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Short communication

A note on the relationship between time spent in turnout and behaviour during turnout in horses (*Equus caballus*)

Layne Chaya, Elizabeth Cowan, Betty McGuire*

Department of Biological Sciences, Clark Science Center, Smith College, Northampton, MA 01063, USA

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Abstract

We examined if time spent in turnout influenced behaviour during turnout for horses maintained in stalls and given either 2 h/week ($n = 7$) or 12 h/week ($n = 7$) of turnout. Horses turned out for 2 h/week were more likely than those turned out for 12 h/week to trot, canter, and buck. Frequency of trotting and cantering was also higher and frequency of grazing lower in horses turned out for 2 h/week. These results have welfare implications and support previous studies showing that horses react to confinement with increased activity when not confined.

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1. Introduction

Physical and social conditions of the environment influence the behaviour of horses (Kiley-Worthington, 1987; Mills and Nankervis, 1999). Przewalski horses spent more time milling and pacing in small as compared to large enclosures (Hogan et al., 1988). Domestic mares kept in stalls either with or without social contact exhibited higher levels of

* Corresponding author. Present address: Department of Ecology and Evolutionary Biology, Corson Hall, Cornell University, Ithaca, NY 14853, USA. Tel.: +1 607 254 4252; fax: +1 607 255 8088.

E-mail address: bam65@cornell.edu (B. McGuire).

movement and performed more activities in open field tests than mares kept in pasture with conspecifics; isolation plus confinement produced more dramatic effects on behaviour than confinement alone (Mal et al., 1991). When compared to pastured horses, horses kept in stalls adapted less readily to training and had higher frequencies of unwanted behaviours such as bucking and jumping (Rivera et al., 2002). Pregnant mares kept in straight stalls for 2 weeks and then allowed 30 min of exercise in a paddock trotted and galloped more than pregnant mares kept in straight stalls for 2 weeks and allowed 30 min of daily paddock exercise; the higher levels of trotting and galloping were considered compensatory locomotor activity in response to exercise deprivation (Haupt et al., 2001). Thus, a general finding of such studies is that horses react to confinement with increased activity.

Most previous studies of domestic horses have assessed behavioural differences between horses maintained in pastures versus stalls; less information is available on how different degrees of physical confinement affect the behaviour of stalled horses. In this study we examined if geldings and non-pregnant mares kept in stalls and routinely given either 2 h or 12 h of turnout per week differed in their behaviour during turnout.

2. Materials and methods

We videotaped 14 horses (10 geldings and 4 non-pregnant mares) at Fox Meadow Farm, Smith College, Northampton, MA. We did not establish experimental groups for our study, but instead studied two existing groups of horses distinguished by differences in use and time spent in turnout each week. Thus, individual horses were not randomly assigned to treatments. Horses in the first group ($n = 7$) were permanent residents of the farm used in the college riding program, and were turned out 2 h/week (=short turnout time). Horses in this group were ridden by students Monday through Friday, and were sometimes used on weekends in shows or a community riding program. Six of these horses were ridden 5–6 h/week and one was ridden 10 h/week. The 2 h turnout period occurred each Sunday. All horses in this group had been maintained with short turnout time for 2 or more years (range, 2–15) before videotaping. Six horses in this group were between 7 and 16 years old; the remaining horse was 31 years old. Horses in the second group ($n = 7$) were boarded at the farm and privately owned; these horses were turned out 12 h/week (=long turnout time; 2 h of turnout each day, Monday through Saturday). Horses in the long turnout group were used at their owner's discretion; however, all were ridden 5–7 h/week. Of the seven horses in this group, five had been maintained with long turnout time for 2 or more years (range, 2–17) and the remaining two horses for about 1 month prior to videotaping. Horses in this group were between 9 and 18 years old.

All horses were housed in box stalls in the same barn. Non-corner stalls (2.4 m \times 3.7 m) had a solid back wall; the front wall and side walls were solid from the floor to 1.2 m, where vertical bars, spaced 7.6 cm apart, began and ran to a short panel of solid wood that continued to the ceiling. Corner stalls (3.1 m \times 3.7 m) had either 2 or 3 walls with bars. Each stall had a grain bucket, 1 or 2 water buckets, hay trough, and rubber mat covered with sawdust bedding. All horses had at least one neighboring stall occupied by a horse, and had visual and auditory contact with other horses.

The farm had four paddocks and one outdoor riding ring used for turnout. Turnout location was randomly assigned. Three adjacent paddocks were located against the back of the barn, but we videotaped horses in only the two larger ones in the back (2380 and 2894 m²; mostly sand footing with some grass). The fourth paddock (988 m²) and outdoor ring were separated by a driveway at the front of the barn; we videotaped horses in the outdoor ring only (1254 m²; all sand; horses could graze by stretching their necks under the fence slats to reach grass outside the ring). Each horse was turned out individually, but had visual and auditory contact with other horses during turnout. When turned out in the paddocks at the back of the barn, tactile contact was also possible.

Diets differed somewhat due to age, weight, physical condition, ownership and work schedule, but all horses received grain (once or twice a day) and hay (three times a day), and a handful of linseed meal in the afternoon. All horses in the long turnout group received 2 l of bran mash once a week and most received daily supplements. Horses in the short turnout group did not receive bran mash and two received daily supplements. All diets met NRC requirements.

We videotaped horses in April, September, and December of 2004 using either a Sony Digital-8 or a JVC Mini-DV video camera. Each horse was videotaped during the first and last 10 min of their 2 h turnout from a relatively inconspicuous location 5 m from the paddock or ring. The individual videotaping was visible to the focal horse, but made every effort to limit disturbance. We scored each videotape for frequencies of the following 12 behaviours (after Mal et al., 1991): graze, investigate (sniffing while walking with neck horizontal or lower), snort, neigh, shake, roll, walk, trot, canter, gallop, rear, and buck. A frequency of one was scored when a behaviour started and then ended due either to a pause in the behaviour or start of a different behaviour, or the end of the 10 min session. Most behaviours scored were of relatively short duration; however, uninterrupted behaviours of relatively long duration (e.g., grazing for a few minutes) were still scored as a single occurrence.

We used Fisher's exact test to compare the number of horses in each turnout group that displayed each behaviour at least once during the 20 min period of videotape (10 min at the start and 10 min at the end of turnout). For each horse, we calculated a mean frequency for each behaviour from the frequencies exhibited during the first and last 10 min of turnout and used these means in matched pairs analyses. We matched horses for gender and as closely as possible for age and hours ridden/week and analyzed frequencies of each behaviour with Wilcoxon's signed-ranks test. Analyses were performed using BMDP 7.0 (BMDP Statistical Software, Inc., Los Angeles, CA, USA).

3. Results

Horses turned out for 2 h/week (short turnout group) were more likely than those turned out for 12 h/week (long turnout group) to show active behaviours during the two 10 min periods of videotaping (Table 1). Horses in the short turnout group were more likely than those in the long turnout group to trot, canter, and buck (Table 1). A similar, but not significant, pattern emerged for gallop (Table 1). We found no differences between turnout groups in graze (all horses displayed), investigate (all horses displayed), snort, neigh, shake, roll, walk (all horses displayed), and rear (Table 1).

Table 1

Proportion of horses that displayed each behaviour at least once during 20 min (10 min at start of turnout and 10 min at end of turnout) in relation to turnout group; *P* values from Fisher's exact test

Behaviour	Turnout group		<i>P</i>
	Short (2 h/week)	Long (12 h/week)	
Graze	100.0 (7/7)	100.0 (7/7)	–
Investigate	100.0 (7/7)	100.0 (7/7)	–
Snort	85.7 (6/7)	57.1 (4/7)	0.56
Neigh	42.9 (3/7)	28.6 (2/7)	1.00
Shake	71.4 (5/7)	100.0 (7/7)	0.46
Roll	85.7 (6/7)	57.1 (4/7)	0.56
Walk	100.0 (7/7)	100.0 (7/7)	–
Trot	85.7 (6/7)	14.3 (1/7)	0.03
Canter	85.7 (6/7)	0.0 (0/7)	0.005
Gallop	57.1 (4/7)	0.0 (0/7)	0.07
Rear	28.6 (2/7)	0.0 (0/7)	0.46
Buck	71.4 (5/7)	0.0 (0/7)	0.02

Table 2

Frequency (mean \pm S.E.) of behaviour of horses per 10 min period in relation to turnout group; *n* = 7 horses in each turnout group and *P* value from Wilcoxon's signed-ranks test

Behaviour	Turnout group		<i>P</i>
	Short (2 h/week)	Long (12 h/week)	
Graze	1.8 \pm 0.9	5.8 \pm 1.3	0.015
Investigate	13.6 \pm 1.9	13.2 \pm 3.2	0.81
Snort	0.9 \pm 0.2	0.6 \pm 0.2	0.69
Neigh	0.4 \pm 0.3	0.1 \pm 0.1	0.75
Shake	1.7 \pm 0.5	5.9 \pm 2.4	0.31
Roll	0.8 \pm 0.2	0.4 \pm 0.1	0.12
Walk	19.1 \pm 5.9	11.3 \pm 2.3	0.22
Trot	4.0 \pm 1.7	0.1 \pm 0.1	0.05
Canter	3.1 \pm 1.2	0.0 \pm 0.0	0.03
Gallop	0.6 \pm 0.3	0.0 \pm 0.0	0.12
Buck	2.2 \pm 0.9	0.0 \pm 0.0	0.06
Rear	0.2 \pm 0.1	0.0 \pm 0.0	0.50

Results from matched pairs analyses showed that horses in the short turnout group trotted and cantered more frequently than those in the long turnout group and grazed less frequently (Table 2). There also was a tendency for horses in the short turnout group to buck more frequently than those in the long turnout group (Table 2). We found no differences between turnout groups in the frequencies of investigate, snort, neigh, shake, roll, walk, gallop, and rear (Table 2).

4. Discussion

Time spent per week in turnout influenced behaviour during turnout. More horses in the short turnout group than in the long turnout group showed active behaviours such as trot,

canter, and buck. Horses in the short turnout group also displayed active behaviours more frequently, but grazed less frequently, than those in the long turnout group. Our finding of increased activity in horses maintained with little access to environments that permit natural behaviour agrees with the findings of Kiley-Worthington (1987), Hogan et al. (1988), Mal et al. (1991), Houpt et al. (2001), and Rivera et al. (2002).

Horses in our study also were used for riding. Horses in the short turnout group were used in the school riding program, with most being ridden 5–6 h/week but one for 10 h/week. Horses in the long turnout group were used at their owner's discretion, with all being ridden 5–7 h/week. In our analyses, we matched horses in the two groups as closely as possible for hours ridden/week. Nevertheless, riding schedules (e.g., number of days ridden/week, number of times ridden/day) and number of riders differed between the two turnout groups, making different riding regimens a confound in our study.

Stalls isolate horses, restrict their movement and behavioural options, and reduce environmental stimulation (Kiley-Worthington, 1990; Mills and Clarke, 2002). Use in riding undoubtedly increases movement and behavioural options and is likely more stimulating than being kept in a stall. Despite being ridden at least 5 days per week, however, horses in the short turnout group showed the same compensatory locomotor activity noted for pregnant mares released from confinement in straight stalls (Houpt et al., 2001). Use in riding does not permit natural behaviours, particularly grazing, and limited grazing opportunity has been linked to increased activity (Hogan et al., 1988).

5. Conclusion

Horses that must be maintained in stalls should have adequate turnout time to permit the occurrence of natural behaviours, such as grazing, and use in riding should not be viewed as a sufficient substitute for turnout.

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