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Pawing by Standardbred Racehorses: Frequency and Patterns

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The objectives of this study were to determine the prevalence of pawing behavior in a population of Standardbred racehorses and the relationship of pawing frequency to time of day. Standardbreds (n=41) were observed using instantaneous scan sampling twice daily, in the morning before training and in the afternoon after training. A majority of the horses, twenty-four (58.5%) of the 41 horses showed pawing behavior at least once (median=7, interquartile range=2–15). After training, there were a median of 4 (interquartile range 1–11) observations of pawing or 11.2% of total observations. In the morning, before training, there were 3 (0–3.25) pawing observations, or 9.1% of total observations. There was a significantly greater frequency of pawing in the afternoon (P=0.0005). They pawed less on Sunday afternoons when they had not trained. Pawing may be related to exercise and, possibly, discomfort.

Key words: *digging, horse, pawing, standardbred, stereotypy*

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Standardbreds, or harness-racing horses, consistently show little to no prevalence of stereotypies such as cribbing and weaving [1, 5, 8]. Redbo *et al.* [8] attributed this to the less restrictive management imposed on harness horses. The prevalence of another repetitive behavior, pawing, has not been determined. Pawing is a natural horse behavior. In their natural setting horses paw to uncover food, open up water holes, inspect unfamiliar objects or soften the ground before rolling [2, 7]. Pawing also can be a sign of colic.

Problem pawing in domestic horses has been determined to be either a displacement behavior when a horse is restrained [2] or an operantly conditioned response when a horse anticipates food [7]. The latter is believed to occur when a horse is inadvertently rewarded for pawing with food or attention, and begins to associate the pawing behavior with anticipation of a reward. Pawing may not be a stereotypic behavior in all cases. Horses may paw because they are uncomfortable or in pain. They may be attempting to change the flooring to compensate for uneven flooring or unbalanced hooves or in an effort to redistribute their weight.

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The frequencies of pawing before and after training were compared. Training days were compared to the non-training day (Sundays) to determine the immediate effect of exercise. If the horses pawed less on Sundays that might indicate an effect of exercise such as pain or stiffness that would not occur on a day the horse was not working.

The purpose of this study was to observe the prevalence of pawing in Standardbred racehorses as an indication of their wellbeing. We also wished to examine possible relationships between pawing and sex, gait, age, time of day, and performance. Some stereotypies are found more commonly in males than females [5]. An association with age might suggest a degenerative condition as a cause.

This experiment was approved by the Institutional Animal Care and Use Committee of Cornell University.

The study was performed at the New York State Fairgrounds Training Facility in Syracuse, New York over a period of 62 days from 6 June 2008 to 6 August 2008. Ten Standardbred trainers agreed to participate in the study. Each trainer was responsible for 1 to 6 horses. Observations of 41 currently racing registered Standardbred racehorses (37 pacers and 4 trotters) were made. The population observed consisted of 11 mares, 29 geldings, and 1 stallion. For analysis of data the geldings and stallion were combined into one group collectively termed "male". Ages ranged from three to 12 years of age.

The horses were housed in 3.3 m by 3 m stalls. Flooring underneath bedding consisted of approximately two feet of dirt fill over cement composite. Thirty-seven horses were

bedded on wood shavings and 4 were bedded on straw. Horses were fed three times a day between 07:45 and 08:00 hr, between 13:00 and 14:00 hr and between 20:00 and 21:00 hr. The diet and amount fed varied from stable to stable, but all were fed both hay and concentrate at each meal. Horses were exercised once daily for approximately 30 min Monday through Saturday, approximately 1 to 3 hr after the morning feeding. On days when horses were not present in the stall (OUT) they were either racing or receiving veterinary treatment.

One observer (CB) collected all the data. She did not feed the horses. Each horse's behavior was recorded twice a day, once in the morning before feeding at approximately 07:30 hr (AM) and again in the afternoon at approximately 16:00 hr (PM) using instantaneous scan sampling [4]. Observations were recorded seven days a week for a total of 122 observations per horse. Behaviors were recorded at the time of observance from a list of 12 possible mutually exclusive behaviors (Table 1) using instantaneous scan sampling. The observer walked by the stall and recorded the behavior of the horse at that instant; she then moved on to the next stall and recorded what that horse was doing. The percentages were calculated by dividing the number of times the horse was observed performing that behavior by the total number of observations (122).

Chi Square was used to compare the sex distribution and age of pawing and non-pawing horses. Because the data were not normally distributed nonparametric tests (Wilcoxon signed rank test) were used to determine differences between AM and or PM observations. The same statistical test was used to compare Sunday AM and PM pawing because the horses were not trained on Sunday. The Wilcoxon/Kruskal Wallace rank sum test was used to compare the differences between pawers and non-pawers in earnings and speed. For all tests significance was declared at the $P<0.05$ level.

The Standardbreds spent the majority of their time standing, and then stand resting (SR) followed by eating hay (Table 1). Twenty-four of 41 horses, or 58.5% were observed pawing. Four horses in the pawing population were observed to paw on only one occasion. Within the pawing group, the median number of observations of pawing was seven (interquartile range 2–15) or 8.6% of observations. Individual percentages of pawing observations ranged from 0.83 to 31.4% of total observations.

There was no relationship between sex and likelihood of pawing (Chi square=8.58, $P>0.05$). The age range (3–12 years) and mean age of the horses that pawed (7 ± 2.5 years) and those that did not (6 ± 0.7 years) was not different (Chi square=1.18, $P=0.24$). One horse weaved as well as pawed. Note in Table 1 that he weaved much more in the AM before feeding than in the PM, a pattern opposite to that of pawing.

Table 1. Behaviors (% of observations) of horses that paw and those that do not

Behavior	AM		PM	
	Paw	No Paw	Paw	No Paw
Stand	43.6	47.8	36.5	38.7
Stand Rest	31.8	36.1	27.2	34.9
Paw	9.1	0.0	11.2	0.0
Eat Hay	7.0	7.3	11.4	14.4
Eat Grain	0.4	0.5	0.9	0.7
Walk	2.3	3.7	2.8	2.6
Graze	1.6	2.2	6.6	5.9
Weave	1.6	0.0	0.9	0.0
Drink	1.0	1.3	1.5	1.6
Urinate	0.8	0.2	0.5	0.1
Lie Sternal	0.3	0.7	0.1	0.8
Lie Lateral	0.0	0.2	0.0	0.0
Out	0.2	0.2	0.4	0.3

Standing was defined as standing with the head raised, whereas stand resting was defined as standing with the head down and one hind limb flexed. Grazing was defined as searching in the bedding for scattered hay or grain. AM=07:30 hr; PM=16:00 hr. The percentages were calculated by dividing the number of times the horse was observed performing that behavior by the total number of observations (122).

In the PM, after training, there were 4 (interquartile range 1–11) observations of pawing or 11.2% of total observations. In the morning, before training, there were 3 (0–3.25) pawing observations, or 9.1% of total observations. There was a significantly greater frequency of pawing in the afternoon (Wilcoxon signed rank test, $P=0.0005$). In contrast, on the rest days there was no difference in pawing frequency between AM (median=0, interquartile range=0–1) and PM (median=0.5, interquartile range=0–1.75) (Wilcoxon signed rank test, $P=0.32$).

Performance results were available for only 9 of the non-pawers and 17 of the pawers. The fastest speed per mile (1.6 km) of the pawers was 116.4 (114.1–117.4) sec and that of the non-pawers was 113.4 (112.8–115.8) sec. There was no significant difference (Wilcoxon/Kruskal Wallace rank sum test, $P=0.1402$). The total money earned per horse by the pawers was $43,936 ($15,125–$88,791) and that earned by the non-pawers was $70,245 ($40,088–$150,602). There was no significant difference in earnings (Wilcoxon /Kruskal Wallace rank sum, $P=0.257$).

The twenty-four pawers were fairly evenly distributed among the ten trainers. Six trainers had both pawers and non-pawers in their stable. One trainer of 3 horses had no pawers. Three trainers of 1 to 5 horses had only pawers.

Although the pawers spent less time standing, stand resting, or eating hay than non-pawers, there were no significant differences between the groups in those behaviors at either time of day. Pawers spent significantly less time eating hay in the PM (9, 2–10.75) than in the AM (3,

2–8.25) (Wilcoxon sign test, P=0.00037).

Of the overall observed population, 58.5% of the horses were observed pawing. This is a much greater prevalence than that of the other common equine stereotypies-crib biting or weaving [1, 2, 5]. Pawing occurred more often in the afternoon than in the morning. This is important because it brings into question the notion that horses paw as an operantly conditioned or anticipatory response [6, 7]. The horses were fed directly after the morning observation and were *not* fed any time within 2 hr before or after the afternoon observation. The fact that they showed significantly less pawing behavior in the morning suggests that pawing may not be an operantly conditioned or anticipatory response in these horses.

Focal animal sampling will be necessary to determine the number of pawing actions/bout, the length of pawing bouts, and the interbout interval. There were no statistical relationships between pawing and sex or age, in contrast to cribbing and weaving behaviors [5].

The horses were observed to have a higher frequency of pawing in the afternoon 4 hr after being exercised. Post-workout soreness may be a possible explanation for the increased observation of pawing in the afternoon. On the day of the week that the horses were not exercised they did not exhibit a PM increase in pawing. Exercise decreases one equine behavior−wood chewing [3] but increases another−crib biting [9]. Horses may be pawing to create holes in which they may place their back legs to redistribute their weight or compensate for unevenness of flooring. Many anecdotal observations of the horses showing pawing behavior seemed to support this hypothesis. This hypothesis certainly warrants further investigation. If horses are indeed trying to compensate for uneven flooring through pawing to dig holes is which they may stand, then pawing would not be considered a stereotypic behavior.

Further investigation into the behavior and physiology of pawing horses will be necessary to determine if pawing is a stereotypic behavior or a sign of illness. Comparison of lameness evaluation and imaging of the limbs of horses that paw with horses that do not paw should be made. Future research should examine whether horses that paw will paw again in the same place after the hole has been filled in to determine if there is a preference for location of the hole. A quantitative examination should be made of the number of horses that stand in their holes and whether they chose to stand with their forequarters or hindquarters in the hole.

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References

1. Albright, J.D., Mohammed, H.O., Heleski, C.R., Wickens, C.L., and Houpt, K.A. 2009. Crib-biting in US horses: breed predispositions and owner perceptions of aetiology. *Equine Vet. J.* **41**: 455–458. [Medline] [CrossRef]
2. Houpt, K.A. 2011. Domestic Animal Behavior for Veterinarians and Animal Scientists, 5th ed., p. 275, Wiley Blackwell, Iowa.
3. Krzak, W.E., Gonyou, H.W., and Lawrence, L.M. 1991. Wood chewing by stabled horses: diurnal pattern and effects of exercise. *J. Anim. Sci.* **69**: 1053–1058. [Medline]
4. Lehner, P.N. 1996. Handbook of Ecological Methods, 2nd ed., Cambridge University Press, Cambridge.
5. Luescher, U.A., McKeown, D.B., and Dean, H. 1998. A cross-sectional study on compulsive behaviour (stable vices) in horses. *Equine Vet. J. Suppl.* **27**: 14–18. [Medline]
6. McGreevy, P.D., Cripps, P.J., French, N.P., Green, L.E., and Nicol, C.J. 1995. Management factors associated with stereotypic and redirected behaviour in the thoroughbred horse. *Equine Vet. J.* **27**: 86–91. [Medline] [CrossRef]
7. McGreevy, P.D., and McLean, A. 2010. Equitation Science, p. 78, Wiley-Blackwell, Iowa.
8. Redbo, I., Redbo-Torstensson, P., Odberg, F.O., Hedendahl, A., and Holm, J. 1998. Factors affecting behavioural disturbances in race-horses. *Anim. Sci.* **66**: 475–481. [CrossRef]
9. Whisher, L., Raum, M., Pina, L., Perez, L., Erb, H., Houpt, C., and Houpt, K. 2011. Effects of environmental factors on cribbing by horses. *Appl. Anim. Behav. Sci.* **135**: 63–69. [CrossRef]