

Behavioural Enrichment For Horses: The Effect Of Foraging Device (The "Equiball") On The Performance Of Stereotypic Behaviour In Stabled Horses.

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Introduction

Stereotypic behaviour patterns are well documented in both domestic horses and captive wild horses. Surveys of stabled horses in the UK have indicated that over 15% of horses exhibit what are commonly termed stable vices, such as weaving and crib-biting. Many of these behaviours can adversely affect the health of animals, and give rise to concern for their welfare. Once established, stereotypies are incredibly difficult to disrupt using traditional treatment methods (physical prevention, turn out to pasture, surgical procedures, and aversion therapy). Time spent feeding is believed to be one of the most important causal factors of equine stereotypies. In the wild, horses will feed for short periods throughout most of the day and night, whereas most domesticated horses receive all their daily food in just two concentrated rations. Whilst this may satisfy the horses nutritional requirements, reduced time manipulating and ingesting food may contribute to the development of stereotypies. Indeed, Marsden (1993) found that time spent performing abnormal behaviour was negatively correlated with time spent foraging.

Turning a horse out to pasture is generally agreed as being the best way to reduce stereotypies (e.g. Fraser, 1992). However, this is not always possible, for example, due to time constraints, bad weather, and the financial value of the horse. Even if a horse is turned out to pasture, stereotypies are likely to return when the horse is put back in its stable. Traditionally, equine stereotypies have been controlled by various gadgets which physically prevent an animal from performing the behaviour; examples of such gadgets are crib-collars, anti-weave bars, and shock-collars. Physical prevention of stereotypies has been found to lead to a rise in corticosteroids, however, and these methods may therefore be associated with stress. Some researchers feel that stereotypic behaviours are mechanisms which help an animal to cope with particular situations or environments, and that if an animals expectations are not met by their environment they will seek stimulation internally. This homeostatic hypothesis of stereotypies appears to be supported by recent research which found that the heart rate of horses often rose a few seconds before cribbing bouts, and was statistically lower ($p < 0.02$) when horses were cribbing than during all other behaviour patterns (Minero et al, 1996). If we are to treat stereotypies, it would therefore seem a better approach to aim to examine the cause of the behaviour, rather than just the symptoms. A behavioural enrichment technique which increased foraging time (without increasing food intake) could be a useful tool in preventing and/or reducing equine stereotypies.

Behavioural enrichment

Behavioural enrichment is a technique which is used to change the environments of captive animals for the benefit of the inhabitants. The goals of behavioural enrichment include increasing behavioural diversity, and decreasing the frequency of abnormal behaviour. Stereotypies in autistic children and chimpanzees are reduced when toys are present in the environment (e.g. Hutt & Hutt, 1965. cf. Kiley-Worthington, 1977), and there are currently a number of "stable-toys" available which claim to reduce stable vices. Providing animals with methods of self-dispensation of food increases their level of control over the environment, and hiding food in manipulable objects reduces stereotypic pacing in captive American black bears.

The enrichment device

The enrichment device used in this study was the modified "Edinburgh Football", as used by Winkill et al, 1996. This device is currently being marketed as the "Equiball" (UK Patent No. GB 2253329), and this name shall be used in this abstract. The Equiball is a cylindrical device designed to provide small food rewards relatively randomly in space and time, as it is pushed around the floor by the horse. It is filled with a suitable horse and pony nut or course mix, which can be dispensed through a number of small holes (a detailed description of the mechanics of this device is given by Young et al, 1994). Winkill et al. (1996) found that the Equiball increased species-typical behaviour in stabled horses, and suggested the device may reduce stereotypic behaviour.

Materials & Methods

This study investigated the influence of the Equiball on the performance of equine stereotypies. Six horses (3 mares & 3 geldings; ages 3-20 years) exhibiting stereotypic behaviour (2 weaving, 2 crib-biting, 1 windsucking, 1 box-walking) were subjected to the following treatments: Baseline (days 1-3), normal management practices followed; known quantities of concentrates and hay fed twice daily; Enrichment (days 4-8), baseline evening concentrated feed replaced by introduction of the Equiball, and the device then left in the stable continuously; hay fed as during baseline. All study animals were stabled for at least 20 hours per day. The horses were videoed continuously using 24-hour time lapse, and behavioural data collected by 2-minute instantaneous scan sampling.

Results

1. Stereotypic Behaviour

During baseline horses spent an average 5.27% (1 8.17 SD) of time in the stable performing stereotypy. Significant individual variation in mean time performing stereotypic behaviour was found during baseline (Kendall's Concordance, N=6, W=0.0554, p<0.05). Several peaks in stereotypy over the day were found; mainly corresponding to pre-feeding times.

2. Football Use

During enrichment horses used the Equiball on average, for 6.3% (1 9.23 SD) of their time in the stable. All horses tended to use their nose to push the ball, and occasionally a foreleg. Significant individual variation in time spent using the ball was found (Kendall's Concordance, W=0.497, p<0.05). Most horses used the ball as soon as it was filled, and ball use generally declined overnight. Equiball use was highly reinforcement dependant, and tended to decrease over the enrichment period. Several individual patterns of football use were observed: (i) using the ball continually until almost empty; (ii) alternating between

bouts of eating hay and bouts of ball use; and (iii) only using the ball once all hay had been eaten. It was interesting to observe that horses tended to use the football more in straw-covered areas of the stable, than in the cleared concrete area (where it would be easier to find dispensed food).

3. Effect of the Equiball on Stereotypic Behaviour. A reduction in stereotypic behaviour in five horses, and an increase in stereotypic behaviour in one horse was observed during enrichment. During enrichment there was an overall trend for stereotypic behaviour to decrease (Wilcoxon matched pairs, $N=6$, $W=2$, $p<0.1$). During enrichment, maximum levels of stereotypy were reduced; in particular the two peaks originally found prior to feeding. Between the hours of 10:00 and 18:30, levels of stereotypy were consistently lower during enrichment. Between approximately 18:30 and 22:30, more stereotypic behaviour tended to be seen during enrichment than during baseline (mainly seen in cribbing horses).

Discussion

A number of studies have illustrated that horses can perform some learning tasks successfully, and others with great difficulty. This study found that using the Equiball is a task that horses learn easily. It appeared that older horses, or animals that have a strong association between humans and food take longer to learn how to use the football, and some horses appeared to use the football most when left alone in the stable. Some horses would use the football only after eating all the hay provided, whilst other horses would alternate between eating hay and eating from the football.

The study has illustrated how variable equine behaviour problems are; each one having its own causal factors and manifestations. Significant intra-individual, as well as inter-individual variation in the performance of stereotypy was found. In this study there appeared to be 5 main factors influencing stereotypy: (i) Increased arousal due to anticipation of feeding; (ii) Increased arousal due to presence of other horses &/or humans near the stable, or in the stable; (iii) Removal of neighbouring horses (iv) Restraint (v) Low environmental stimuli.

Anticipation of feeding was often a trigger for both oral and locomotory stereotypies. It was interesting to note that whilst considerable frustration-related behaviour was seen in one cribber prior to feeding, crib-biting did not often occur at this time. Stereotypies were reduced in all horses when hay was available, and weaving was usually associated with increased levels of arousal. It appeared that the same stereotypy could have very different causes in different animals.

The results of this experiment showed that when horses were given their evening feed in the Equiball, there was a trend for stereotypic behaviour to be reduced. Although this reduction was not highly statistically significant, the Equiball still appears to be a useful enrichment device, as any reduction in stereotypic behaviour may be considered an improvement in welfare. It appeared that the football was most beneficial in the treatment of stereotypies related to food. By extending feeding overnight, the football also appeared to reduce stereotypies by reducing levels of feeding motivation in the morning. The reduction in weaving seen in one horse cannot be connected to Equiball use, as virtually no physical interaction with the device was seen during enrichment (probably due to lack of feeding motivation). The decrease may instead reflect variation in stereotypy over time, or could arise from the presence of a novel object in the stable. It is likely that the decrease in stereotypy was caused

by the increased human contact facilitated by the enrichment routine, as this animal did not weave whilst people were in the stable. Between approximately 18:45 and 22:40 (i.e. after evening feed) there was consistently more stereotypic behaviour during enrichment. There are a number of explanations for this. Firstly, all horses were conditioned to expect a bucket feed twice a day. During enrichment, some horses appeared frustrated by the sight of other animals getting their usual evening feed. Stereotypy may therefore have increased due to frustration caused by animals thinking they had "missed out". A solution to this would be to give the Equiball to animals in addition to a small bucket feed. A second explanation for the increased stereotypy during enrichment is that feeding on concentrates over a longer period led to increased release of endorphins, which has been found to increase crib-biting, as described by Dodman et al. (1987). An examination of individual changes in stereotypy supports this theory, as noticeable overnight increases in stereotypy were seen in the two cribbers, but not in the weavers.

For stereotypies that appeared to be caused by single acute stressors, the Equiball did not provide enough distraction to affect the stereotypy. In less "stressful" situations, however, the ball did prove a useful tool to prevent stereotypy. For example, feeding from the ball provided enough distraction to prevent one horse noticing a neighbouring horse was being removed from the yard. Consequently, no box-walking occurred. Football use was highly reinforcement dependant. Most horses would rarely approach the ball once it was empty, apart from short bouts when they appeared to be "checking" if it had been refilled (this behaviour was most often seen as feeding time approached). This indicates that for equine enrichment devices to be useful, they must offer some reward for the animal, and cannot rely on novelty alone. The general decline in football activity during enrichment may indicate that animals were using the ball less, as its novelty reduced. Alternatively, it could mean that horses were becoming more efficient in the way they fed from the ball. Several horses initially displayed frustration-related behaviour (e.g. pawing, tail swishing) as the ball became empty. After attempts to obtain food from the ball continued to be unsuccessful, most horses stopped interacting with the ball quickly, and frustration behaviour was no longer observed. In contrast, some horses tried to "break into" the ball when it became empty by kicking or biting the device. It would appear, therefore, that an empty football ought not to be left in the stable with some horses.

Although use of the Equiball is unlikely to "cure" equine stereotypies, it has been shown to reduce their performance, and may help disrupt the pattern of established stereotypies, which have become very fixed over time. As discussed by Marsden (1995) treatment of equine stereotypies requires an assessment of each individual horse's history, to gain an overall picture of how stereotypies may have developed. Thus, the Equiball may have potential as part of a combined treatment programme for affected horses. When used in conjunction with other measures such as behaviour therapy, companionship, increased exercise, and so on, the Equiball may help to create an environment less likely to lead to the development of stereotypic behaviour. The football may be especially useful in reducing the risk of stereotypy at times when owners wish to feed horses entirely on complete cubes (due to lack of storage space, expensive hay, etc.). The results of this study indicate that the Equiball can be especially useful as a short term distraction to mildly "stressful" events; for example, to prevent separation anxiety. It is likely that the football has potential for preventing the development of stereotypies when horses have to be stabled for long periods of time. Clearly more long term research into this area is needed. It would also be interesting

also to investigate whether use of the football could reduce abnormal behaviours such as coprophagia.

Conclusion

The Equiball appears to have potential for reduction of certain equine stereotypies (especially food-related locomotory stereotypies). In conjunction with other measures such as behavioural therapy and increased exercise the device may help prevent the development of stereotypies, and may help disrupt the pattern of established stereotypies. The Equiball also appears to be useful as a short-term "distraction" to mildly stressful events (for example, to help prevent separation anxiety); and has the additional benefit of facilitating increased horse-owner contact.

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