stabled horses

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ABSTRACT

Novel object tests are often used to evaluate a horse's temperament by recording fear responses toward an unfamiliar object, but they might also be used as a part of welfare assessment. Various objects are used during these tests. This study aims to verify the use of different objects during a novel object test performed in the horse's stall. To this end, 54 horses and 4 objects (red-white striped cone [RWCONE]; a red-yellow plastic ball [BALL]; a black open umbrella [UMBR]; black-yellow striped cone [BYCONE]) were selected. To verify associations between behavior during the novel object test and undisturbed behavior at stable, baseline behavior profiling (4 × 10 minutes, spread over 4 days) was carried out. Thereafter, novel object tests were performed. Each object was presented for 10 minutes to the horses in their stalls, spread over 4 consecutive days. Each horse was exposed to the 4 objects in a semirandom order. The results reveal a higher frequency of object-related behavior in the presence of the umbrella ($P = 0.0005$), which might be caused by the color and the size of the object. No differences in object-related behaviors were found between the 2 cones which were colored differently. The age of the horse must be taken into account, as younger horses showed more pronounced reactions to the objects. When feed is available, horses showed less contact with the object, as they are not inclined to explore their environment. Sniffing behavior toward the object positively correlates with specific features of housing (large stall, visual and physical contact with other horses). A higher frequency of fear reactions to the objects is associated with more vocalizations during undisturbed behavior observations, which might be indicative of stress. The results show that associations between behavior during the novel object test and behavior at stable were present. However, the presence of roughage influences the horse's reaction and should be taken into account. In this case, the focus should be on the presence of fear reactions, such as rearing, not approaching the object or defecating, to correctly determine the animal's welfare state.

Introduction

The welfare of stabled horses has become increasingly important, and the way of housing and managing horses is often questioned (Visser et al., 2008). There are different ways to assess welfare, for example, the presence of abnormal behaviors and stereotypies has been linked to poor welfare conditions (Mason and Latham, 2004). In horses, inadequate housing and management, such as confinement and restricted fiber meals, might lead to the development of these abnormal behaviors (McGreevy et al., 1995). However, their presence does not always indicate a lower welfare level at that moment (Mason, 1991). In addition, the presence of stress also relates to horses' welfare. Physiological responses to stress are seen as heart rate and salivary cortisol concentrations both increase (Kiley-Worthington, 1990; Bagshaw et al., 1994). However, the latter techniques to measure stress require direct contact with the horse and consequently affect the measurements.

Novel object tests are often used to test the horse's temperamental characteristics, for example, for breeding purposes. They might also be used to select the right horse for a specific rider (Visser et al., 2002). However, as results from previous research already suggested, the response of a horse during a novel object test relates to its behavior at the stable (Visser et al., 2008). This test can also be used to assess welfare. Animal welfare assessment is based on different measurements, including behavioral and physiological

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measurements, with a focus on health and behavior. Various measurements are necessary to make up a complete picture of the animal's welfare (Wageningen UR Livestock Research, 2011).

Researchers from Wageningen UR Livestock Research developed a protocol to assess welfare in horses and they did include the novel object test in their protocol (Wageningen UR Livestock Research, 2011). Horses tend to avoid potentially fear-eliciting situations and they tend to respond nervously to novelty in a known environment. Responses in novel object tests may reflect exploratory motivation, play behavior, fearfulness, emotionality, or no interests in the object (Wood-Gush and Vestergaard, 1991; Christensen et al., 2005). The advantage of this way to measure welfare is that behavior is easy to measure and signs of fear are relatively easy to detect (Leiner and Fendt, 2011). However, during this test, horses are led out of their stable and exposed to a novel object in another environment. This implies environmental changes, such as social isolation and handling of the horse, which both possibly influence the results (Malmkvist et al., 2012). By performing the test in the horse's stall, these factors of influence are avoided and necessary test time is reduced, which are key factors in using this test as a part of welfare assessment. Furthermore, various objects are used during these tests, and to our knowledge, there is only little information available about differences between objects.

The aim of this study was therefore to verify if the novel object test can be performed in the stall of a horse and to verify whether horses react different toward different objects. During these tests, horses might be exposed to a combination of suddenness and novelty, but we focused only on the effects of novelty in a known environment (Christensen et al., 2005). Furthermore, we want to study associations between behavior during the novel object test and behavior at the stable. The impact of housing and management factors is also measured.

Materials and methods

Animals and housing

Fifty-four horses (31 geldings and 23 mares) were selected from 5 riding schools (Table 1). Horses aged between 2 and 22 years were used for riding school activities (dressage, jumping, and so forth) and housed individually in stalls on straw or straw flax bedding. Because feeding regime and housing slightly differed between riding schools, environmental parameters (bedding material, feed, stall size, and the type of social contact) were recorded during each observation period (Table 2).

Objects

Four single objects of different color and shape were chosen. The objects were a red-white striped cone (RWCONE; 30 cm × 47 cm), a red-yellow plastic ball (BALL; 50 cm), a black open umbrella (UMBR; 90 cm), and a black-yellow striped cone (BYCONE; 30 cm × 47 cm). The novel objects were not used by the current horse owners but individual experiences in the past with similar objects cannot be excluded.

Table 1
Overview of the number of horses per riding school

Riding school/gender	Mare	Gelding
1	4	8
2	6	6
3	4	4
4	5	7
5	6	6

Table 2
Overview of the environmental parameters and their levels

Parameter	Levels
Stall size, m^2	1: Small < (2 × height of the horse)^2 2: Medium (2 × height of the horse)^2 3: Large > (2 × height of the horse)^2
Social contact	1: Visual social contact: bars only in front, with an opening for the horse's head 2: Visual and physical contact: bars in front and in one or more sidewalls
Presence of feed	1: Yes 2: No

Experimental procedure

We tested reactions to the objects presented in the horse's home environment (stall). Novel object tests are often performed in a test arena, including handling horses and social isolation. These influence factors are avoided when performing the novel object test in the stall of the horse. Very small sized stalls were not taken into account. For this experiment, the horses must have the opportunity to ignore or go backward when they are confronted with the novel object. The experiment was carried out from August till October 2013.

Baseline behavior profiling was carried out before novel object tests were started. Both were performed by the same observer (Table 3). Baseline behavior profiling was carried out on 4 consecutive days. Each horse was observed for 10 minutes per day in its stall by the same observer. The prevalence of each behavior, as well as the start and end of each bout, during these 10 minutes was noted. Direct observation was chosen as it allowed us to collect the most detailed behavioral information. Baseline behavior profiling was carried out between 11 AM and 9 PM, equaling a total of 36 hours

Table 3
Definition of the behaviors used during control observations and novel object tests

Behavior	Definition
Standing alert	Elevated neck and head, ears pricked. In NOT distinguishing between orientation of the head: "standing alert" is noted when the head is in other directions than the novel object
Dozing	Standing inattentively with head and neck lowered, eyes closed, and ears relaxed
Eat	Eating concentrates
Drink	Mouth in contact with the water dispenser for >5 seconds
Defecation	Defecating
Vocalization	Vocalizing
Locomotion	Horizontal movement of the body, 4-time gait
Stereotypic behavior	A uniform pattern of movement apparently without purpose (weaving, head shaking, crib-biting)
Paw	One foreleg extended quickly forward, followed by movement backward, dragging the toe against the ground in a digging motion
Kick	The horse lifts its weight on its forelegs and extends one or both hind legs in a rapid motion
Snorting (NOT)	Forceful expulsion of air through the nostrils incidentally preceded by a raspy inhalation sound
Focus (NOT)	Focused on novel object (ears, eyes, and head pointed in direction of novel object)
Nibbling (NOT)	Exploring the novel object by nibbling
Sniffing (NOT)	Standing with lowered head and nostrils within 10 cm of object; repeated and obvious exhalations
Rear (NOT)	The horse rears >50 cm and bears its weight on the hind legs

Behaviors indicated with "NOT" were only observed during novel object tests (Visser et al., 2008; Christensen et al., 2011; Malmkvist et al., 2012).