

THE NATURAL HORSE AND UNNATURAL BEHAVIOUR

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INTRODUCTION

Ethology is the study of the function and evolution of an animal's behaviour in its natural environment. Why should ethology be an important consideration for veterinarians? Being familiar with the norm allows the veterinarian to know when they have been presented with the abnormal - this is the case whether we are considering physiological or behavioural parameters. Understanding not only what is the normal behaviour, but why a certain species of animal has developed its repertoire of behavioural responses can often be invaluable in determining the root cause of many problems, or even preventing them from arising. The modern horse fulfils a variety of roles in today's society and few, if any, truly reflect its natural state. Our current methods of equine management mean that many of our horses are being kept in more alien environments than, for example, many ruminants. Ruminants tend to be kept for most of their lives in herds and often out at pasture, which may be considered similar to their natural environment. Unlike the dog, another social domesticate, the horse does not live with us as part of our group, and while many horses have the opportunity to socialise to some extent with their own species, many are not kept in their natural state as part of a herd or constantly out at pasture.

This paper gives a short review of the role of the horse in its natural environment and community, and its adaptations for survival in that role; it will include feeding behaviour; social behaviour and communication; as well as reproduction and developmental behaviour. The implications of modern equine management practices will be discussed within each section.

THE NATURAL HORSE

The anatomical, physiological and behavioural characteristics of every individual are a consequence of evolutionary adaptation to their environment and, in that sense, they optimise the survival of the animal in a particular niche within a certain community. Understanding the natural environment of the modern horse, *Equus caballus*, is crucial, as many of its responses are 'hard-wired' to ensure the individual horse survives and reproduces in its natural environment; that is, there are innate motivations which domestication has apparently not altered.

The horse evolved in an environment where it was a prey species; therefore its overriding aim is to avoid being eaten and, in order to do this, its survival techniques are based on detection of any possible predators and its subsequent escape from them, for which the horse needs acute senses, quick reactions and the ability to run fast. The modern horse evolved on the plain and developed eyesight with relatively good acuity, which was able to focus on distant objects, but was also very perceptive to small movements, particularly in the peripheral range, which might have indicated a stalking predator. The eyes are large, set high up on the head and far apart so that the horse can remain vigilant whilst grazing. This gives the horse virtually an all-round field of vision, apart from 2 blind

spots, one directly behind the horse and one right in front of its nose. These are important characteristics to remember when approaching the horse and in understanding why sudden movements in and out of the blind spots may precipitate a strong reaction. The anatomy of the horse's eye is such that, in order to focus on certain objects, they must raise and lower their head, which can be mistaken for evasive behaviour and if they are prevented from doing this, for example through rein control, it can be the cause of accidents. Horses, in common with many other species, are naturally most active around dawn and dusk and, therefore, their eyesight is better than ours in half-light and indeed the size of their eyes suggests they are adapted for seeing in poor light (Budiansky, 1997). However, their eyesight may not have developed to cope with rapid changes in brightness, e.g. going from bright outdoors to dark indoors and, therefore, some horses may be reluctant to enter dark places, or may falter going through areas of great light differentiation. The horse's sense of hearing is also honed for the detection of predators; it has large, mobile pinnae, which can move independently of each other and are shaped to pick up sound efficiently.

The sensitivity of an individual's sense of smell depends upon the area of olfactory epithelium and the density of nerve endings present in that epithelium. The length of the horse's nose would suggest that it has a large area of olfactory epithelium and whether it is for communication purposes (e.g. identifying social odours) or for detection of predators or sources of food, there is little doubt that horses have an acute sense of smell. In addition to the aforementioned senses, horses are accepted as having great sensitivity to movement underfoot, that is, they may be aware of how stable the ground is beneath their feet and may be able to sense vibrations. This may help to explain why some horses are reluctant to cross bridges or traverse ramps.

It is therefore vital to remind owners that their horse's sensual perception of the environment is very different to their own, in sight, sound and smell and, therefore, what they may perceive as reaction without cause may, in actual fact, have a real and substantial source.

Once danger has been perceived, prey species have 2 options: either they hide, by being motionless and/or cryptic; or they remove themselves from the area. The horse, a large animal living in a wide open space, is a poor candidate for hiding successfully and has therefore evolved as a flight response animal. To flee successfully from a predator the horse must react immediately and depart quickly. The horse's reactivity is renowned and the cause of much anguish in horse owners. Yet in racehorses we have bred individuals that are even more reactive, in that they respond to a shorter array of cues used to precipitate departure, such that they can bolt out of the stalls instantaneously at a given signal (or before it!). The horse is well adapted for its survival technique of fleeing, with large lungs and heart space. The horse's legs in particular, being single-toed and with the muscle mass concentrated at the top of the leg, allow it to cover a lot of ground at speed (Rees, 1993). It is little wonder then that the horse, which is very observant and highly reactive, if surprised or fearful responds by running first and thinking later.

The modern horse evolved, essentially, as a plains dweller, ranging up to 80 km per day (Lindberg, 1998), exploring and roaming over wide open spaces; in addition, by comparison to ruminants which tend to eat fairly fast and then ruminate for long periods, the horse grazes relatively slowly and keeps on the move for longer, with shorter periods at rest. The horse is, therefore, strongly motivated to keep moving, not necessarily at high speeds, but certainly over some distance, and providing on-the-spot feed may remove some but not all of that motivation. In the wild, horses would not voluntarily put themselves in a small, confined area from which they cannot escape, but for our convenience we prefer to keep most horses confined to small boxes for long periods. Once stabled, the horse's flight response and opportunity to explore are curtailed. The horse's movement tends to be severely restricted, especially as in many stables all the action can be seen out of one door only. Therefore, the horse needs to remain standing in one spot to be either vigilant or sociable. The confinement may, therefore, impinge both on the physical and mental health of the horse, indicated by filled legs, stiffness, locomotory stereotypies, etc. The huge proportion of behavioural problems associated with confinement are well known in all of our captive species and while many horses do habituate to this unnatural environment and some cope with it as long as other stressors are not imposed, for too many it is a chronic stressor. Horses kept in their social group out on pasture, or even in a small dry lot, will move around far more, giving themselves natural exercise. While taking a horse out of its box to exercise does improve the situation, this is by no means an adequate replacement for time out in the field.

Stabling our horses usually benefits only one half of the horse-human relationship, the human; and, as is well-appreciated, there is another consequence of stabling that affects up to 50% of stabled horses, that of respiratory disease. The respiratory system of the horse was designed for an animal that spent all of its time outside with its head and neck lowered for a significant part of the day and not for the stabled horse in an enclosed area with dusty bedding and dry fodder. Feed as well as roughage is often placed continually above the ground. Although most owners are aware of the importance of getting a good circulation of fresh air in the stables and providing straw and hay that are not dusty, with a low airborne fungal spore count, there is no doubt that the high incidence of respiratory problems in horses would be greatly reduced if they were kept in a more natural environment.

Owners, especially of expensive competition animals, are often worried about releasing these horses either out for a bout of free exercise or to mix with other horses, but the risks involved can be minimised by a few simple steps and these would soon be outweighed by the benefits. Explosive bouts of energy that may be displayed by a horse just released into a pasture can cause injury but this may be avoided or reduced in some animals by, for example, recommending a short period of lunging prior to release. This acts to warm up the horse, minimising the likelihood of strain, and will use up some of the excess energy. Ensuring the horse is released among a stable social group of familiars may also reduce the chance of any squabbles. In addition, the size and layout of the paddock and the animals in neighbouring fields will affect the horses choice of activity; therefore various combinations should be explored.

FEEDING BEHAVIOUR

The diet and feeding behaviour of the intensively managed horse is far removed from that of the horse in a natural environment. The horse's digestive anatomy and physiology suits the activity of a trickle feeder (little and often). Naturally, the horse grazes, from a seasonally varying menu, for about 16 h out of every 24, depending on the type of grazing available. Many horses now receive 1-2 meals a day, consisting of feedstuffs with a greatly reduced water content and often a radically different nutritional profile from the diet they would be able to select in the wild. Many horses are put by us at constant risk of digestive problems from multiple causes, including reduced chewing time, drier boluses and decreased stomach pH. In addition, certain behaviour problems are inextricably linked to reduced feeding time, reduced chewing and/or gut pain. The purposes for which we keep horses require us to feed them higher energy diets and researchers are striving hard to understand how best to feed the stabled/performance horse. The gold standard for our feeding practices should be the horse's natural behaviour but, as yet, we are a long way from achieving this for the stabled horse. A common problem in horses managed artificially is one of reduced feeding time, so owners should be encouraged to increase the time spent feeding, which can be done in a variety of ways, e.g. by adding chaff to concentrates. Alternatively, greater quantities of forage can be offered, but if weight gain is a problem then forages with higher fibre content of a lower digestibility should be used. Ideally, the feed should be offered in such a manner that the horse has to work for it and of course allowing longer periods at grass (preferably not rich pastures) would be advantageous.

An animal's ability to select an appropriate diet and to avoid toxic sources of food is achieved through a number of mechanisms: *in utero* experiences, through lactation, experience of the mother's diet and its own experiments, from which it would learn to repeat positive consequences and avoid negative ones. Experiencing anything for oneself for the first time is extremely risky, but necessary for survival. Expelling food rapidly from the buccal cavity and vomiting are adaptive mechanisms evolved to minimise the risks associated with toxic foods. The inability to vomit means that the horse must try to ensure that whatever it ingests is nontoxic (Kiley-Worthington, 1997); this would suggest that its ability to discriminate between toxic and nontoxic food is extremely good. Horses are selective feeders and, as with other species, some horses are naturally more discriminating than others. However, there are particular occasions when any individual may refuse to eat, for example, food neophobia or loss of appetite associated with illness. In the case of neophobia, if it occurs with a new feed or, for example, when adding electrolytes to water, then gradual introduction is essential. If it is fussiness because the horse has been moved to a new environment, whether permanently to a new yard or temporarily to a show, then keeping their surroundings as familiar as possible may help. In such instances, offering the same feed in the same bucket and, if possible, having familiar smells around them, like used straw from their original box or a rug which has been worn by the horse's stable mate can be very beneficial. The horse is a social animal which would normally graze when other members of the herd were grazing and, while most horses habituate to being fed isolated from a herd, studies have shown that social facilitation of feeding does occur (Sweeting et al., 1985). Therefore, many would benefit from being in visual contact with other horses whilst feeding. Injuries associated with

group-feeding horses can be minimised if sufficient feed is provided and safe distances are maintained between feeding sites. If necessary, tie up the horses so that they can watch each other feed but not have to guard their feed from the other horses. If a boxed horse is reluctant to feed, often the sight of another horse eating will be enough to reassure and to encourage it to do likewise. When regaining appetite after illness, it may be worth applying the same logic that we apply to smaller animals - stimulate the gustatory senses by offering small, palatable meals; do not leave uneaten feed in with them for long periods but take it away and reoffer after an interval; and, again, allow the horse to see another horse feeding. Of course, 'Dr Green', that is, turning out or hand-grazing, as all veterinarians know, may be just the tonic required.

SOCIAL BEHAVIOUR AND COMMUNICATION

To live successfully as part of a herd, individuals in any herding species have developed a behavioural repertoire designed to reduce tension between individuals and increase cohesion between group members. This bias towards affiliative behaviour rather than aggressive behaviour is crucial if individuals are not going to spend valuable time and energy guarding resources and fighting. To this end, horses are very communicative animals with highly developed social skills and are motivated to cooperate rather than dominate. With its natural environment being open spaces, the horse did not need to develop a complex repertoire of vocal signals, but rather one of visual signals. Many of these may be either very subtle or quite overt for distant signalling or greater effect. Horses are motivated to avoid aggression and, therefore, rather than attack without warning, their signals escalate gradually, from flattening the ears through to lunging. Humans may put themselves at risk if they ignore the initial, more subtle visual signals. Such situations often become cases of escalated aggression as the human unconsciously trains the horse that all initial signals are redundant, and the end point is a horse that attacks without apparent warning. Therefore, it is vital that anyone handling horses in any way learns to read and understand their visual and vocal signals. Being very good visual communicators, horses are quick to pick up body language. In the wild, ungulates are often to be found grazing in mixed species groups and, although the signals may vary between species, they quickly come to recognise each other's expressions of fear



(Goodwin, 1999). Horses are quite capable of reading our body language and perceiving when we are fearful. Therefore, it is important that owners are encouraged to select animals that suit their experience and confidence and, should they become fearful of their horse, to spend time on gaining confidence, possibly with a lot of ground work or with less reactive horses. A combination of frightened horses and nervous people is a dangerous one and, as is well appreciated, in potentially stressful situations it is often better to have an experienced stranger handling the horse rather than a nervous owner.

When living in a herd, peace is often maintained by spatial behaviour; that is, each animal permits particular individuals to remain at a certain distance from them without threats. The distance is greater for nonherd members than for herd members, and reduces as the intimacy of the relationship increases. Thus, invasion of the personal space of a horse, which is about 6-10 feet (Rees, 1993) is tolerated for the closest of relationships, e.g. between mare and foal and during mating. This has an impact on the welfare of any horse that we keep in a restricted area; not only does there need to be sufficient acreage for nutritional purposes, but also to allow for each horse to maintain its personal space without constantly having to worry and threaten. In crowded situations (e.g. at competitions or in an overcrowded paddock), injuries between horses are often the result of invaded personal space. In addition to its mother or mate, the horse seeks to form a 'pair bond' - basically a buddy which it will allow within its personal space. The original purpose of this was presumably to permit grooming between the 2 horses to reduce parasites, as we see with many other species. This mutual grooming (allogrooming) also serves to reaffirm the bond between horses and reduce social tension within the group (Feh and Maziers, 1993). When humans groom a horse, they are essentially asking the horse to initiate a mutual grooming session, which most horses are delighted to cooperate with by nibbling the person in return (much to the chagrin of some owners). Ideally, if the horse has the urge to respond, rather than punish the behaviour, offer an alternative medium for his attention e.g. a piece of coconut matting placed at the right height.

In the natural environment no horse lives in isolation. The mature stallion, while often portrayed as an aggressive and dominating savage, lives relatively quietly within the group and does not spend all his time fighting but rather remotely 'guards' his mares by scent-marking their piles of dung and urination spots (Houpt, 1983). The herd, while being driven at certain times by the stallion, is usually led by a dominant mature mare. Even young stallions that have not yet attained their own harem will form bachelor bands when driven out from their natal group. Modern breeding practices have led to the isolation and confinement of stallions and often a fear of handling them. Self-directed aggression, although seen in both sexes, is more prevalent in stallions. No one cause is known to be the source of this behaviour (Dodman et al., 1994) but in many cases changing the environment to a more natural one, i.e. increasing social contact, increasing forage and reducing concentrates and increasing exercise, has reduced the incidence (Houpt, 1998). The social structure of a natural horse herd is relatively stable; compare this to that of many livery yards, where new horses come and go, and horses may have little choice as to their neighbour or field companion. It is worth noting that while owners may wish for their 2 horses to be the best of friends, it may not necessarily be so, particularly if they are buying a youngster and expecting it to be a companion for their retiree. While horses thrive in a mixed age herd, in the wild there would be horses from the same cohort available for playing with. However, in the reduced group sizes usually found in domestic situations, geriatric horses may not appreciate being the sole focus of attention for a younger horse. In short, the horse needs to live amongst other horses in an established group and we should strive to achieve this goal.

REPRODUCTIVE BEHAVIOUR



It can be helpful to compare reproduction under natural conditions with that under many managed conditions. In the natural environment, the stallion will probably have competed for his harem with stallions who may or may not be around at the time of mating. The stallion will spend time interacting with his mares, deciding who is in oestrus and who is not, reading their signals (visual, olfactory, etc) and courting the mares throughout their comparatively long oestrous period before copulating, with the mares initiating many of the

interactions (Kiley-Worthington, 1997). Under managed breeding, where the horses have lost all autonomy in their choice of partner and stallions are inexperienced in communicating with mares, the stallions are invariably presented with unfamiliar mares and expected to perform. The mare herself will often be restrained to permit breeding to take place with a horse she has had little previous interaction with. This will often lead to misunderstandings between the stallion and mare and can result in injuries to horses and handlers. It has also been observed that in the wild, once copulation has taken place, the mare moves forward and the stallion, who is resting on the mare's back, does not strain himself by trying to lift his bodyweight up and back (McDonnell, 1998) which may encourage the development of breeding problems. Houpt, 1998 reports that between 10 and 25% of stallions examined for breeding soundness were found to have behavioural problems. Stallions kept stalled have been reported as having lower testosterone levels than those who run with their own harem and some stallions are more likely to copulate in the presence of a third horse, particularly if it is another stallion (Houpt, 1998). Little wonder then that the fertility rates reported under artificial conditions are often lower than many of those recorded under more natural circumstances (Kiley-Worthington, 1997). Intensive breeding is often carried out in such a manner that it is fraught with opportunities for injuries to occur and behavioural problems to develop. One should perhaps ask if it is really necessary to demand that these animals perform a behaviour with unfamiliar animals that would normally only occur between familiar animals, once bonds had been formed. Are there better ways? Is artificial insemination, perhaps, a partial, practical answer?

DEVELOPMENTAL BEHAVIOUR

Foals are naturally born in the spring which increases their chance of survival (this may have negative implications for foals born significantly earlier e.g. racing Thoroughbreds (Kiley-Worthington, 1997). There are different strategies adopted by various species to ensure the survival of their young from predators in the first few weeks after birth; some species are 'hidiers', ensuring they leave their young well hidden while they go back to the herd to graze or out to hunt, going back at intervals to nurse; others are 'followers', that is, their young remain with the mothers at all times. The horse is a 'follower' species. This

has a number of implications; first and foremost, the bond between dam and foal is very strong, because the foal is not hiding and remains very close to the dam and there is a higher number of suckling bouts in comparison to 'hider' species. The foal interacts with other foals through short bouts of play within a matter of days (Fraser, 1992), but remains closely bonded to the dam long after weaning at about 9 months. Therefore, the foal is emotionally dependent upon the mare even if it no longer requires her as a source of food. By comparison, many domesticated foals are weaned prematurely and relatively abruptly, which is a great source of stress for the foal. Owners should be encouraged to opt for a very gradual weaning process, for example, allowing the mare to remain in sight of the foal, or leaving a mature and tolerant mare in the field and gradually removing the other mares one by one. In the wild the foal will remain as part of the dam's family group even after the birth of a new foal, remaining with the natal group for up to 18 months. These young horses learn to communicate with mature horses, get disciplined by the adults and learn survival techniques, such as what is safe to eat. By prematurely separating foals from adults and placing them in cohorts, many young horses do not receive the education they would in the natural environment - one of communication, discipline and safety. Although, sadly, hand-rearing is sometimes the only option, handlers should behave as the mare would, by guiding and disciplining the foal when it displays consistently unsociable or unsafe behaviour. In addition, as soon as is safely possible, the foal should be introduced to a sympathetic adult, otherwise they run the risk of the foal turning into an ill-mannered bully.

IMPLICATIONS OF NATURAL HORSE BEHAVIOUR FOR MODERN MANAGEMENT PRACTICES

The horse could be summed up as a social, grazing, prey species - probably the 3 characteristics which we impinge upon the most in our relationship with this animal. Many of the attributes we find in the horse, and often label as problems, are not failings but rather the culmination of a species successfully adapted to its natural environment, and the fact that it no longer lives in that environment means it is somewhat like a fish out of water. Many behavioural problems associated with horses can be linked with the environment in which horses are maintained. There is no doubt that most stable environments are boring compared to that of the seasonally changing, natural environment in which the horse has evolved. While a stabled horse may be able to stick his head out over the door to observe and occasionally comment on yard activity, which by its nature is usually fairly routine, it is unable to physically participate beyond vocal comment and a little physical interaction should a body pass close by. Add to this the reduction in social contact with other horses, the lack of autonomy and huge amount of spare time and it is little wonder that horses find other activities to while away the time, give them some sort of stimulation or just to cope. By behaving in this way the horse, as a species, has survived for thousands of years; by restricting this behaviour we are having an effect on its physical and mental state, in some situations causing it pain and distress. It would not be realistic to expect every captive horse to be kept in an entirely natural environment; however, if we wish to prevent problems rather than treat the complex matrix of symptoms that are too familiar at the moment, then people should be encouraged to evaluate their management practices in the light of this knowledge and to make appropriate changes to the best of their ability and means.

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