A REVIEW OF AGGRESSIVE BAHAVIOR IN HORSES

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Abstract: The aim of this work is to describe different types of aggressive behaviour in horses. Knowledge about reasons and signs of aggressiveness in horses is essential to improve horses management, welfare and both human and horse safety. There are different factors responsible for behavioral development. Environmental and biological aspects of aggression should be considered. The influence of parents and humans, nervous system structure, hormones level ect. are strongly connected with aggressive behaviors. There are various types of aggression, from natural (dominance hierarchy) to abnormal (aggression against offspring, self-directed aggression). The most common causes of aggressive behavior are: dominance related aggression, fear induced aggression, hormonal disorders, unsuitable conditions and diseases. Awareness about those factors will help to handle horses properly or choose appropriate treatment.

Keywords: horse, aggression, behavior,

1 Introduction

Human–horse relationship has a long and varied history. The first motivation to domesticate horses was meat, but equine industry became progressively more important and horses were used in transportation, sport, and now, they are more and more used as companion animals (Hausberger et al., 2008). In all these cases there are problems with interspecific communication. If there are huge misunderstandings it may lead to accidents (minor incidents: bites, jostles, crushes). The usual victims are veterinarians and stable stuff, that is why there is a great need to know reasons of horses aggressive behavior (Hausberger et al., 2008). Furthermore, fear is an emotion that causes most of human-horse accidents in relation to sudden, unexpected reactions. What is more, defensive aggression may occur if a horse has no possibility to escape (Hall et al., 2012). Nevertheless, equestrians and breeders should be able to recognize behavioral signs of horses mental state to improve their welfare. Those signs may relate to health problems that may induce undesirable reactions to humans (Hall et al., 2012; Hausberger et al., 2008). Knowledge of horse body language will allow to assess the problem, discover its reasons what is necessary to find a proper treatment (Houpt, 1977). On the one hand, horses became more like companion animals, on the other hand, breeding and rearing of horses is a part of rural economy and take place mostly on farms (Søndergaard, 2003). What is more, there is a great number of horses that show abnormal behavior, what is quite often caused by humans. To provide horses welfare at appropriate level it is important to know the factors that influence behavioral development (Søndergaard, 2003).

Horses are great runners and their survival tactic is to flee from predators. They are known as beautiful and majestic animals with strong flight or fight response. Still, there are some situations when horses can behave aggressively. Some of those behaviors are natural (dominance hierarchy), other abnormal (self-directed aggression, aggression against offspring). Knowledge about primary reasons of those behaviors will improve horses management, welfare and both human and horse safety. That is why in the present paper, we will review the scientific knowledge on different aggressive behavior types in horse and factors that cause them.

2 Biological aspects of aggression

The behavior is the result of interaction between the nervous system, hormones, and neurotransmitters, as well as the experience gained by the animals. To understand horses behavior properly it is important to know its biological basis.

2.1 The nervous system

The limbic system is the responsible for emotions part of nervous system. It contains numerous brain structures that operate in an integrated way. Part of the brain that is accountable for the aggression is hypothalamus (Nowicki, 1978). Researches show that different structures of the brain are responsible for different types of aggression. The structures of the brain not only cause the reactions, but also inhibit them. For example destruction of central nucleus of the amygdala resulted in increased dog's aggression, and the damage of medial nucleus caused calmness in dogs (Sadowski, 2003).

2.2 Genetic

An evidence for genetic basis of animal behavior is domestication. With selection during centuries people lowered the level of aggressiveness in horses and cows, produced new breeds of many species, produced hens that are quiet (Nowicki, 1978). Numerous studies on dogs have shown that specific genes are responsible for a certain behaviors, like shyness in Bassets that is conditioned by the dominant gene. Furthermore, selection has resulted in the huge diversity in dog breeds, which are characterized by different behavior patterns. Some of them tend to behave aggressive, while others are extremely calm. It was found that after a few generations of selection an aggressive behavior in dogs can be reduced (Takeuchi, Houpt, 2003).

Horses during centuries were selected on behavior. Still some thoroughbred lines may be more aggressive than others, because those horses were selected for speed regardless to cooperation with them. Another evidence for genetic basis of behavior may be a research done on the arabian mares from Egyptian Agricultural Organization (EAO). Nine from one hundred and seven mares with foals rejected their nursling and behaved aggressively. All this mares came from one of several lines held by EAO (Houpt, 2000).

2.3 Hormones

Males are known to be more aggressive than females. An exception from this can be mother with her offspring. It is proved that androgens are responsible for aggressiveness (Sadowski, 2006). Effects of those hormones is known to be important in fetal life. In dogs, unborn females were treated with testosterone which caused higher dominancy level to compare with normal females. However, males still were more aggressive. Furthermore, males are exposed on androgens, produced in testicles, during puberty what increase aggressiveness (Houpt, 2005). It is proved that castration lowers aggression in horses. Geldings will still exhibit aggressive behavior but it is seen much rarer and its intensity is not as severe as in stallions. What is more, an important role in shaping the behavior is the age at which the animal has been castrated and an individual experience (Houpt, 1986). Furthermore, testosterone that naturally occurs in females is responsible for intensity of aggressiveness in mares (Van Dierendonck et al., 1995). Probably mares are exposed at similar decrease of estrogen and progesterone level as women. Those variations cause PMS, mood changes and are often accompanied by aggression in women (Houpt, 1980). Moreover, a granulosa tumor of the ovary may elicit masculine behavior and increased aggression (Houpt, 1986). On the other hand, the presence of dopamine and serotonin in dogs and humans reduces the level of aggression (Takeuchi, Houpt 2003).

3 Environmental influences on aggression

Almost in all species aggressive behavior can be observed when animals feel hunger or if there are too much individuals in small area (Houpt, 2005). Furthermore, researches on rats show that maternal care is important for developing future behavior patterns. Orphans rats showed increased aggressiveness, fearfulness and lower ability to learn (Takeuchi, Houpt, 2004). If it is about horses, it has been observed that foals learn the aggressive behavior from their mothers (Van Dierendonck et al., 1995). Moreover, inappropriate horses handling can induce

aggressive behavior. It can be caused by ignorance when innocent behavior of the foal may turn into aggression or by violent handling that cause fear induced aggression.

4 Signs of aggression

Horses use all senses to communicate. The non verbal communication is very easy to read for other individuals. People, during long-term observations, learned to read most of the horses "body language" signals what is essential for communication with them. Unfortunately human sense of smell is no comparative to animals and the equine voice communication is very poor. That is why all practitioners should be able to observe and recognize facial and posture signs of aggressive behavior.

Typical signs of aggressive behavior are:

- small eyes with flashing sclera
- ears laid back against its head
- lips pulled up that teeth are often seen
- nostrils will be dilated causing wrinkles and the air is drawn loudly
- rapid tail movements
- sometimes squealing can be heard
- tensed skeletal muscles
- body turned toward the object of aggression (Pruchniewicz, 2003).

In equine community the physical contact is not often seen, the animals use mostly the threat to reduce energy loss. Using body language horses convey his intentions to other horses so that actual fights can be avoided (Waring, 2003). Signals and postures indicating aggression are very varied and show different types of interactions. For better understanding those signal it is important to know ethogram of aggressive behavior in horses.

1. Ears position: ears lay flat to the neck, the head pointing towards the object of aggression.
2. The bite threat: the ears lay back along the neck, the head directed to the object of aggression, teeth can be seen, the bite movement but without physical contact.
3. Bite: as in point 2, but with physical contact. The attacker does not more than two steps to the recipient. The bite can occur suddenly with violent jump on the object.
4. The threat of kicks: ears along the neck, rump addressed to the recipient, and one of the pelvic limb is lifted.
5. Kick: as in step 4 the fact that there is a kick necessarily the contact.
6. Attack: the neck extended, ears are laid back against his head, pushed flat against the skull. The threat of bites and kicks can occur. The reaction is rapid. Two steps toward target are made.
7. Chase: chasing of another individual. Usually at gallop with ears laid back. The longer the distance, the less violent reaction than attack.
8. Fight: with physical contact. Series of bites and kicks with high frequency.
9. Pushing: pushing aside another individual with shoulder
10. Strike: attack with front limbs with or without contact
11. Threat approach: Approach the receiver with ears backward (not flat against the neck). Head is not extended as far as in ears laid back. (Vervaecke et al., 2006).

Furthermore, it was observed that there are sex differences in way of expressing aggressive behaviour. Mares usually use hind legs, while stallions climb and attack with the front limbs (as a typical form of attack or defense). An active defense, as well as agonistic behaviors are considered as aggression in many sources. In this article agonistic behaviors are also considered. Horses usually flee from danger, but when they have no place to escape thy change tactic to active defense (Pruchniewicz, 2003).

5 Intraspecific aggression

Intraspecific aggression is usually a normal behavior that is observed in wild horses. As far as it is not very intensive it is natural behavior in domesticated horses. However, there are some situations when abnormal behavior occurs as a result of frustration or diseases.

5.1 Dominance hierarchy

Horses are typical herd animals with highly developed social behaviors. There is established hierarchy in the group what is essential for its survival. Stable hierarchy reduces the number of injuries and energy lost (Greevy, 2004). It is suggested that body mass, physical condition, age, previous agonistic interactions, parents place in the hierarchy and the level of individual aggression are factors that influence place in the hierarchy (Rho et al., 2004). Aggressive behavior is the most important factor that places an individual in the herd (Vervaecke et al., 2006). Once the hierarchy is established, aggression from most dominant horses is rarely observed because other horses respect their dominance. Conflicts often occur when a horse's critical distance is exceeded by another individual (about 60%). While aggression as a response to received is rarely observed (Heitor et al., 2006).

A rapid growth in number and intensity of aggressive interactions is observed after a new horse enters the group until a new hierarchy is established (Nowicki, 1978). The duration of agonistic behaviors depends on new horse's temperament and level of aggression (Houpt, 1987). What is more, this phenomenon also occurs in nature when mares migrate from their native herd (this happen probably to reduce inbreeding). Fillies usually join groups with familiar to them mares but unfamiliar stallion (Monard, Duncan, 1996). Research shows that introducing new stallion to the group of mares does not affect predetermined hierarchy amongst them (Heitor et al., 2006). The stallion is not always the most aggressive individual in the herd and not always stands at the top of the hierarchy. It can be observed that geldings may be more dominant, what suggests that previous experience is more important than the castration (Houpt, Keiper, 1982). It is proven that aggression can be much lower if new horse is placed next to other horses behind the fence. In horse industry, it is very important to reduce agonistic interaction and those behaviors occur with much lower frequency if animals know each other earlier. The fence gives horses possibility to see and smell each other. Furthermore, the high level of aggressive behaviors is observed during feeding if horses are kept in herds. It is important to put a few fodders in different places on pasture that submissive horses will have access to food. However, it was observed that dominant individuals usually finish earlier and push away submissive horses from full fodders (Houpt, Wolski, 1980).

5.2 Age of mares and foals and the level of aggression in the herd

Age is positively correlated with the dominance. It has been observed that older mares were dominant, and the younger subordinate. Most interactions are seen between mares under 5 years old because those mares do not have stable rank in the herd. It was found that level of aggressive behavior decrease with the age of the animal due to gaining a stable position in herd. What is more, in 95.4% aggression from one side was observed. Fights between two mares in 75% were among young, under five years old mares (Rho et al., 2004). Furthermore, most of agonistic behaviors occur between mares without foals (70%), then, between the mare without foal and mother with offspring (23%), while aggression between the two mothers was quite rare (7%). On the other hand, with approaching date of birth an increase of aggression intensity can be observed (both offensive and defensive). For a few days after parturition these interactions are high, but with aging the foal maternal aggression decrease (Rho et al., 2004).

5.3 Aggression directed on foals

Foals are rarely exposed to attacks, because older horses usually tolerate younger individuals. However, the literature reports several cases of infant killing by stallions. It was observed that

stallion may kill other stallion offspring. This behavior is rare but horse breeders should be aware of these phenomena. These attacks are similar to those against young, sexually maturing colts that are expelled from herd. The male grabs the foal's neck or back, shakes it and throws it. Similar behavior can occur in geldings (Houpt, 1984). What is more, nurslings can be rejected by their mothers. The lack of maternal instinct can lead to aggressive behaviors and its strongest form mares can bite the foal's neck and even throw it in the same way as the stallions do. This abnormal behavior is observed mainly in primiparous. It is suspected that the lack of experience, postpartum stress syndrome and lack of contact during first hours after parturition are the main factors that influence the foal rejection (Houpt, 1984).

6 Interspecific aggression

Horses aggression can be directed at people or other animals, regarding to specific way of horse keeping this kind of aggression is usually seen toward dogs. Feral horses behave aggressively toward predators like wolfs. Interspecific aggression may occur at various forms.

6.1 Domination toward human

Horses, mostly stallions, may try to dominate over people. Nowadays the horses value depends on his willingness to submit to human authority. If horses are not trained to respect people the aggressive behavior may be worse causing dangerous situations (Houpt 1984). What is more, horses can learn quickly and it is essential that to handle stallions properly an experience is required. Improper training may cause that cooperation with those horses will be impossible. There are some individuals who examine people all the time. Domination is usually demonstrated by disobeying orders, pushing or showing aggression (mostly from front like biting or prancing). Consistent, confident handling will do a lot to reduce dominant behaviors.
Maternal aggression

Mares after parturition may be aggressive towards other animals and humans. A mare natural behavior is to protect her foal from "strangers". During first days after parturition the highest level of aggression is observed. Mares usually are not aggressive toward familiar to them people, however horse breeders should be aware that maternal aggression can occur toward them (Houpt, 2000).

6.2 Learned aggression

Unaware, inexperienced people can teach a horse some aggressive behaviors. For example, it is often seen that horses are fed from hand. Some individuals are very impatient and start to behave nervous, people seeing this go to those animals earlier. The horse is rewarded for this kind of acting and in the future he will do the same. What is important, demanding can be seen with anger and in some cases horses bite to get food.

Due to stallions excitability a lot of people are afraid of them. To avoid contact horses are often kept in isolation. This solution does not solve the problem but also increase it. Lack of exercise and contact with other animals has strong, negative impact on the stallion mental state (Parelli, 2002).

6.3 Fear induced aggression

As mentioned above, threatened horses with no possibility to escape may behave aggressively. Furthermore, horses remember well experiences from past. It is often seen that some individuals are afraid of specific objects, people, colors, that are associated with pain or discomfort. Unfortunately this kind of fear, if caused by humans may lead to aggressive behaviour in horses (Dietz, Huskamp, 2008). Mostly veterinarians are exposed on attacks due to unpleasant for horses veterinary treatments (Houpt, 2005). Aggression during taking a horse from pasture is not rare. Some horses have very strong social needs and feel not safe alone. Another reason of this behavior may be the fear of what happen after (improper handling or riding that cause pain). To choose proper treatment it is important to look trough different possibilities to find the reason (Houpt, 1984). Recreational horses often work with inexperienced people who unaware may cause the pain. In those horses aggressive behavior is seen during brushing or saddling and riders are mostly exposed to bites (Walendowska, Nowicka-Obedient, 1991). If a horse is very sensitive, but well behaved the redirected aggression from person to an object can be observed.

7 Self-directed aggression

Self-directed aggression is sex-related behavior because it is mostly seen in stallions. Auto aggression occurs in horses that feel the presence of other individuals but have no contact with them. In particular, if mares are kept nearby and the stallion is locked for a long time. This is an evidence that limited space has a negative effects on horses.

The stallion or gelding bites himself at flank or near the knee. At the same time animals sometime also kick and squeal. This behavior is a risk for horses and humans health. Sometimes self-directed aggression can be induced by physical reasons and it this case those behavior is not related to sex. It has been suggested that neurological diseases, including rabies, may be the main problem. Also, other diseases like colic or dermatitis such as allergy may be the reason of auto aggression (Houpt, 1983).

8 Conclusion and perspectives

The scientific literature and data from horse farm shows that aggression is very important issue that still is not fully known. There is still need to conduct researchers about factors that cause developing this behavior. This knowledge allows keeping horses without exposing them to unnecessary suffering and protecting people from accidents.

Abnormal aggression is usually caused by humans. Inappropriate handling of dominant and fearfulness horses may cause the growth in the problem. What is more, wrong management, keeping horses in too small area, isolation or feeding mistakes may induce development of aggressiveness. If there is genetically determined "malice", it occurs rarely. Still, this phenomenon is difficult to prove. There are no established methods. What is more an analysis of chromosome structure is expensive, and to prove which changes are responsible for the aggressive behavior can be very difficult. Researchers on mice revealed some genes that are responsible for aggression: monoamine oxidase A, serotonin 5-HT1B receptor and α-calmodulin-dependent protein kinase II (CaMKII). This enzyme is required for activation of tryptophan hydroxylase which is the rate-limiting step in serotonin synthesis (Bowling, Ruvinsky, 2000).

Knowledge about aggressive behaviors in horses has practical aspects. First of all, prevention is always better than treatment. The priority should be horses welfare. What is more, treatment is expensive and may not result in full recovery. The ability to recognize aggressive behaviors and dominant horses will help to manage them. For example, people may predict which individuals should not stand next to each other or be aware of proper feeding subordinate horses.

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