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## **The Importance of Ethology in Understanding the Behaviour of the Horse.**

Dr Deborah Goodwin.

*Anthrozoology Institute, University of Southampton, Bassett Crescent East, Southampton,  
SO16 7PX, UK.*

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### **Summary**

Domestication has provided the horse with food, shelter, veterinary care and protection, allowing individuals an increased chance of survival. However, the restriction of movement, limited breeding opportunities and a requirement to expend energy for the benefit of another species conflict with the evolutionary processes which shaped the behaviour of its predecessors. The behaviour of the horse is defined by its niche as a social prey species but many of the traits which ensured the survival of its ancestors are difficult to accommodate in the domestic environment. There has been a long association between horses and humans and many features of equine behaviour suggest a predisposition to interspecific co-operation. However, the importance of dominance in human understanding of social systems has tended to overemphasise its importance in the human-horse relationship. The evolving horse-human relationship from predation to companionship, has resulted in serial conflicts of interest for equine and human participants. Only by understanding the nature and origin of these conflicts can ethologists encourage equine management practices which minimise deleterious effects on the behaviour of the horse.

## **Introduction**

Evolution affects an animal's physical characteristics and its behaviour through natural selection. Evidence for the effects of evolution on the structure of early equids is particularly abundant in the fossil record. There is far less evidence for behavioural evolution. However, due to the abundance of equids at some important North American sites it is possible to gain some clues about the paeleoethology of these early equids. MacFadden (1996) describes a spectrum of social structures in early equid species consistent with differences in body size, habitat and sexual dimorphism. This ranged from small solitary forest browsers to polygynous harems of large plains dwelling grazers. The behaviour of an animal is its most potent interaction with the environment and largely determines its success in survival and reproduction. Ethology, therefore, seeks to explain how the behaviour of an animal in its natural environment contributes to the survival of the maximum number of its offspring and relatives.

For domestic animals the effects of natural selection have largely been replaced by artificial selection by humans, who control access to resources such as food, shelter and mates. The effects of artificial selection on the physical characteristics of domestic animals has received scientific attention for over a century (Darwin 1899, Clutton-Brock 1992 pp 154-164) but, evolutionary effects on behaviour are less well documented. By comparing the behaviour of domestic animals with their ancestral species we have the opportunity to investigate the effects of evolution on behaviour (Goodwin *et al.* 1997). Ethological methods can also be used to observe the behaviour of domestic and captive animals and to assess the behavioural effects of changes in diet, housing and management.

Equids are social animals, preferring to associate with others of their own kind but also accepting other species as companions. For the ancestral horse, like many large grazing herbivores, group-living was an important survival strategy, reducing an individual's immediate chances of being consumed and increasing the chances that an approaching predator will be detected. Today this is seen most clearly in the large mixed groups of zebra, Wildebeest and other ungulates on African savannah. Domestic equids are, therefore, pre-adapted to forming associations with other species and responding to the warning signals in the body language of other species. Though these traits began as a survival strategy in the free-living animal they have been exploited during domestication. However, human cultural transmission of ideas regarding the interpretation of equine behaviour have historically been associated with rights of passage, social status and the dominion of man over the animals, and so can be extraordinarily resistant to change. This has resulted in misunderstandings about the motivation of equine behaviour which persist to the present day, some examples of which will be discussed later.

## **Domestication**

The earliest evidence for horses being associated with human culture comes from cave paintings made in France and Spain around 15,000 years ago, when they were hunted for meat and hides. This hunting probably played a significant part in the extinction of the wild horses in Eurasia, as from around 9000 years ago remains of wild horses at archaeological sites became rare (Clutton-Brock 1992 pp 11-15). It was not until about 6000 years ago that evidence for specialised exploitation of the horse appears at archaeological sites in the Ukraine, though whether the remains of horses there come from wild or domestic populations

remains under investigation (Levine 1990).

The first domestic equids were probably used as sources of meat, milk and hide, then as pack and draught animals. There is some debate over when horses were first ridden, but by the first millennium BC the importance of the ridden horse in human culture had been established (Clutton-Brock 1992, p 73). The role of the horse has mirrored the changes in human society ever since, as war horse, draught horse and today as a sporting and companion animal. During this time there appear to have been two main approaches to the horse-human relationship. One is similar to that which had worked well in the earlier domestication of the dog, where humans attempt to establish their dominance over the horse, and the other is a cooperative approach based on an understanding of the behaviour of the horse. Both approaches were apparent during the Classical period where they reflected the nature of different cultures, especially in regard to mounted combat (Barclay 1980), and both persist to various extent in equestrian traditions today.

Today, truly wild horses are extinct or persist only as captive populations in zoos or semi-reserves. Feral domestic populations have therefore been studied to investigate how free-ranging equine society functions in the natural environment (e.g Tyler 1972, Berger 1977). The ease with which the horse can adopt and thrive in the feral condition indicates that the behavioural repertoire of the horse is relatively unaltered from the ancestral state. The horse remains physically and mentally adapted to life on an open plain or mountain. The plasticity in its behaviour enables it to exploit other habitats, such as the woodlands of the New Forest, or the marshlands of the Camargue and presumably also facilitated the domestication process. However, unlike other large grazing herbivores with horns and antlers, the horse's main

defence is flight. The requirement to detect and avoid potential predators fashioned the morphology, sensory systems and behaviour of the horse and continues to play an important role in the horse-human relationship.

Though human society has changed rapidly since the horse was domesticated, these changes have taken place in a very short period of evolutionary time. Today, in many human cultures, horses do not live in conditions which their evolutionary history has equipped them to survive. Competition, leisure and working horses are often stabled individually, which reduces the risk of horses injuring each other and the amount of land required to keep them. Stabling also makes it easier to control the horses' diet, to catch them and keep them clean. To humans the stable appears safe and inviting as it offers protection from the weather, privacy and a comfortable bed. However, our perceptions evolved under very different conditions to those of the horse. A stable (Fig. 1) appears to conflict with many of the horse's survival instincts; by making it vulnerable through isolation, restricting sensory input for the detection of approaching predators and preventing escape. These effects coupled with associated restriction of foraging time have been linked to the expression of stereotypic behaviour in some individuals (McGreevy *et al.* 1995).

### **Social structure**

Wild or feral equids rarely live alone, but in family or bachelor groups. Studies of feral and free ranging horses have shown that horse society is basically matriarchal and consists of enduring associations between mares and their offspring (Wells & Goldschmidt-Rothschild 1979). These associations persist even in the absence of a stallion, as seen in some of the

managed free-ranging populations of ponies in the UK (Tyler 1972). In un-managed feral populations these family groups usually have a single stallion, though multiple stallion bands do exist (Miller 1981). Despite the popular macho image of the stallion, family bands are generally led by mares, and studies have shown that both in feral and domestic horse groups, stallions were neither the dominant nor the most aggressive animals in their herds (Houpt & Keiper, 1982). It is ironic therefore, that in some human traditions stallions are considered dangerous and savage beasts, to be kept apart. This often leads to their being kept in very restrictive conditions which in turn tend to produce animals which fulfill this expectation (Houpt 1983, Dodman *et al.* 1994). Stallion management and the restraint of mares during in-hand serving are areas of concern for many ethologists who are seeking to raise awareness of alternative management practices (e.g. Kiley-Worthington 1997).

Foals are precocial developers and though they initially stay close to their mother's side they begin to associate with other foals and to form peer groups during the first week of life. As a result the primary social bonding is in kinship groups at weaning which takes place naturally at around 8-9 months (Fraser 1992). Young horses remain with their natal groups until they approach maturity. Juvenile colts leave, or may be expelled by the stallion, when they are 1 to 2 years old and form bachelor groups where they practice the skills necessary for the acquisition of their own band of mares. The majority of fillies leave when between 1.5 and 2.5 years old to join other existing harems or form new ones with males from bachelor groups (Monard *et al.* 1996). The harem, peer groups and pair bonds therefore, provide continuity in the life of juveniles for some considerable time after weaning in the natural environment (Fig. 2.). This is a very different weaning from that experienced by many domestic foals which encounter abrupt separation from the mother, often compounded by removal to a new

environment.

Such traditional weaning may be favoured where foals are raised as a cash crop due to financial considerations, but it also appears to be accepted simply as part of the established regime by many horse breeders in the UK. However, many owners and women especially, feel uneasy about the process. Their concerns, coupled with the information presented in these proceedings by another author (Nicol *in press*) would suggest that weaning practices are an area where ethologists could promote change with relative ease.

### **Social behaviour**

In the wild, membership of a group is such an important survival strategy that the social behaviour of the horse functions to minimise conflict within the group and so promotes its stability. Horses readily form social order and overt aggression in feral horse bands is relatively rare, compared with horses in the domestic environment (Haupt and Keiper 1982). Individual dominance order is unidirectional, but may not be linear throughout the group, so that A may be dominant to B who may be dominant to C, but C may be dominant over A (Haupt *et al.* 1978). The group order may therefore be complex but cohesive. In the wild, unsettled dominance relationships are usually only found among young horses, and free-ranging equine society could be said to function on kinship, recognition and respecting another's space. The existence of an "avoidance order" in established groups gives a far better measure of their social system, than can be gained from a dominance order constructed from aggressive encounters (Fraser 1992).

We tend to get a slightly distorted impression of the role of aggression in equine society as it is far more frequent in the domestic environment in competition for limited resources such as supplementary feed, or access to water troughs (Houpt and Keiper 1982). But even here given adequate space, subordinate individuals will deliberately avoid moving close to dominant ones. Another problem of the domestic environment, and particularly in livery yards, is that membership of the social group is constantly changing and so interband relationships are rarely settled. This results in high levels of aggression and resultant injury, though there are ways of trying to minimise this such as gradual introduction of new horses to established groups.

### **The horse-human relationship**

Researchers from many disciplines have studied dominance and aggression in animals, often in the hope that it will aid the understanding of such behaviour patterns in human societies (Manning and Dawkins 1992). However, the consequences of social dominance appear lower for the horse than in some other species for example, the wolf, and arguably humans as well. First, the horse's primary motivation must be survival, and second, social dominance carries less of a reproductive advantage. In the wolf, only the dominant individuals reproduce and the reproductive activities of subordinates are suppressed so that the activities of the whole pack ensure the survival of the dominant animals' cubs (Zimen 1976, Derix et. al. 1993). In feral horse populations most mares within harems produce offspring, and even bachelor stallions appear to have access to some matings (Miller 1981). Therefore, as horses can establish an enduring social order, reinforcing the dominance relationship between individuals is of comparatively low importance and this must have implications for the human-horse relationship. Equestrian traditions which are constantly concerned with exerting the

dominance of the rider over the horse could appear, therefore, to be misguided. For if humans repeatedly attempt to reinforce their dominance over the horses in their charge, it should be recognised that the natural equine response will be avoidance. If the horse is increasingly assuming the role of a companion animal this would seem far from an ideal strategy.

Equestrian traditions which have their basis in establishing a co-operative relationship with the horse would appear to more closely approximate the social relationships seen in free-ranging equine society. An important feature of equid behaviour is the formation of pair bonds; these are mutually supportive and can occur within groups through preferences for particular companions. Bonded pairs associate closely, grazing and resting together, and indulge in bouts of mutual grooming (Fig. 3) and affiliative neck overlapping. Pair bonds seem advantageous to both participants, and seem to play an important role in social support, particularly in difficult situations. Pair bonds can also be established in domestication with other species such as donkeys or goats, and this tendency may also be the foundation for horse-human bonds which extend beyond the usual master-servant relationship.

An appreciation of the importance of play to the horse under natural conditions also provides an alternative approach to understanding the human-horse relationship. Play within peer groups has a vital role in the development of the horse with up to 75% of the kinetic activity of foals devoted to play. Play continues to be an important activity even in maturity (Fraser 1992). Maynard Smith (1982) demonstrated in his work on game theory, that playing games involves learning sets of rules, so it has been argued that during the process of domestication the naturally high levels of movement and social play have been channelled into work and recreational equestrian activities (Fraser 1992). The process of learning the rules of play can,

therefore, explain the socialisation and training of horses, with horse and human acting as partners in interspecific social play.

### **Interspecific communication.**

Body postures, or outlines, play an important role in communication and co-ordinating group activities. As horses are primarily visual communicators they are extremely sensitive to subtle changes in the body language of their companions (Waring 1983). The alarm posture of the horse serves to alert the herd to possible danger and is a posture of high tension. Sensitivity to displays of bodily tension is also an example of their communication which they generalise towards humans. Horses react to tension in humans with the same alarm as if it were exhibited by equine companions.

As with many social animals horses show escalated warnings of aggression, and due perhaps to the consequences of ignoring these, they have received more attention in the literature than other aspects of equine communication and behaviour (e.g. Miller 1981, McDonnell & Haviland 1995). In comparison, there are few obvious signals of submission in the horse, and submission is often expressed simply by moving away from a threat, or desired resource (Waring 1983). It is possible that acknowledged control of space within the herd renders unnecessary signals obvious enough for humans to recognise.

In addition to the generally accepted submissive signals of tail clamping and rapid head withdrawal (Waring 1983), some signals have been claimed to indicate submission but on closer examination may not. For example, foals exhibit snapping towards other horses and

this is characterised by drawing back the lips and snapping the jaws, with the head and neck outstretched. This is a juvenile gesture and generally ceases to be expressed after puberty. Snapping was originally considered to be submissive, but studies have shown that snapping failed to inhibit aggression from conspecifics and may even trigger aggression in some cases (Crowell-Davis *et al.* 1985). They suggested that snapping may have multiple meanings depending on context, or that it is a displacement activity derived from nursing behaviour.

Licking-and-chewing and head lowering are also claimed by some to be submissive signals, but at present there is no published account of their appearance during social interactions in either domestic or free ranging horses. Licking-and-chewing is often exhibited during demonstrations of round pen work, but a similar set of signals have been reported by Houpt *et al.* (1978) when horses are expecting food. Licking-and-chewing may therefore prove to be a displacement activity, or comfort behaviour, associated with conflicting motivations in the horse. Head Lowering during demonstrations of Round pen techniques, or lunging without side-reins (Fig. 4), is also often interpreted as submission but may simply signal a desire to approach the handler. Further investigation of both of these behaviour patterns is required if their role in horse-horse and horse-human interactions is to be fully understood.

## **Conclusion**

When we consider the reasons for people keeping horses and the way that they are managed, a great deal seems contrary to the behaviour which has ensured the horse's survival. People restrict horses' freedom and ability to maintain social relationships; we expect them to allow our presence in areas which make them vulnerable to attack; we make them jump over easily

avoidable objects and expend energy travelling in repeated circles. This is not to say that the horse has not benefited from its association with man, but unfortunately human culture has both helped and hindered our understanding of the horse. All too often those horses which cannot adapt to the conditions that we impose are destroyed. However, by appreciating the adaptive significance of equine behaviour, sympathetic and effective management of the horse can be achieved. Most people who own horses have their best interests at heart, but if misconceptions and inertia in traditional management systems are not challenged, improvements are likely to be slow to emerge.

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Fig. 1. The stable is not a natural environment for the horse.

Fig. 2. A nutritionally weaned yearling filly with her natal group.

Fig. 3. Bonded pair indulging in mutual grooming.

Fig. 4. Headlowering exhibited during lunging.