Rocz. Nauk. Zoot., Vol. 47, No 2: 257–265

AN ANALYSIS OF HORSE STEREOTYPIES DURING SOCIAL ISOLATION

Ewelina Tkaczyk [1], Beata Kaczmarek[2], Martyna Mierzicka[1] ,
Martyna Frątczak[1] , Marta Dybczyńska[1]

[1]Uniwersytet Przyrodniczy w Lublinie, Wydział Nauk o Zwierzętach i Biogospodarki, Katedra Hodowli i Użytkowania Koni, ul. Akademicka 13, 20-950 Lublin
[2]Uniwersytet Przyrodniczy w Lublinie, Wydział Medycyny Weterynaryjnej, Katedra i Klinika Chorób Wewnętrznych Zwierząt, Zakład Chorób Wewnętrznych Zwierząt Gospodarskich i Koni,
ul. Akademicka 13, 20-950 Lublin

Abstract

It was assumed in the study that social isolation increases the occurrence of stereotypies in horses. The aim of the study was to compare the number and duration of selected stereotypies in the case of socially isolated and non-isolated horses. The research material consisted of seven riding horses. The experiment was to keep a horse accustomed to the company of other horses in its own stall in the stable, from which all other animals were taken out just before the start of the research. In the control study and during the experiment, 60-minute behavioral observations were made to determine the type and number of stereotypies occurring in the test horses. The stereotypies indicated by horse owners as occurring in each individual were taken into account: crib biting (leaning teeth against the edge of an object while simultaneously bending the neck, flexing muscles, drawing in and out of air with a characteristic sound), weaving (the horse swaying on the front legs, apart) , stepping from one foot to another (clear movement of the horse while engaging mainly the front limbs along the front wall of the box), stall walking (walking in your own box), biting and licking the walls of the stall. The number of

repetitions of the stereotypy, i.e. the entire sequence of the horse performing a given activity, from its beginning to its end, was determined, regardless of its duration. As part of the time measurements, the duration of all repetitions of each of the analyzed stereotypies was also determined. It was found that social isolation influences the type and frequency of stereotypies presented by horses. When horses are left without company, the frequency of stereotypies related to motor movement: weaving or walking in the box increases. However, the frequency of stereotypies, such as biting or licking the walls of the stall, is decreasing. Isolation also lengthens the time it takes to express these stereotypies, especially when it comes to swallowing, weaving, and stall walking.

Key words: horses / stereotypies / social isolation

Introduction

The domestication of horses contributed to their being closed in stables (Goodwin, 2007). These animals, which had a great need to move, were forced to stay stationary for most of the day. Their long-distance travel in order to search for food has been replaced by the consumption of low-volume condensed feed, short training sessions and very limited stay on paddocks or pastures, which is visible, among others, in the case of sports and racing horses (Nowicka-Obuszna et al. 2013, Cotugna et al., 2011). Additionally, social isolation or the creation of the so-called artificial herds were created, without hierarchy and friendly relations (Gustowska, 2008).

Changes in the natural lifestyle of horses resulted in the appearance of emotional disorders and, consequently, behavioral anomalies, which ultimately resulted in the deterioration of the well-being of horses (Zeitler-Feicht et al. 2014). Currently, the term 'horse satisfaction', which is a component of well-being, does not have a specific definition (Goodwin, 2007). However, an important concept in creating this definition is the so-called coping, i.e. 'the body's ability to

cope with an existing, aggravating situation' (Cooper and Albentosa, 2005). It is coping that is the basis of stereotypical behaviors that help an animal to adapt to uncomfortable and stressful conditions, such as a system of rearing or use, inconsistent with the needs of the species (Sambraus, 1997). Stereotypies are compared to people's mental disorders, which is repetitive, intrusive and obsessive behavior (Brummer, 1978). The causes of such disorders fall into symptomatic categories (e.g. head shaking due to an ear disorder), changes in the central nervous system (e.g. rabies), hormonal disturbances, nutritional deficiencies, or in reactive categories as a response to poor housing or animal handling. It is the latter category that is most often considered as a problem of modern horses (Zeitler-Feicht et al., 2014).

Reactive stereotypies in horses most often arise due to the lack of knowledge about the environmental needs of these animals or simple human negligence (Cooper and Albentosa, 2005). This type of behavior often becomes residual-reactive, which means that the stereotypical behavior remains even though its original cause has been eliminated and deficiencies have been replaced. The reason for this is the structural changes that form within the brain during the formation of behavioral disturbances.

Stereotypy as a constant repetition of pointless or ritualistic movements and attitudes is classified as meaningless, as it does not lead to satisfying the basic physiological needs of the animal (Kowalski, 2005). The most common stereotypies include: 1) weaving, which consists in swaying the horse on the front legs, apart, 2) crib biting, when the animal rests its teeth against the gutter, fence or the front of the box and, bending its neck with tense muscles, draws in air and then releases it with a specific noise, 3) planing, i.e. mechanical grinding of teeth against hard surfaces, 4) self-mutilation of the sides of the body with teeth, 5) stepping from one foot to another or stall walking. According to Zeitler-Feicht et al. (2003), crib biting, weaving or stall walking occur in over 6.5% of riding horses. Specimens mixed with pure breeds are particularly susceptible.

For each of the described stereotypies in horses, specific therapy can be carried out, which, depending on the individual case, the degree and type of the disorder, may bring various effects. It should be remembered that persistent behavioral disorders are usually extremely resistant to any kind of therapy (Waters et al., 2002). The occurrence of these stereotypies can be avoided by appropriate preventive measures and by maintaining the conditions of animal welfare.

It was assumed in the study that the social isolation of horses increases the occurrence of stereotypies. The aim of the study was to compare the number and duration of selected stereotypies in the case of socially isolated and non-isolated horses.

Material and methods

The horses

The research material consisted of seven anglo-arabian, riding horses with a set of several stereotypies. The age of these horses ranged from 5 to 15 years. The stake was five mares and two geldings. The horses were kept in six different centers for a minimum of six months. The conditions of keeping were comparable in each center. In all cases, the horses were stationed in box-type stables accompanied by at least one other horse. Each horse was kept in a separate box. The horses were fed three times a day with hay and crushed oats. The stalls were lined with oat or wheat straw. The horses were used as a standard for recreation, intended for children and adolescents. In their free time, they were released in groups to the paddocks, where they spent at least two hours a day.

Experiment

The experiment was to keep the horse in its own stall in the stables, from which all the other animals were taken out just before the start of the research. During the research, there was silence in the stable, and there were no people in it, except for the observer known to horses. The observer was not directly at the horse's stall. The horses were subjected to social isolation for 60 minutes. Then they were taken to the paddock where the rest of the animals they knew were kept. In the control study, the horses were kept in the stable with other horses for 60 minutes before the start of the experiment. As before, there was silence during the examination. There was only one person in the stable (the observer) whom the horses knew.

Research methods

Both in the experimental and control study, 60-minute behavioral observations were carried out to determine the number of repetitions of stereotypies occurring in the test horses. Each of the seven horses was therefore tested twice: control and experimentally. It was assumed that one

repetition of the stereotypy is , regardless of its duration, the entire sequence of the horse performing a given activity, from its beginning to its end. The following were taken into account: crib biting (leaning teeth against the edge of an object while bending the neck, flexing muscles, drawing in and out of air with a characteristic sound), weaving (the horse swaying on the front legs, apart), stepping from one foot to another (clear movement of the horse when involving mainly the front limbs along the front wall of the stall), stall walking (walking in one's own stall), biting or licking the stall walls as stereotypies indicated by horse owners. The time of occurrence of each of the analyzed stereotypies (total time) was also used as part of the time measurements. a manual stopwatch for this purpose. Time is given in minutes (min.).

Statistical methods

Due to the lack of a normal distribution of the data (chi-squared test), the collected results were subjected to the Kruskal-Wallis test. The significance of the differences was determined at $P \leq 0.05$.

The relationships between the means were identified using the Spearman's rank correlation.

Results

The number of repetitions of the stereotypy differed significantly during the follow-up examination and the experimental examination (Table 1). In the control study, licking the walls of the box was the most common, while crib biting and stall walking were the least frequent. In the experimental study, stepping from one foot to another was more frequent than in other stereotypies. Weaving was the least frequent. The differences between the number of repetitions of the stereotypy in the control and experimental study did not occur only in the case of biting the walls of the box. The remaining stereotypies were more common during the experimental study.

Table 1. Type and number of repetitions of the stereotypy bouts (n = 7)

Stereotypy	Crib biting	Weaving	Stepping from one foot to another	Stall walking	Biting stall walls	Licking stall walls
Control study						
Mean	3,45ax	2,84bx	10,56cx	2,59ax	16,89dx	24,29ex
SD	0,32	2,14	3,65	0,45	8,34	11,45
Experimental Study						
Mean	7,56ay	6,15by	32,45cy	16,45dy	10,93ax	13,32dy
SD	1,09	1,45	7,42	5,38	7,54	8,54

Means with different letters (a, b, c in rows, x, y in columns) differ significantly at $P \leq 0.05$.

The time of manifesting various types of stereotypies differed significantly during the follow-up examination and the experimental examination (Table 2). In the control study, horses exhibited crib biting the longest, and stall walking the shortest. In the experimental study, they showed stepping from one foot to another the longest, and stall walking the shortest.

Table 2. Duration (min) of stereotypy expression (n=7)

Stereotypy	Crib biting	Weaving	Stepping from one foot to another	Stall walking	Biting stall walls	Licking stall walls
Control study						
Mean	12,45ax	6,56bx	12,45ax	2,17cdx	6,76bx	4,44bdx
SD	3,65	1,72	4,87	0,61	2,15	1,64
Experimental study						
Mean	4,56ay	11,56by	15,34bx	4,05ax	7,44ax	6,15ax
SD	1,52	4,34	3,56	1,32	2,43	2,11

Means with different letters (a, b, c in rows, x, y in columns) differ significantly at $P \leq 0.05$.

There were three cases of significant correlations between the number of repetitions and the duration of stereotypy in the control group (Table 3). They were related to the positive correlation of the number of repetitions of weaving with the duration of crib biting, the number of repetitions of stepping from one foot to another with the duration of weaving, and the negative correlation of the number of repetitions of box walking with the duration of crib biting.

Table 3. Correlations between number of stereotypy bouts and duration of expression in the control study

Number of bouts	Duration trwania (min.)					
Stereotypy	Crib biting	Weaving	Stepping from one foot to another	Stall walking	Biting stall walls	Licking stall walls
Crib biting	-	-	-	-	-	-
Weaving	0,742*	-	-	-	-	-
Stepping from one foot to another	0,567	0,897*	-	-	-	-
Stall walking	-0,802*	-0,245	0,261	-	-	-
Biting stall walls	-0,387	0,109	0,092	0,234	-	-
Licking stall walls	-0,351	0,213	-0,261	0,125	0,321	-

*Significant correlation at $P \leq 0,05$

There were two cases of significant correlations between the number of repetitions and the duration of stereotyping during the experimental study (Table 4). They concerned the positive correlation of the number of stall walking repetitions with the crib biting time and the negative correlation of biting stall walls repetitions and the time of shifting from one foot to another.

Table 4. Correlations between number of stereotypy bouts and duration of expression in the experimental study

Number of bouts	Duration (min.)					
Stereotypy	Crib biting	Weaving	Stepping from one foot to another	Stall walking	Biting stall walls	Licking stall walls
Crib biting	-	-	-	-	-	-
Weaving	0,115	-	-	-	-	-
Stepping from one foot to another	-0,321	0,222	-	-	-	-
Stall walking	0,872*	0,082	-0,274	-	-	-
Biting stall walls	-0,128	0,421	-0,783*	0,321	-	-
Licking stall walls	0,321	0,045	0,371	-0,095	-0,327	-

*Significant correlation at $P \leq 0,05$

Discussion

The results of the research carried out in this study indicate that the intensity of stereotyping in horses increases when they are left without the company of other horses. The positive influence of other animals on the horse's mental state is evidenced by studies conducted by McAfee et al. (2002). The results obtained in own research can therefore be considered as consistent with those presented by the cited authors.

It is also worth emphasizing that when horses are isolated from their companions, the type of stereotypies most often expressed by them changes. In the presence of other animals, horses most often bite or lick the stall walls. At the time of isolation, however, the number of stereotypies related to motor activity, such as stepping from one foot to another and stalls walking, increases. It can be suggested that the presence of motor stereotypies is associated with an increase in the emotional excitability of horses left in the stable without company. As McGreevy et al. (1995) claim, it is an image of loneliness, and thus the desire to get to other horses.

The time of displaying subsequent stereotypies also turned out to be an important issue. It turns out that this parameter was most often not correlated with the number of repetitions of their occurrence. Particularly noteworthy is the time of crib biting in the case of horses kept in the company of other animals. It was one of the highest figures, next to the time of stepping from one foot to another, although the number of repetitions was relatively small. The reverse was the case with biting and licking the stall walls. On this basis, it can be concluded that in the standard conditions of group keeping of horses in the stable, stereotypies appear less frequently, but last longer. The situation is different during social isolation. Horses then more often succumb to certain stereotypies, but express them for a shorter time. This fact is mainly indicated by the obtained correlations between the number of repetitions and the time of expressing the same stereotypy as for crib biting, weaving and stall walking. This situation is most likely caused by an increase in nervous excitability, which manifests itself in a chaotic operation. McLean and Christensen (2017) are of a similar opinion, referring to Yerkes-Dodson's First Law, indicating that the ability to logically associate stimuli, especially when performing difficult tasks, decreases when emotional arousal increases. However, it can also be seen that social isolation does not change the duration of all stereotypies, which at this stage of the research does not fully support the theory of the negative impact of keeping horses in isolation for the time devoted to the stereotypy (Roberts et al., 2017). At this stage of research, it is worth paying attention mainly to weaving, the frequency of which both occurrence and time of appearance increase significantly during isolation, which means that in the case of such horses, it is especially necessary to care for their company.

Summary

Based on the obtained results, it was found that social isolation influences the type and intensity of stereotypies expressed by horses. When horses are left unaccompanied, stereotypies related to motor movement, such as weaving or stall walking, increase in severity. However, the

intensity of biting or licking the walls of the box decreases. Isolation also lengthens the time it takes to express these stereotypies, especially crib biting, weaving, and stall walking.

References

1. Brummer H. (1978).Verhaltensstörungen, w: Nutztierethologie. Hrsg.: Sambraus, H.H., Paul Parey Verlag, Berlin, 281-292.
2. Cooper J. J., Albentosa M. J. (2005). Behavioural adaptation in the domestic horse: Potential role of apparently abnormal responses including stereotypic behaviour. Livestock production science, 92(2): 177-182.
3. Cotugna N., Snider O. S., Windish J. (2011). Nutrition assessment of horse-racing athletes. J Community Health, 36(2): 261-254.
4. Goodwin D. (2007). Horse behaviour: evolution, domestication and feralisation. In The welfare of horses, Springer, Dordrecht, 1-18.
5. Gustowska R. Czego potrzebuje koń? Koń Polski, (9/2008), 66-67.
6. Kowalski A. (2005)Stereotypie jako wskaźnik dobrostanu zwierząt. Medycyna Wet. 61, (12): 1335-1338
7. McAfee L. M., MillsD. S., Cooper J. J. (2002). The use of mirrors for the control of stereotypic weaving behaviour in the stabled horse. Appl AnimBehav Sci, 78(2-4): 159-173.
8. McGreevy P. D., Cripps P. J., French N. P., Green L. E., Nicol C. J. (1995). Management factors associated with stereotypic and redirected behaviour in the Thoroughbred horse. Equine Vet J, 27(2): 86-91.
9. McLean, A. N., Christensen, J. W. (2017). The application of learning theory in horse training. Appl AnimBehav Sci, 190: 18-27.
10. Nowicka-Posłuszna A.,Ziomko A.,Ziomko K. (2013).Stereotypies and undesirable behaviours in horses used for sports and leisure activities. Poznań, 30(4): 124-134.
11. Roberts K., Hemmings A. J., McBride S. D., Parker M. O. (2017). Causal factors of oral versus locomotor stereotypy in the horse**.** J Vet Behav, 20: 37-43.
12. Sambraus H.H. (1997).Normalverhalten und Verhaltenstörungen, w: Das Buch vomTierschutz, Hrsg.: Sambraus H.H. I Steiger A., Enke-Verlag, 57-59.
13. Waters A. J., Nicol C. J., French N. P. (2002). Factors influencing the development of stereotypic and redirected behaviours in young horses: Findings of a four year prospective epidemiological study. Equine Vet J, 34(6): 572-579.
14. Zeitler-Feicht M.H., Miesbauer D,. Dempfle L. (2003).ZurPrävalenz von

VerhaltenstörungenbeiReitpferden in Deutschland, KTBL-Schrift 418, LandwirtschaftsverlagGmBH, Münster-Hiltrup, 86-93.

15. Zeitler-Feicht M.,Matuszczak D. (2014). Zachowania koni, przyczyny, terapia i profilaktyka, Warszawa.

16. https://encyklopedia.pwn.pl/haslo/stereotypie-ruchowe;3979622.html

17. http://pzhk.pl/wp-content/uploads/Dobrostan_i_utrzymanie_koni.pdf

18. http://www.pdmpromocja.pl/jnbt/portal/artykul/76,lykanie---fakty-i-mity.html