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Prevalence of Crib-Biting and Weaving in Stabled Horses Tie Stalls

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Abstract

The objectives of this study were to evaluate the prevalence of crib-biting and weaving in horses stabled in tie stalls and to investigate the relationship between gender, age, and stereotypies. One hundred and seventy-seven half-bred saddle horse residents of a riding school, of both genders and between the ages of 3 and 20, distributed in three buildings with the same management conditions, were observed. For the statistical analysis according to gender, the horses were classified into 2 groups: geldings (n = 110) and mares (n = 67). According to age, the horses were classified into 2 groups: namely, 3 to 7 years old (n = 31) and 8 to 20 years old (n = 146). During three consecutive days, a single evaluator spent one day per building observing the presence or absence of crib-biting and weaving. Each given day was divided into 2 periods of observation: from 7:30 to 13:00 and from 14:30 to 20:00. Stereotypies were observed in 4.5% of the horses, i.e., 3.4% of the horses showed crib-biting and 1.1% showed weaving. We did not find horses showing crib-biting and weaving at the same time. No association was found between the prevalence of stereotypies and either gender or age of the horses. Our results suggest that visual and tactile contact with other horses, which occurs in tie-stall housing, could reduce the risk of developing weaving in tie-stall horses but not crib-biting.

Keywords: equine, stereotypy, stereotypic behavior, abnormal behavior.

Prevalencia de aerofagia y balanceo en caballos estabulados atados en un cubículo

Resumen

Los objetivos de este estudio fueron evaluar la prevalencia de aerofagia y balanceo en caballos estabulados atados en un cubículo e investigar la relación del género y edad con las estereotipias. Se observaron 177 caballos mestizos de silla, residentes en una escuela de equitación, de ambos géneros, de 3 a 20 años de edad, distribuidos en tres edificios y mantenidos en las mismas condiciones de manejo. Para el análisis estadístico, según el género, los caballos fueron clasificados en 2 grupos: machos castrados (n = 110) and hembras (n = 67). De acuerdo con la edad, los caballos fueron clasificados en 2 grupos: de 3 a 7 años (n = 31) y de 8 a 20 años (n = 146). Durante 3 días consecutivos un único evaluador utilizó un día por edificio observando la presencia o ausencia de aerofagia y balanceo. Cada día fue dividido en 2 periodos de observación: desde las 7:30 a 13:00 y de 14:30 a 20:00 h. Se observaron estereotipias en el 4,5% los caballos; 3,4% de los caballos presentaba aerofagia y 1,1% balanceo. No se observaron caballos que presentaran ambas estereotipias. No se encontró asociación entre la prevalencia de estereotipias y el género o edad de los caballos. Nuestros resultados sugieren que el contacto visual y táctil con otros caballos como ocurre en caballos estabulados atados en un cubículo podría reducir el riesgo de desarrollar balanceo pero no de aerofagia.

Palabras clave: equino, estereotipia, conducta estereotipada, conducta anormal.

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Prevalência de aerofagia e balanceamento em cavalos estabulados atados em um cubículo

Resumo

Os objetivos deste estudo foram avaliar a prevalência de aerofagia e balanceamento em cavalos estabulados atados em um cubículo e investigar a relação do gênero e idade com as estereotipagens. Se observaram 177 cavalos mestiços de sela, residentes em uma escola de equitação, de ambos gêneros, de 3 a 20 anos de idade, distribuídos em três edifícios e mantidos nas mesmas condições de manejo. Para a análise estatística, de acordo com o gênero, os cavalos foram classificados em 2 grupos: machos castrados (n = 110) e fêmeas (n = 67). De acordo com a idade, os cavalos foram classificados em 2 grupos: de 3 a 7 anos (n = 31) e de 8 a 20 anos (n = 146). Durante 3 dias consecutivos um único avaliador utilizou um dia por edifício observando a presença ou ausência de aerofagia e balanceamento. Cada dia foi dividido em 2 períodos de observação: desde as 7:30 às 13:00 e de 14:30 às 20:00 h. Se observaram estereotipagem em 4,5% os cavalos; 3,4 % dos cavalos apresentava aerofagia e 1,1 % balanceamento. Não se observaram cavalos que apresentaram ambas estereotipagens. Não se encontrou associação entre a prevalência de estereotipagens e o gênero ou idade dos cavalos. Nossos resultados sugerem que o contato visual e tátil com outros cavalos como ocorre em cavalos estabulados atados em um cubículo poderia reduzir o risco de desenvolver balanceamento mas não de aerofagia.

Palavras-chave: equino, estereotipagem, conduta estereotipada, conduta anormal.

Introduction

Crib-biting/windsucking, weaving and box walking are considered the most prevalent equine stereotypic behaviors (1). The most accepted definition of *stereotypy* is a behavior pattern that is repetitive and invariant with no obvious goal or function (2). However, Mason (2) later redefined stereotypy as a repetitive behavior induced by frustration, repeated attempts to cope, and/or central nervous system dysfunction (3). The prevalence of stereotypies can reach up to 59.2% (4). These stereotypies can reduce the conception rate in mares (5) and can produce health problems (6–9). Also, stereotypies can reduce the economic value of horses (6,10–12) and are one of the most important indicators of long-term welfare problems in these animals (13). The inclusion of welfare in the definition was later reaffirmed by Cooper and Mason (10), who state that stereotypies are a sign of poor welfare linked to an inappropriate environment associated with domestication. In fact, the stereotypies have not been observed in feral and semi feral horses (14). According to some studies, there is a genetic predisposition to display stereotypies (9,15,16), which could be associated with temperament (17–19). However, there are other risk factors, such as age (1,17,20,21), gender (1,20–22), type of bedding (23–25), feeding frequency (26,27), concentrate feeding (27–30), lack of access to pasture (17,24), and restriction of free movement (17,18,25,31). Most studies of prevalence and risk factors for stereotypies in horses have been conducted in box-stabled horses, as reported in previously cited papers, and only two studies have been done in tie-stall stabled horses (32,33). Consequently, the objective of this study was to determine the prevalence of crib-biting and weaving and its association with age and gender in tie-stall stabled horses kept tied 22 hours per day.

The objectives of this study were to evaluate the prevalence of crib-biting and weaving in horses stabled in tie stalls and to investigate the relationship between gender, age, and stereotypies.

Materials and Methods

One hundred and seventy-seven half-breed saddle horses corresponding to all horses stabled in tie stalls and residing in a riding school at Region de la Araucanía, Chile, were included in this study, ages ranging between 3 and 20 years old. The weight, wither height, gender and age of the animals were obtained from the riding school records. The horses weighed between 370 and 485 kg and their wither height was between 1.35 and 1.57 m. According to gender, horses were classified into geldings (n = 110) and mares (n = 67), and no stallions were included. Age groups were classified using the approach described by Mills et al. (20), namely, 3 to 7 years old (n = 31) and 8 to 20 years old (n = 146). Horses were kept in 3 tie-stall buildings, two of them with 60 horses and one with 57 horses. Tie stalls were side by side in a row along the opposite walls of the building and separated by a wide alley. Each tie-stall was 1.5 m wide and 2.5 m long. Each stabled horse was separated from its neighbors by a 50-cm height pendant rod affirmed from the poles with a chain, which allowed physical contact with one or both of the neighbors and visual contact with all other tie-stall building horses.

The stalls had cement floor with wood shavings as bedding material. The front area of each stall had a water trough, a feeder, and a tie ring. The tie ring was used to secure the horse by the neck with a 1.2 m long chain necklace. Daily feeding of the horses consisted of 6 kg of lucerne hay and 2 kg of moisture oat grain and was given in three equal size daily rations at 6:30, 11:00, and 18:00. Salt blocks were permanently offered to each horse. During a 9-month period, horses were kept in a 2-hour/day tied up regime and 2-hour period doing riding exercises or being groomed. All horses followed a similar training program but at different times of day. The training program consisted of one or more of the following activities performed once or twice a day, every two hours from 9:00 to 21:00: lunging in a round pen (10 to 20 min), riding at the walk (30 to 40 min) and/or cantering with the rider (5 to 15 min). After the exercise, the horses were groomed outside the tie-stall building. Then, they were placed in the tie stall. During the remaining 3 months of the year, the horses were kept on pasture on a 24-hour basis.

For this study, an observational analysis was used, while the horses were in the tie-stall, one day, for 11 hours. The day of observation was divided into two periods: from 7:30 to 13:00 and from 14:30 to 20:00, spending one day per tie-stall building. During three consecutive days, a single evaluator positioned at a higher position in the middle of the tie-stall building, which gave them a panoramic view of all the horses, performed the following recording by direct observation, to detect the presence or absence of crib-biting and weaving based in a previously elaborated ethogram (Table 1) (34). The observation period allowed one or two times to record the behavior of the horses before, during and after receiving food, and before and after exercising. The behavior while they were out of tie-stall building was not recorded. The results were expressed as percentages. Fisher's exact test was used to establish differences of stereotypies frequencies between genders with an alpha level of 0.05 (35).

Table 1. Terminology for stereotypies described (23)

Stereotypy	Definition
Crib-biting/wind-sucking	An oral-based behavior frequently involving the horse grasping a fixed object with its incisor teeth and engulfing air with an audible grunt.
Weaving	An obvious lateral swaying movement of the head, neck, forequarters and sometimes the hindquarters.

Results

Eight (4.5%) out of 177 horses were observed performing stereotypies, 6 (3.4%) for crib-biting and 2 (1.1%) for weaving. Horses grasped a feeder and/or the front side pole to display crib-biting. No horses were observed performing both stereotypies simultaneously. The prevalence of crib-biting and weaving in horses stabled in tie-stall by gender is shown in Table 2.

No statistically significant differences were observed between the gender of the horses, either for crib-biting and weaving ($p \geq 0.05$). The prevalence of crib-biting and weaving in horses stabled in tie stall by age is showed in Table 3.

No statistically significant difference was observed between the age categories of horses for crib-biting and weaving ($p \geq 0.05$).

Table 2. Prevalence of crib-biting and weaving in tie-stall stabled horses, by gender

Gender	n	Crib-biting		Weaving		Total stereotypies	
		n	%	n	%	n	%
Mares	67	3	4.4	2	2.9	5	7.4
Geldings	110	3	2.7	-	-	3	2.7

Table 3. Prevalence of crib-biting and weaving in tie-stall stabled horses, by age

Age groups in years	n	Crib-biting		Weaving		Total stereotypies	
		n	%	n	%	n	%
3-7	31	-	-	-	-	-	-
8-20	146	6	4.1	2	1.3	8	5.4

Discussion

The total prevalence of both stereotypies found in tie-stall stabled horses, although it is within the wide range from 0 to 59.2% described by other authors, is one of the lowest reported in the literature (9,11,17,20–22,24,27–29,32,33,36–54). Notoriously, the total prevalence is close to the 4.2% reported by Pagliosa et al. (33) in a study conducted in 72 military horses kept in tie stalls, including that weaving in both studies does not exceed 1.4%. The low prevalence of both stereotypies is noteworthy, considering that the housing conditions of the horses in our study had several risk factors, such as wood shavings as bedding material (23,24), the 22-hour daily period in tie-stall conditions (25,31,55), no access to pasture (17,24), fractionated feeding (26,27), and concentrate feeding (29,30,37). All these factors should have resulted in a higher prevalence of these stereotypies. The results obtained coincide with several studies indicating that the possibility of visual and tactile contact with their neighbors (4,17,56,57) and including an image of a horse face (58) or the use of a mirror inside the stall (57,59) decrease the risk of stereotypies, which is feasible in tie-stall stabled horses, and even Flannigan and Stookey (32) indicate that the welfare of mares kept in tie stalls is sound.

The failure to find an association between the gender variable and the prevalence of stereotypies agree with those reported in previous studies, especially because ours did not consider stallions (17,21,24,28, 43,50,51,53,54). On the contrary, in a study conducted in 743 thoroughbred horses, Tadich et al. (22) showed a higher prevalence of classic stereotypies in mares than geldings. Therefore, we cannot conclude anything about the effect of gender in the stereotypies. While horses with stereotypies were all older than 7 years old, no statistical association between age and stereotypies was found, which had been reported in previous studies (43,48,50,51,53,54). However, it is expected that older horses had a higher percentage of stereotypies (17,21,24), because it has been shown that environmental risk factors for stereotypies increase with age (24) and that the stereotypies do not usually disappear with its causative factors (14). The absence of young horses with stereotypies is a surprising finding, since these animals should have recently faced high stress periods, such as weaning, housing, training, or new routines (28,29). One explanation for this finding could be that young horses with stereotypies have been previously removed from the school, except the very good saddle horses, because some owners or trainers believe that stereotypies are imitative behaviors (11,27), although this presumption has not been proved (14,59,60). The small size of the sample is also another factor that could be affecting these results.

The absence of horses displaying both stereotypies simultaneously is surprising, as it has been reported in other studies (4,20,43,53).

As for crib-biting, the prevalence found is within the range reported by previous studies (9,11,20–22,24,27–29,32,33,36–54,61), which can reach up to 13.3% (60), although a higher prevalence was expected due to wood shavings as bedding (22–25), concentrate feeding (28,30,62), no grazing (17, 24,25) and consumption of less than 6.8 kg of hay feed 3 times a day (23). The failure to find a link between gender and crib-biting had already been reported in another study (17,28,43,50,51,53,54). However, gender as a risk factor for the development of crib-biting is contradictory, because some studies report that it is more common in geldings than mares (20,48,61) and another study showed it was more frequent in mares than geldings (22). The absence of statistically significant differences in crib-biting percentages and age categories coincides with other studies (22,43,48,50,51,53,54), even though it was expected that older horses had a higher prevalence of crib-biting (21,61) due to their cumulative impacts and that it was so difficult to remove once found (14).

In relation to weaving, the prevalence found is within the range reported in other studies (9,11,20–22,24,27–29,32,33,36–54,61,63), which can reach values as high as 50.7% (4). However, it is one of the studies with lower prevalence of weaving, since only 6 studies reported equal or lower prevalence (21,37,42,48,52,53). This is also lower than expected because the restrictive stabling (14,40), and as pointed out by Houpt (55), could have been an option to the impossibility of box walking. Although one report with a higher prevalence of weaving (22.8%) was carried out with visual contact between mares (5), we believe that the low prevalence of weaving in this study is associated with the possibility of visual and physical contact of the horses kept in tie stalls, which had been previously reported by McGreevy (18) and recommended as a preventive measure and even as a treatment for weaving (1,18,55–58). In fact, Flannigan and Stookey (32) demonstrated, from tie-stall stabled pregnant mare's urine, that the few mares shown to perform weaving interacted much less with their neighbors than mares showing no stereotypies. As for gender, the absence of statistically significant differences is consistent with other studies (4,17,24,28,31,43,48,50,51,53,54), even when those that only found with weaving. Previous studies had already found that the weaving was more frequently observed in mares than geldings (20,22,61). This result may be influenced by the levels of reproductive hormones, as indicated by Benhajali et al. (63). However, in the same study, which was carried out with 24 broodmares out of 25 weaving mares, only one mare was lactating. On the one hand, concern, worry and social contact associated with the foal, as well as their hormonal status, could be

the responsible factors for the absence of weaving in lactating mares in this study. Furthermore, the presence of almost exclusively weaving in broodmares without a foal could be a result of the stress associated with weaning or separation from her foal during the previous year, which is a social factor. In relation to age, no association was found, which is consistent with previous reports (17,21,31,43,48,50,51,53,54); however, it was not surprising that weaving was only observed in the group of 8 to 20 years old, because, in general, it is noted that the risk of developing weaving increases with age (14,24).

Conclusions

Crib-biting and weaving prevalence in tie-stall stabled horses was low, considering that they are stabled for 22 hours, with restricted movement, and that they used wood shavings for bedding material. No association was found between the prevalence of stereotypies and either the gender or age of the horses. Our results suggest that visual and tactile contact with other horses, which occurs in tie-stall housing, could reduce the risk of developing weaving.

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