

Crib-biting in US horses: Breed predispositions and owner perceptions of aetiology

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Summary

Reasons for performing study: Crib-biting is an equine stereotypy that may result in diseases such as colic. Certain breeds and management factors have been associated.

Objectives: To determine: breed prevalence of crib-biting in US horses; the likelihood that one horse learns to crib-bite from another; and owner perceptions of causal factors.

Methods: An initial postal survey queried the number and breed of crib-biting horses and if a horse began after being exposed to a horse with this habit. In a follow-up survey, a volunteer subset of owners was asked the number of affected and nonaffected horses of each breed and the extent of conspecific contact. The likelihood of crib-biting given breed and extent of contact was quantified using odds ratio (OR) and significance of the association was assessed using the Chi-squared test.

Results: Overall prevalence was 4.4%. Thoroughbreds were the breed most affected (13.3%). Approximately half of owners believed environmental factors predominantly cause the condition (54.4%) and crib-biting is learned by observation (48.8%). However, only 1.0% of horses became affected after being exposed to a crib-biter. The majority (86%) of horses was turned out in the same pasture with other horses and extent of contact with conspecifics was not statistically related to risk.

Conclusion: This is the first study to report breed prevalence for crib-biting in US horses. Thoroughbreds were the breed more likely to be affected. More owners believed either environmental conditions were a predominant cause or a combination of genetic and environmental factors contributes to the behaviour. Only a small number of horses reportedly began to crib-bite after being exposed to an affected individual, but approximately half of owners considered it to be a learned behaviour; most owners did not isolate affected horses.

Potential relevance: Genetic predisposition, not just intensive management conditions and surroundings, may be a factor in the high crib-biting prevalence in some breeds, and warrants further investigation. Little evidence exists to suggest horses learn the behaviour from other horses, and isolation may cause unnecessary stress.

Introduction

Crib-biting or 'cribbing', is an oral behaviour in which a horse grasps a fixed horizontal surface with its incisors, contracts the strap muscles of the ventral throat, and typically emits a grunting sound. Wind-sucking is a similar behaviour in that the horse flexes the strap muscles and produces an audible grunt, but does not seize an object with the incisors (McGreevy *et al.* 1995a). The behaviour is considered to be a stereotypy, repetitive, relatively invariant and, apparently, functionless. Oral stereotypies are common in domestic ungulates (Mason and Latham 2004) and confined horses may therefore be motivated due to decreased ability to display natural foraging behaviour (McGreevy and Nicol 1998). Stereotypies may signify suboptimal welfare conditions (Mason 1991). Alternative hypotheses suggest that crib-biting horses are attempting to compensate for a gastrointestinal abnormality, such as decreased intestinal motility (McGreevy and Nicol 1998) or gastric ulcers (Mills and MacLeod 2002). Several studies have demonstrated an increased risk of epiploic foramen entrapment (Archer *et al.* 2004, 2008) and simple colonic obstruction (Hillyer *et al.* 2002), potentially resulting from altered gut motility in these horses. Furthermore, the behaviour is considered an unsoundness and causes subsequent tooth wear and property damage, thereby decreasing the economic value of the horse (Prince 1987; McBride and Long 2001).

Epidemiological studies have found correlations between management factors such as turnout, social contact, bedding, diet and abnormal behaviours such as crib-biting (McGreevy *et al.* 1995b; Luescher *et al.* 1998; Redbo *et al.* 1998; Bachmann *et al.* 2003). In a prospective study, Thoroughbred foals were most likely to develop an oral stereotypy in the first 9 months if fed concentrates at weaning and not weaned on pasture (Waters *et al.* 2002). The associations between crib-biting and the discipline for which the horse is used, as well as breed, have been examined in Europe and Canada, but not in the United States. Thoroughbreds (Luescher *et al.* 1998; Redbo *et al.* 1998), Warmbloods (Bachman *et al.* 2003) and horses used for eventing and dressage (McGreevy *et al.* 1995c) have been identified as those most prone to crib-biting in other countries. Breed, discipline and management may be confounding factors, in that Thoroughbreds and Warmbloods

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are often used for eventing and dressage and spend more time in the stable than horses used for endurance riding, but there is some evidence to suggest a genetic role in this behaviour (Hosoda 1950; Vecchiotti and Galanti 1986).

It is a commonly held belief that horses learn to crib-bite from affected horses (McGreevy *et al.* 1995c; McBride and Long 2001) and epidemiological evidence suggests stereotypy performance in neighbouring horses may be a contributing factor (Nagy *et al.* 2008). Observational learning of stereotypic behaviour has been demonstrated in other species (Cooper and Nicol 1994). In an attempt more fully to assess social influences on equine learning, several studies have quantified how well a subject horse copies a demonstrator horse's choice in a foraging task (Baer *et al.* 1983; Baker and Crawford 1986; Clarke *et al.* 1996; Lindberg *et al.* 1999). Clarke *et al.* (1996) found latency to approach the testing area was shorter in horses that observed a demonstrator, but no more accurate than those that did not witness the task. Observational learning was not established in any of these horse foraging tasks.

The present study aimed to determine the prevalence of crib-biting in various breeds in the USA, the likelihood that one horse learns from another and horse owners' perceptions of aetiology.

Materials and methods

Owner-queried postal questionnaires were employed as the most practical method of surveying a large number of horse owners representing various disciplines and US geographic regions. Initial postcard surveys were sent nationally to a random sample of 2000 subscribers to 4 magazines: *Equus*, *Horse and Rider*, *Dressage Today* and *Practical Horseman*. A subset of these subscribers who volunteered was sent a more extensive postal survey regarding breeds, crib-biting aetiology beliefs, and contact with other horses (Appendix I, www.evj.co.uk/supinfo). Wood-chewing behaviour is often confused with crib-biting (grasping of a fixed object with the incisor teeth, arching the neck, pulling back, and emitting a grunting sound) and wood-chewing (wood is eaten and disappears) were therefore explicitly defined in the survey. Owners were not asked to answer questions regarding wind-sucking. Data from the 2 surveys were analysed separately. Only horses described as purebreds or crosses of the same category (i.e. Warmblood or Gaited Horse) were considered for analysis.

The significance of association between the occurrence of crib-biting and any of the categorical putative risk factors was evaluated using the Chi-squared test. The likelihood given a particular factor was quantified using the odds ratio (OR) as an

estimate of the relative risk. OR>1.0 indicates a greater risk and <1.0 indicates decreased risk (Dawson and Trapp 2001). The level of significance was considered at P<0.05. All statistical analyses were performed using the Statistix software¹.

Results

Postcard surveys were returned by 401 owners reporting on 3574 horses (median 4 horses/owner range 0–400 horses/owner). The initial national postcard survey revealed 162 crib-biting horses of which 72 (44.4%) were Quarter Horses, 53 (32.7%) Thoroughbreds, 15 (9.3%) Arabians, and 13 (8.0%) Warmbloods. The breeds of noncrib-biters were not queried in this postcard survey, but the total prevalence was 4.4%. There were 1467 horses exposed to 136 affected horses at 96 different facilities, but in only 15 cases (1.0%) did a horse living with a crib-biter begin this behaviour after contact.

Long surveys were collected from 233 owners (approximately 25% of those contacted initially) reporting on 1359 horses. The median number of horses per facility was 4 (range 1–177 horses/owner). Overall prevalence was 4.5%, similar to the postcard survey findings. Data from the survey in which respondents were asked for number and breed for both affected and nonaffected horses demonstrated prevalence for Thoroughbreds (13.3%), Warmbloods (5.5%), Quarter Horses (4.8%) and Arabians (3.0%) (Table 1). No Standardbreds or Draught horses were reported as affected in this survey. Thoroughbreds were 5x more likely to display the behaviour than Arabians (OR = 5.0) and 3x more likely than Quarter Horses (OR = 2.9) (Table 2). The likelihood of crib-biting among horses of other breeds was not significantly different.

Of the 88 long survey responders of owners of affected horses, 49 (54.5%) believed that environmental factors contribute predominantly to the behaviour and 3 (3.4%) considered genetics was the primary cause, 36 (40.9%) that both genetic and environmental aspects contributed. Opinions expressed indicated that 48.8% presumed learning by observing another crib-biter and 47.7% that it was not. The remaining (3.5%) were undecided. Most horse owners believed environmental factors contribute predominantly to the development of the condition regardless of breed.

The majority of horses (1512, 86%) were turned out in a paddock or pasture with other horses and 90 (5.9%) of those horses were affected. Of 102 horses with conspecific visual-only contact, 6 (5.9%) were affected, and 7 of 124 horses (5.6%) that could contact another horse through a barrier. Only 24 horses were not in visual or tactile contact with a conspecific and 3 (12.5%) of the isolated horses were affected. No differences in risk of crib-biting among various social contact levels were statistically significant (Table 3).

TABLE 1: Comparison of crib-biters, noncrib-biters and prevalence by breed

| Breed | Crib-biters | Noncrib-biters | Prevalence (%) |
|---------------|-------------|----------------|----------------|
| Thoroughbred | 16 | 104 | 13.3 |
| Warmblood | 5 | 85 | 5.5 |
| Quarter Horse | 28 | 559 | 4.8 |
| Other | 3 | 84 | 3.4 |
| Arabian | 6 | 196 | 3.0 |
| Gaited Horse | 2 | 74 | 2.6 |
| Pony | 2 | 118 | 1.7 |
| Draught | 0 | 20 | 0 |
| Grade | 0 | 110 | 0 |
| Standardbred | 0 | 12 | 0 |
| Total | 62 | 1362 | 4.5 |

TABLE 2: Comparison of crib-biting risk in various US breeds of horses

| Breed | Crib-biters | Noncrib-biters | Odds ratio | Pearson's Chi-squared | 95% CI |
|---------------|-------------|----------------|------------|-----------------------|------------|
| Thoroughbred | 16 | 120 | 5.0 | 12.70* | 1.91–13.23 |
| Arabian | 6 | 202 | 1 | | |
| Thoroughbred | 16 | 120 | 2.19 | 11.30* | 1.52–5.58 |
| Quarter Horse | 28 | 559 | 1 | | |

* Significantly different risk of crib-biting between breeds P<0.05

TABLE 3: Comparison of contact extent allowed among US horses and relative risk of crib-biting among conspecific contact conditions

| Extent of contact with other horses | Crib-biters | Noncrib-biters | Prevalence (%) | Odds ratio | Pearson's Chi-squared | 95% CI |
|-------------------------------------|-------------|----------------|----------------|------------|-----------------------|-----------|
| Same pasture | 90 | 1422 | 5.9 | 1 | | |
| Visual only | 6 | 96 | 5.9 | 0.9 | 0 | 0.42–2.31 |
| Visual + limited tactile | 7 | 117 | 5.6 | 0.9 | 0 | 0.42–2.09 |
| No visual or tactile | 3 | 21 | 12.3 | 2.3 | 1.78 | 0.13–1.51 |

Discussion

An overall crib-biting prevalence of 4.4% is the first reported for US horses. The prevalence rates were almost identical between the postcard (4.4%) and longer survey (4.5%). This was not surprising as the latter respondents were a volunteer subset of those surveyed by postcard. This prevalence rate was similar to approximately 5% in Canadian horses, in a survey of a variety of breeds and disciplines (Luescher *et al.* 1998).

The results from this US study concur with those from other countries in that Thoroughbreds have the highest prevalence of crib-biters, namely prevalences 2.4–9.3%, mean 4.8% (Vecchiotti and Galanti 1996; Luescher *et al.* 1998; Redbo *et al.* 1998; Pell and McGreevy 1999; Mills *et al.* 2002). In US Thoroughbreds the 13.3% prevalence was higher than that of their European and Canadian counterparts. Possible explanations include the different sample population as compared to the other studies. Most researchers in Europe and Canada surveyed trainers of large racing farms by mail or in person. The majority of the surveys returned for the present study were from owners of fewer than 5 horses and likely to be familiar with the stall behaviour. It is conceivable that trainers based at large farms may not be involved in daily management of the horses and, as such, may not be aware of each horse's stable behaviour. Furthermore, horse owners motivated to fill out a survey concerning an affected horse may be more likely to own such a horse. Rates of crib-biting may therefore be falsely inflated. Alternatively, trainers with affected horses may not be inclined to answer such a survey because crib-biting entails a decreased monetary value. Finally, US Thoroughbreds may be genetically different and a genetic difference could be susceptibility to crib.

Findings may differ from previous studies due to dissimilar management practices at large training and smaller, mostly recreational riding farms. Extended periods of stall confinement is common practice for horses at large competition and training facilities and may convey a risk for stereotypy development. Although similar intense management practices within sporting areas, such as flat racing or dressage, may contribute to the relatively high percentage of affected Thoroughbreds and Warmbloods, these breeds often are considered more reactive than others (Mader and Price 1980) and may be more susceptible to the effects of confinement (McGreevy *et al.* 1995c).

A majority (72%) of respondents in a previous study believed horses copied abnormal behaviours (McGreevy *et al.* 1995c), compared to 49% in the present study. Horse community perception did not seem to correspond to experiences as only 1% of horses began to crib-bite after the arrival of a crib-biter and it is possible that it occurred because of common management conditions and genetic factors. Almost all owners of affected horses (97%) felt environment contributed to some extent to their horses' abnormal oral behaviour. The ability of horses to learn any task by observation was recently demonstrated. Krueger and Heinze (2008) found horses observing a dominant horse during

round pen training 'joined-up' to the human trainer more quickly than if an unfamiliar horse or subordinate horse was the demonstrator. Familiarity and social rank of the demonstrator apparently are important in observational learning. The small number of horses that began to crib-bite after the arrival of a crib-biter at the same farm does not support the notion of observational learning in the development of crib-biting. Prospective studies are needed to elucidate the relationship of social learning and abnormal behaviours such as crib-biting.

Attitudes of horse owners toward crib-biting horses may have welfare implications. As a social species, horses naturally spend most of their time in close proximity to conspecifics. Studies have shown short-term isolation from other horses may result in substantial changes in locomotor and ingestive behaviours as well as physiological indicators of stress (Mal *et al.* 1991). McBride and Long (2001) reported 39% of crib-biters were isolated from other horses. Fortunately, the current study found that most affected horses were turned out with horses. Although length of turn out time or exposure was not queried, extent of contact with conspecifics (unimpeded, partial or isolated) was not significantly associated with risk of crib-biting.

Thoroughbreds have a high prevalence of crib-biting although they are not the only breed or discipline intensively managed. For example, Standardbreds, Warmbloods and Quarter Horses competing in physically demanding sports such as racing, eventing or cutting (cattle herding) may also endure long training sessions, little time outside of the stall and large amounts of concentrate, yet, in this study, Thoroughbreds had at least twice the prevalence of any other breed. Crib-biting is a condition with a high prevalence and correlation to serious illnesses such as colic (Hillyer *et al.* 2002; Archer *et al.* 2004, 2008) and, as such, merits further investigation. The behaviour is very difficult to treat and therefore efforts should be concentrated on prevention. Research into specific genes responsible for crib-biting through pedigree analysis and association mapping, along with prospective studies of management and social factors involved in aetiology are warranted.

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Manufacturer's address

¹Analytical Software, Tallahassee, Florida, USA.

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