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1 Manuscript title - Prevalence of headshaking within the equine population in the United Kingdom.

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24

25 **Owner informed consent.** Owner informed consent was stipulated in the introduction to the
26 questionnaire as follows; "Completion of this survey indicates your consent for us to use your data
27 for research purposes, however please note that questionnaires are completed anonymously."

28

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44 Prevalence of headshaking within the equine population in the United Kingdom.

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48 **Summary**

49 **Background:** Headshaking in horses has been reported to be most commonly due to idiopathic
50 neuropathic facial pain (trigeminal-mediated headshaking). The prevalence of headshaking in horses
51 in the United Kingdom (UK) is unknown.

52 **Objectives:** To estimate owner-reported prevalence of headshaking in horses in the UK and to
53 report their signalment and disease characteristics, as reported by owners.

54 **Study design:** Cross-sectional web based owner questionnaire.

55 **Methods:** The questionnaire was advertised on-line via social media, horse forums, veterinary
56 websites and equestrian magazines from 17th June 2016, until greater than 1,000 responses had
57 been obtained. All UK horse owners were eligible to complete the questionnaire, however only one
58 questionnaire could be completed per owner.

59 **Results:** The estimated prevalence of owner-reported headshaking in the sample population of
60 horses (n=1014), within the last year, was 4.6% (95% CI 3.5, 6.1), whereas 6.2% (95% CI 4.9, 7.9) of
61 horses were reported by their owners to have shown signs of headshaking at any time-point since
62 ownership. There was no association of sex or breed. Nineteen per cent of headshaking horses were
63 reported to show headshaking at rest. Fewer than one-third (30.2%, n=19) of headshaking horses
64 had been examined by a veterinarian for headshaking. Of horses seen by a veterinarian, the cause
65 for headshaking remained unknown in the majority of cases (57.9% responses) and trigeminal-
66 mediated headshaking was reported as a diagnosis in just one case.

67 **Limitations:** The accuracy in data reporting by horse owners was not verified in this study. There
68 may be a potential for bias towards over-reporting due to the nature of survey participation.

69 **Conclusions:** Within this sample, owner-reported prevalence of signs of headshaking within the last
70 year, in horses in the UK was 4.6%. Over two-thirds of owners of headshaking horses did not seek
71 veterinary intervention for headshaking. Trigeminal-mediated headshaking was rarely reported by
72 owners as a diagnosis.

73

74 **Introduction**

75 Headshaking is a condition whereby horses show repeated, uncontrollable, predominantly vertical
76 movements of the head and neck, often accompanied by nasal irritation [1, 2]. Headshaking is a
77 significant cause of distress in some horses [1]. Even with extensive investigation, usually no
78 physical cause for headshaking is found [3, 4]. In most cases, headshaking is reported to occur due
79 to an idiopathic neuropathic facial pain syndrome (termed trigeminal-mediated headshaking) [1, 5,
80 6]. Severely affected horses appear to have compromised welfare and significant self-inflicted
81 trauma has been reported [7]. The determination that many cases occur due to pain is recent [6] and
82 therefore likely to be under-recognised by owners and veterinarians. Many affected horses become
83 dangerous to handle and ride and especially if the condition is not understood, may undergo several
84 futile treatments. Horses that are unsuccessfully treated may eventually be euthanased.

85 A diagnosis of trigeminal-mediated headshaking is supported when no defined aetiology can be
86 found on thorough assessment and examination [6]; thus excluding other causes of facial pain which
87 include, but are not limited to, guttural pouch disease, dental pathology and sinus disorders. A
88 recent breakthrough provided evidence that the trigeminal nerve in affected horses is sensitised,
89 firing at too low a threshold [8]. This discovery paved the way for the proposal that the previously
90 favoured term 'idiopathic headshaking' be replaced by the term 'trigeminal-mediated headshaking'

91 [7, 9]. While some progress has been made in recent times towards diagnosing and treating the
92 condition, the prevalence of headshaking within horses in the UK has not been fully elucidated. The
93 prevalence of headshaking within the UK horse population is a fundamental question which once
94 answered, would reveal the scale of a potential welfare problem and may endorse further research
95 into the pathogenesis and treatment of the condition. Furthermore, how frequently trigeminal-
96 mediated headshaking is considered the cause for headshaking has not been investigated.

97 The aim of this study was to investigate the owner-reported prevalence of headshaking in the
98 general horse population in the UK. Secondary aims were to report signalment and disease
99 characteristics for headshaking in horses, as reported by owners.

100 **Materials and Methods**

101 An online questionnaire with the 'neutral' title 'Horse Health Questionnaire' was compiled using
102 Bristol Online Surveys (BOS)¹. Ethical approval was obtained from the University of Bristol, Ethics of
103 Research Committee, application number 34361. Questionnaires were pre-tested using a small
104 convenience group of horse owners (n=6) and then revised accordingly. An online sample size
105 calculator (Ausvet Epitools [10]) was used to calculate the sample size required to estimate the true
106 prevalence of headshaking signs based on an estimated population size of 1,000,000 i.e. large
107 population, assumed true prevalence of 4%, assumed sensitivity and specificity of 0.95 respectively,
108 confidence level of 0.95 and desired precision of 0.02. A sample size of 932 was calculated to be
109 required. The questionnaire was advertised on-line via social media, horse forums, first opinion
110 practices and equestrian magazines on 17th June 2016 and remained open until 10th August 2016,
111 once greater than 1,000 responses had been obtained.

112 The questionnaire was accessible via a uniform resource locator (URL). Participants were required to
113 be 18 years of age or older, live in the United Kingdom and to own or have owned a horse within the
114 last year. Owners that had sold or had their horse euthanased within the last year were eligible to
115 complete the survey. Respondents were restricted to completing a questionnaire for just one horse

116 per owner. Owners of multiple horses were asked to choose the animal whose name came first in
117 the alphabet. The questionnaire took most people less than five minutes to complete.

118 Questions on headshaking were flanked by questions on laminitis and equine sarcoids. Equine
119 sarcoid data are not presented here. There were two purposes to having the distractor questions.
120 One was to disguise the area of interest to minimise response bias. The other, that figures for
121 prevalence of laminitis in horses in the UK have been reported [11]. A comparison of those figures
122 with our own, if similar, would offer reassurance that prevalence figures obtained for owner-
123 reported headshaking are also reliable. The following definition of headshaking was used; *'for the*
124 *purposes of this survey headshaking is characterised by unexplained and uncontrollable movements*
125 *of the head and neck that may affect the horse either at rest or during exercise.'* The following
126 definition of laminitis was used, *'for the purposes of this survey, laminitis is an episode of lameness*
127 *which was either; a) diagnosed by a vet as laminitis or b) laminitis was strongly suggested based*
128 *upon the following; lameness was present in all four limbs **and** the horse or pony stood with an*
129 *altered stance **and/or** the horse or pony was reluctant to move **and/or** there was increased heat in*
130 *all four hooves **and/or** laminitis was diagnosed by a farrier.'*

131 Prevalence values and 95% confidence intervals were calculated using Ausvet EpiTools [10]. The
132 Kolmogorov –Smirnov test was used to assess age data for normality. Age was not normally
133 distributed and thus median and interquartile ranges were reported. The Mann Whitney test was
134 used to compare median age of headshaking and non-headshaking horses. Association of sex (male
135 / female) and breed (seven categories of breed, Table 1) with headshaking (yes/no) was assessed
136 using a chi-squared test and a Fisher's exact test, respectively to account for cells with fewer than
137 five expected data points. Statistical tests were carried out in IBM SPSS Statistics Version 23.
138 Significance was set at $P < 0.05$.

139 **Results**

140 Prior to closure of the survey, 1016 responses were returned. Two responses were excluded due to
141 failure to comply with the inclusion criteria.

142 Headshaking prevalence

143 Of the horses in this sample population (n=1014), 47 (4.6%, 95% CI 3.5, 6.1) were reported to have
144 shown signs of headshaking in the last year. A further 16 (1.6%, 95%CI 1.0, 2.6) were reported to
145 have shown signs of headshaking, but not within the last year. Currently / previously affected horses
146 are hereafter referred to as “headshakers”. An additional two horses were reported by their owners
147 to have died (likely euthanased) during the last year as a direct result of headshaking. For horses
148 that were still alive and where no distinction was made regarding time of displaying signs of
149 headshaking, the combined prevalence of headshakers was 6.2% (n=63) (95% CI 4.9, 7.9).

150 Laminitis prevalence

151 Of the horses in our sample population (n=1014), 64 (6.3%, 95%CI 5.0, 8.0) were reported to have
152 had laminitis in the last year. A further 83 (8.2%, 95% CI 6.7, 10.0) were reported to have had
153 laminitis, but not within the last year. For horses that were still alive and where no distinction was
154 made regarding when the horse suffered from laminitis, the combined prevalence was 14.5%
155 (n=147) (95% CI 12.5-16.8).

156 Headshaking signalment

157 Questionnaires included data for 65 headshakers.

158 Age

159 Age in 2016 was provided for 63 horses (Table 1). Respondents were asked to choose from the
160 nearest whole number age but horses 21 years or older were grouped together and therefore exact
161 age for horses older than 20 years of age could not be ascertained. Fifty headshakers (79.4%, 95%
162 CI 67.8, 87.5) were aged 20 years or less; the median age of this sub-group was 12 years (IQ range 9-
163 15 years). For non headshakers, 754/949 (79.5%, 95% CI 76.8, 81.9) were aged 20 years or less; the

164 median age in this group was 11 years (IQ range 9 -15 years). There was no significant difference
165 between the median age of headshakers and non-headshakers aged less than 20 years (p=0.08).

166 Breed

167 A wide range of breeds were represented which were combined into seven subcategories (Table 1).
168 No evidence (P=0.65) was found for an association between breed category and headshaking.

169 Sex

170 In total, 29/65 (44.6%) of headshakers were recorded as female (mare or filly) and 36/65 (55.4%)
171 were recorded as geldings (Table 1). A chi-squared test revealed no statistically significant
172 association between sex and absence/presence of headshaking signs (P=0.23).

173 Season of purchase

174 There was no season of the year for which purchase of headshakers was disproportionate to
175 purchase of non-headshaking horses (Table 1).

176

177 Time of year headshaking first began

178 Respondents were asked to indicate in which month headshaking first began. The three most
179 frequent months with respect to onset of headshaking signs were as follows: May: 21.9% (n=14),
180 April: 17.2% (n=11) and March: 14.1% (n=9) (figure 1). Considering season, 53.1% of horses (n=34)
181 first showed signs of headshaking in spring (March, April and May) and 17.2% (n=11) first showed
182 signs in summer (June, July and August).

183 <ross1.pdf>

184 **Figure 1: Bar chart displaying the number of headshaking horses reported to first show signs of headshaking**
185 **for each month of the year.**

186 Time of year affected

187 Considering horses for which data were available (n=56), 89.3% (n=50) were reported to headshake
188 in summer, 76.8% (n=43) were reported to headshake in spring, 32.1% (n=18) were reported to
189 headshake in autumn, and 19.6% (n=11) were reported to headshake in winter (figure 2). Of 56
190 headshaking horses, 19.6% (n=11) were reported to headshake during all four seasons and 8.9%
191 (n=5) were reported to headshake over three seasons. A larger proportion of headshaking horses,
192 42.9% (n=24), were reported to headshake over just two seasons. Of these the majority, 95.8%
193 (n=23) were affected during spring and summer. In addition, 39.3% (n=22) of headshaking horses
194 were reported to headshake during a single season only.

195 <ross2.pdf>

196 **Figure 2: Bar chart displaying the number of horses reported to headshake during each season of the year;**
197 **spring (March, April and May), summer (June, July, August), autumn (September, October, November) and**
198 **winter (December, January, February). Respondents were asked to pick all that applied.**

199

200 Weather conditions

201 Respondents were asked to indicate which weather conditions, if any, they associated with
202 headshaking in their horse (figure 3). Headshaking was reported to be most commonly associated
203 with sunshine in 79.4% (50/63) of horses and heat in 52.4% (33/63) of horses.

204 <ross3.pdf>

205 **Figure 3: Association between environmental conditions and signs of headshaking. All applicable**
206 **environmental conditions could be selected.**

207 Clinical signs

208 Headshaking was reported to have been gradual in onset in 37.5% of cases (24/64) and sudden in
209 onset in 35.9% of cases (23/64). In addition 26.6% of respondents (17/64) indicated that the horse
210 had been headshaking since the beginning of their ownership.

211 Owners were given a list of clinical signs and were asked to indicate which sign or signs best
212 described their horse whilst headshaking. The most frequently reported clinical sign was vertical
213 head movement reported in 78.5% (51/65) of horses, followed by excessive rubbing of the muzzle in
214 38.5% (25/65) (figure 4).

215 <ross4.pdf>

216 **Figure 4: Bar chart displaying observed frequencies of clinical signs reported to be associated with signs of**
217 **headshaking. Respondents were asked to select all that apply.**

218 Effect of exercise

219 Of horses that were lunged, 53.2% (25/47) were reported to headshake during lunged exercise. Of
220 horses that were ridden 95.1% (58/61) were reported to headshake during ridden exercise. Of
221 horses that were turned out 26.4% (14/53) were reported to headshake at rest. Of horses that were
222 stabled 12% (6/50) were reported to headshake at rest. “Don’t know” and “not applicable” options
223 were available.

224 Severity

225 Owners were asked to grade the ‘usual’ severity of headshaking under a range of conditions, based
226 on the following grading criteria:

- 227 • Grade 0 - there is no headshaking.
- 228 • Grade 1 - there is headshaking, only at exercise but sufficiently mild that the horse
229 may be ridden.
- 230 • Grade 2 - there is headshaking at exercise to a severity as to make ridden exercise
231 unsafe or impossible.
- 232 • Grade 3 - there is headshaking even at rest.

233 The results are summarised in table 2. A higher percentage, 31.8% (14/44) of horses were grade 0/3
234 (asymptomatic) with a nose-net, compared with 11.4% (5/44) of horses recorded as grade 0/3

235 without a nose-net. There was no apparent association between open spaces versus hedgerow
236 when considering reported headshaking grade.

237 Respondents were asked to grade their horse considering headshaking at its worst. In total 50.8%
238 (32/63) of horses were considered grade 1/3, 30.2% (19/63) were considered to be grade 2/3 and
239 19.0% (12/63) of horses were considered to be grade 3/3, at worst (table 2). The seasons for which
240 the highest percentage of horses were typically assigned grade 0/3 were winter and autumn (Figure
241 5). The seasons for which the highest percentage of horses were typically assigned grade 1/3 were
242 spring and summer.

243 <ross5.pdf>

244 **Figure 5: Bar chart displaying the distribution of usual severity of headshaking (based on a 0-3 grading scale)**
245 **during each season of the year.**

246 Veterinary intervention

247 Of headshaking horses, 30.2% (19/63) were examined by a veterinary surgeon for headshaking, and
248 69.8% (44/63) were not. Of the horses examined by a veterinarian, respondents were asked to
249 indicate which diagnostic procedure(s) had been performed, for which 18 responses were obtained.
250 The most commonly performed test was dental examination performed in 83.3% of horses (15/18),
251 followed by aural and ophthalmological examinations performed in 50.0% of horses (9/18) each.
252 Endoscopy was performed less commonly in 38.9% horses (7/18). Radiographs of the head were
253 performed in 22.2% of horses (4/18). The “other” category of response was recorded eight times
254 and included blood tests, allergy testing and an anti-histamine trial. Both computed tomography
255 and diagnostic analgesia were reported infrequently in just one horse each.

256 Respondents were asked to indicate whether a cause had been diagnosed. Considering only horses
257 that had been seen by a veterinarian, the cause remained unknown in 57.9% (11/19) of cases,

258 allergy was diagnosed in 36.8% (7/19) of cases and trigeminal-mediated headshaking (idiopathic
259 headshaking) was diagnosed in just one case.

260 Treatments

261 There were 75.4 % (49/65) of respondents that had attempted at least one form of treatment trial.
262 In 12 horses, three or more treatments had been trialled. Treatments employed are listed in Table
263 3. Of all headshakers, 63.1% (n=41) had been tried with a nose-net. An eye mask was the second
264 most frequently trialled treatment in 35.4% (n=23) of horses.

265 The treatments were examined individually to determine the effect of each treatment, based on
266 reduction of severity grade (Table 3). Of the horses trialled with a nose-net no effect of treatment
267 was reported in 73.2 % (n=30); partial improvement was reported in 7.3% (n=3) and full resolution
268 reported in 19.5% (n=8) of horses.

269 **Discussion**

270 In the population studied, the estimated prevalence of owner-reported headshaking within the last
271 year was 4.6%. The equine population of Great Britain in 2015 was estimated at 944,000 [11]. This
272 represents a significant number of horses that are likely to be afflicted with headshaking. These
273 findings are consistent with results of the 2016 National Equine Health Survey (NEHS)[12] where
274 headshaking was the fifth most frequently reported internal medicine syndrome, accounting for
275 1.8% of all reported syndromes.

276 In the current study 6.3% of horses developed laminitis in the last year, 8.2% of horses developed
277 laminitis more than a year ago, the combined prevalence in this sample population was 14.5%. The
278 frequency of equine laminitis has been previously reviewed; however of the ten publications
279 deemed by the review authors to be the highest quality publications, only two were conducted in a
280 general equine population and neither in the UK [13]. Menzies-Gow, Katz [14] investigated the
281 prevalence of laminitis in a UK rescue animal population over a six year period and found that each
282 year between 7.9% and 17.1% of the population had at least one episode of laminitis. While the

283 sample populations are non-identical and rescue animals may be at increased risk compared to the
284 general population, our findings are comparable. A more recent study using a population of non-
285 laminitic ponies aged ≥ 7 years, reported prevalence of pasture associated laminitis to be 4.0%, 6.7%
286 and 9.9% after 1, 2 and 3 years cumulatively for that population [15]. Given that the present study
287 did not exclude animals that had previously had laminitis, the results are reassuringly analogous.
288 This provides confidence that the sample and reported prevalence were not leading to over-
289 estimation of the prevalence of laminitis, or headshaking, with this population.

290 The signalment of headshaking horses has been previously reported [3, 7]. Our study corroborates
291 the assertion that headshaking is not a condition of the young horse; in this population the median
292 age of headshakers aged 20 years or less was 12 years. No evidence was found for a sex or breed
293 predisposition within the sample studied here. This is in contrast to the findings of Madigan and Bell
294 [3] who reported that geldings and Thoroughbreds were over-represented. Approximately one in
295 five headshaking horses were reported to headshake all year round, with the remainder affected for
296 a variable proportion of the year. A seasonal component in some headshakers has been previously
297 reported, of these most started headshaking in the spring [3], in agreement with our findings.

298 Worsening of signs with exposure to sunlight has also been documented [8] however the range of
299 environmental conditions associated with headshaking reported here, which include cold and rain as
300 well as heat and sun, highlight the practical difficulties in managing these cases. The results of this
301 study do not support anecdotal speculation that more headshaking horses are sold during autumn
302 or winter.

303 Our survey suggests that approximately one in four headshaking horses show signs when turned out
304 and approximately one in ten show signs at rest in a stable. It has been reported that in more
305 advanced cases, of longer duration, signs are more obvious at rest [2]. While it is well documented
306 that exercise precipitates headshaking in many cases [3], horses affected at rest represent a
307 particular welfare issue. Should treatment fail, retirement will not be curative in these cases, leaving
308 euthanasia on welfare grounds as a viable option.

309 Vertical head movements and rubbing of the muzzle were commonly reported clinical signs in this
310 study. The clinical signs of head shaking can be reasonably interpreted as manifestation of the
311 resulting neuropathic facial pain. The human condition trigeminal neuralgia is an exemplary
312 condition of neuropathic facial pain [16] and one which shares some clinical similarities with
313 trigeminal-mediated headshaking in horses. Pain associated with trigeminal neuralgia is
314 characterised by debilitating electric shock-like pain and can lead to suicide within humans [17].
315 Reasons for the low level of veterinary intervention reported here were beyond the scope of the
316 study and were not investigated. It is possible that horse owners perceive that veterinary
317 investigation is often fruitless. Alternatively, it could be speculated that a lack of veterinary
318 intervention could reflect that many owners simply do not associate signs of headshaking with
319 expression of facial pain.

320 Consensus in the literature indicates that treatments for headshaking are generally ineffective [1, 2,
321 5, 8, 18]. This study highlights that multiple treatments may be tried for any one horse. Our study
322 reports the perceived effect of treatment from an owner perspective and thus findings must be
323 interpreted with caution as there is evidence for placebo effect [19]. Secondly, due to the known
324 component of seasonality [3, 20] and spontaneous remission, any treatment for headshaking cannot
325 be judged to have been effective in the long-term, unless an improvement is sustained for at least 12
326 months. Furthermore we are reliant on memory recall and for some categories of treatment the
327 sample size was very small; thus results must be interpreted with caution.

328 This study suggests that trigeminal-mediated headshaking is not a common diagnosis for
329 headshaking in horses attended by a veterinarian, as reported by owners. Diagnosis of trigeminal-
330 mediated headshaking is based on detailed history and observation of phenotypic headshaking,
331 combined with exclusion of other pathology[7]. Roberts [9] states, that the condition is idiopathic
332 should be no excuse for not performing a thorough and systemic diagnostic process to investigate
333 cases. However this relies on veterinary attention being sought, and also upon owners committing
334 to the financial costs associated with a complete investigation. The knowledge that detectable

335 pathology is unlikely to be found in the vast majority of cases[21] may act to deter owners from
336 consenting to complete investigation, if offered. In this sample population “the cause remains
337 unknown” was indicated much more frequently; this may reflect lack of awareness of trigeminal-
338 mediated (Idiopathic) headshaking as a potential diagnosis or may reflect hampered ability of
339 attending veterinarians to perform complete investigation. A lack of owner familiarity with the
340 terminology is a further possibility and it may be the case that veterinarians do not use the
341 terminology ‘trigeminal mediated’ or ‘idiopathic’ in conversation with clients, to avoid alienating
342 owners with jargon.

343 The purpose of this survey was to capture data on horses from horse owners in the general
344 population; veterinary intervention was not a criteria for inclusion. The accuracy in data reporting
345 by horse owners was not verified and is a major limitation of this study. The level of knowledge of
346 the respondents completing the questionnaire cannot be vouched for and is a further limitation. In
347 addition potential exists for bias, particularly towards over-reporting of the condition, despite our
348 efforts to provide both precise definitions and distractor questions. However, referral centres were
349 deliberately not contact in an effort to avoid potential bias, and over estimation of prevalence,
350 which may be associated with using a referral population.

351 In conclusion, the findings of this study estimated the prevalence of owner reported headshaking in
352 horses within this sample of horses in the UK to be 4.6% for horses affected within the last year, and
353 6.2% for horses affected at any time point.

354

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358 Vacation Studentship.

359 **Table 1: Age, breed and gender data for non-headshaking and for headshaking horses.**

Variable	Category	Non-headshaking horses % (n=949)	Headshaking horses % (n=65)
Season of Purchase	Spring	26.2 (n=237)*	23.1 (n=15)
	Summer	26.2 (n=237)*	32.3 (n=21)
	Autumn	25.1 (n=227)*	21.5 (n=14)
	Winter	16.0 (n=145)*	15.4 (n=10)
	Don't remember	3.2 (n=29)*	6.2 (n=4)
	Not applicable (homebred)	3.2 (n=29)*	1.5 (n=1)
Age this year	1-5 years	8.7 (n=83)	3.1 (n=2)
	6-10 years	29.5 (n=280)	24.6 (n=16)
	11-15 years	22.7 (n=215)	26.2 (n=17)
	16-20 years	18.5 (n=176)	20.0 (n=13)
	21 years and over	16.8 (n=159)	18.5 (n=12)
	Unknown	3.8 (n=36)	7.7 (n=5)
Breed	Arab or Arab X	4.6 (n=43) □	6.2 (n=4)
	Cob or Cob X	15.4 (n=145) □	20 (n=13)
	ID, ID X or ISH	13.8 (n=130) □	15.4 (n=10)
	TB, TB X or TB X WB	18.6 (n=175) □	16.9 (n=11)
	WB or WB X	12.2 (n=115) □	12.3 (n=8)
	Native or Unknown pony breed	20.5 (n=193) □	18.5 (n=12)
Unknown horse breed or other	15.0 (n=141) □	10.8 (n=7)	
Gender	Female	37.2 (n=353)	44.6 (n=29)
	Gelding	61.9 (n=587)	55.4 (n=36)
	Stallion	0.9 (n=9)	0 (n=0)
* indicates % derived from total number of responses with complete data (n=904). □ indicates % derived from total number of complete data (n=942). 'X' refers to crossbred. 'ID' = Irish Draught, 'ISH' = Irish Sports Horse, 'TB' = Thoroughbred, 'WB' = Warmblood.			

360

361 **Table 2: The usual grade of headshaking (H/S) assigned to affected horses, considering each of the variables**
362 **listed. n=number of responses, % = percentage of responses. The proportion of horses reaching each grade**
363 **of headshaking, considering headshaking at its worst severity, is also provided.**

Grade of H/S	During the day %	At night %	Indoors %	Outdoors %	Without a nosenet %	With a nosenet %	In open spaces %	Next to hedgerows %	H/S grade at worst

0	14.8 (n=9)	88.0 (n=44)	70.6 (n=36)	13.6 (n=8)	11.4 (n=5)	31.8 (n=14)	16.3 (n=8)	16.7 (n=8)	0
1	60.7 (n=37)	6.0 (n=3)	17.6 (n=9)	64.4 (n=38)	47.7 (n=21)	52.3 (n=23)	61.2 (n=30)	54.2 (n=26)	50.8 (n=32)
2	14.8 (n=9)	2.0 (n=1)	3.9 (n=2)	13.6 (n=8)	34.1 (n=15)	13.6 (n=6)	18.4 (n=9)	25.0 (n=12)	30.2 (n=19)
3	9.8 (n=6)	4.0 (n=2)	7.8 (n=4)	8.5 (n=5)	6.8 (n=3)	2.3 (n=1)	4.1 (n=2)	4.2 (n=2)	19.0 (n=12)

364

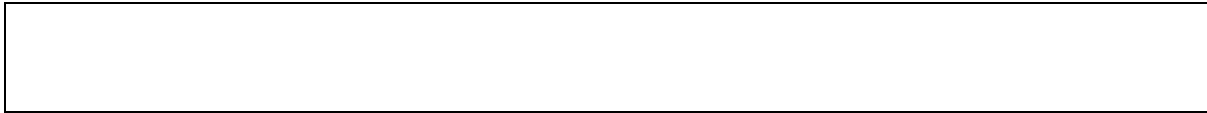
365

366 **Table 3: Treatments trialed and percentage of horses each treatment was trialed in. Change in severity**
367 **score was calculated by considering the usual grade (0-3) of headshaking during the day and the usual grade**
368 **(0-3) of headshaking during treatment.**

369

Treatment	% of horses tx tried in	No effect reported	Partial Improvement reported Δ	Full resolution reported
Nose-net	63.0 (n=41)	73.2% (n=30)	7.3% (n=3)	19.5% (n=8)
Eye mask	35.4 (n=23)	47.8% (n=11)	13.0% (n=3)	39.1% (n=9)
Antihistamines	23.1 (n=15)	73.3% (n=11)	13.3% (n=2)	13.3% (n=2)
Phenylbutazone	9.2 (n=6)*	80% (n=4)	20% (n=1)	0
Steroids	9.2 (n=6)	66.7% (n=4)	16.7% (n=1)	16.7% (n=1)
Equipens	3.1 (n=2)	0	0	100% (n=2)
Other	6.1 (n=4)	_____	_____	_____
Gabapentin	0	_____	_____	_____
Surgery for coil placement	0	_____	_____	_____

The following criteria were used: No reduction or worsening in grade = no effect. Reduction in grade of 1 or more to a value > 0 = partial improvement. Reduction in grade to 0 = full success. * data relating to effect of treatment missing or incomplete for one horse. 'Tx' refers to treatment. Δ Partial improvement reported excludes full resolution.



370

371 Manufacturers' address

372 ₁BOS, University of Bristol, Beacon House, Queens Road, Bristol, BS8 1QU UK

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420 Word count 4534

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Horse Health Questionnaire

Introduction

Thank you for your interest in this survey on equine health. In order to complete the survey we ask that you are 18 years of age or over, live in the United Kingdom (UK) and currently own or have owned a horse within the last year. A survey can still be filled in for any horse which may have passed away or been sold within the last year. This aim of this survey is to allow veterinary researchers to establish how common certain diseases are within the horse population in the UK. Your participation is greatly appreciated. If you have more than one horse, please complete the survey for the horse whose name comes first in the alphabet. Completion of this survey indicates your consent for us to use your data for research purposes, however please note that questionnaires are completed anonymously.

The survey does not take long to complete, we anticipate less than 5 minutes for most people and a maximum of 10 minutes. Please note that we are using the term "horse" throughout however this form can be completed for a horse or pony. We also refer to the present tense throughout however we do realise that some horses may be sold or deceased.

Are you completing this survey for a horse that you currently own?

- Yes
- No

If you answered "no" to the question above, is this a horse you have sold or did he/she die whilst in your ownership?

- Yes, the horse has been sold
- Yes, the horse died whilst in my ownership

If your horse was sold or has died, how old was he/she when you last owned him/her?

General Information

How old is your horse this year?

What sex is your horse? * *Required*

- Mare/Filly
- Stallion/Colt
- Gelding

What breed or type is your horse? "x" refers to crossbreed.

- Arab
- Arab x
- Cob
- Cob x
- Irish Draught
- Irish Draught x Thoroughbred
- Irish Sports Horse
- Thoroughbred
- Thoroughbred x
- Thoroughbred x Warmblood
- Warmblood
- Warmblood x
- Native
- Unknown horse breed
- Unknown pony breed
- Other

If you selected Other, please specify:

How old was the horse when you got him or her?

During what season of the year did you purchase this horse?

Which UK region is this horse kept in for most of the year?

Did you have a pre purchase examination (vetting) performed prior to purchase?

- Yes
- No
- Not applicable (homebred)

If Yes, what form of vetting was carried out?

- Two stage
- Five Stage (includes evaluation at exercise)
- Five Stage (includes evaluation at exercise) and X-rays

Which of the following options best describes the usual management of this horse during the Summer?

- Lives in 24/7
- Stabled during the day only
- Stabled during the night only
- Stabled for part of the day or night only
- Turned out 24/7

Which of the following options best describes the usual management of this horse during the Winter?

- Lives in 24/7
- Stabled during the day only
- Stabled during the night only
- Stabled for part of the day or night only
- Turned out 24/7

Does your horse display any of the following behaviours? *Please tick all that apply.*

- Weaving
- Box walking
- Crib biting
- Windsucking
- Self mutilation
- None of the above

Veterinary Conditions and Definitions

We are interested in finding out how many horses or ponies in the UK are affected by the following conditions:- laminitis, headshaking and sarcoids.

Definitions

Laminitis is inflammation of the sensitive laminae of the hoof. For the purposes of this survey, laminitis is an episode of lameness which was either;

a) diagnosed by a vet as laminitis (or)

b) laminitis was strongly suspected based upon the following; lameness was present in all four limbs **and** the horse or pony stood with an altered stance **and/or** the horse or pony was reluctant to move **and/or** there was increased heat in all four hooves **and/or** laminitis was diagnosed by a farrier.

For the purposes of this survey, **headshaking** is characterised by unexplained and uncontrollable movements of the head and neck that may affect the horse either at rest or during exercise.

For the purposes of this survey, **sarcoids** are fibroblastic tumours of the equine skin that have been diagnosed by a vet, either based upon appearance or biopsy results.

Laminitis

Reminder- laminitis is inflammation of the sensitive laminae of the hoof. For the purposes of this survey, laminitis is an episode of lameness which was either;

a) diagnosed by a vet as laminitis (or)

b) laminitis was strongly suspected based upon the following; lameness was present in all four limbs **and** the horse or pony stood with an altered stance **and/or** the horse or pony was reluctant to move **and/or** there was increased heat in all four hooves **and/or** laminitis was diagnosed by a farrier.

Has your horse had laminitis? * *Required*

- Yes in the last year
- Yes more than a year ago
- Not since I have had him/her
- My horse/ pony is no longer alive as a result of laminitis

Laminitis questions

Which of the following best describes how easy your horse is to feed?

- He/she is a very "good doer" and gets fat easily
- He/she is uncomplicated to feed and to keep weight on
- He/she is a fussy eater and/ or is difficult to keep weight on

Body condition scores help us estimate the condition of animal without the use of weigh scales. The body condition scoring system devised by Carroll and Huntington (1988) is based on a grading system of 0 (emaciated) to 5 (obese). Based on this grading system (link below) what score is most applicable to your horse or pony? <http://www.bris.ac.uk/vetscience/media/images/conditionscoringleaflet.pdf>

- 0
- 1
- 2
- 3
- 4
- 5

With thanks to the British Horse Society for the body condition scoring leaflet used above.

Which, if any, of the following methods do you use to monitor your horse's condition? *Tick all that apply.*

- None (I don't worry about this)
- Weight tape
- Weigh scales
- Body condition score
- By eye
- Based on how tight or loose the girth is
- Other

If you selected Other, please specify:

In which month did your horse first have laminitis?

In which year did your horse first have laminitis?

How many episodes of laminitis has your horse had since you have owned him or her?

- Just one
- 2-3
- 4 or more
- My horse has chronic laminitis and management is ongoing

What was your horse **mainly** used for before his or her laminitis? *Select one box only.*

If you selected Other, please specify:

Which of the following best describes the level of use your horse returned to after the most recent bout of laminitis?

- Same or higher level of use
- He/ she has dropped down a level
- He/ she still has laminitis and is out of work
- He/ she has another problem
- He/ she was put to sleep (euthanased)

Was laminitis diagnosed by a vet?

- Yes
- No

Have these possible underlying causes of laminitis been tested for by this vet?

	Has your horse been tested for this disease?			
	Yes and positive	Yes and negative	Yes but can't remember results	No
Equine Metabolic syndrome (EMS)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pars Pituitary Intermedia Dysfunction (PPID or Cushing's)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which if any of the following drugs been given for treatment or control of laminitis? *Please select all that apply.*

- Bute (phenylbutazone) e.g. equipalazone
- Suzibuzone e.g. danilon
- Flunixin e.g. finadyne paste
- Meloxicam e.g. metacam
- Metformin
- Pergolide e.g. prascend
- None of these

Which if any of the following options have you tried for managing weight in your horse or pony? *Please select all that apply.*

- Restricting grazing using a grazing muzzle
- Restricting grazing by stabling or increasing time spent indoors
- Restricting grazing by fencing off small areas or strip grazing
- Turn out into poorer quality grazing
- Avoiding grass turnout completely
- Soaking hay
- Using double haynets or small holed haynets
- Increasing exercise
- Cutting out treats
- None of these
- Other

If you selected Other, please specify:

How often does your farrier usually attend to your horse's feet?

- Every 4-6 weeks
- Every 7-8 weeks
- Every 9-12 weeks
- As required
- Only when my horse has a problem

Has your farrier performed corrective farriery for laminitis on this horse or pony?

- Yes
- No

Headshaking

Reminder- for the purposes of this survey **headshaking** is characterised by unexplained and uncontrollable movements of the head and neck that may affect the horse either at rest or during exercise.

Has your horse shown signs of headshaking? * *Required*

- Yes in the last year
- Yes more than a year ago
- Not since I have had him/ her
- My horse is no longer alive as a result of headshaking

Headshaking questions

In which month did headshaking first begin?

In which year did headshaking first begin?

How would you describe the onset of headshaking?

- Headshaking came on gradually
- Headshaking came on suddenly
- My horse or pony has been headshaking since I've owned him/ her

At which times of the year does your horse tend to show signs of headshaking? *Indicate all that apply.*

- Spring (March, April, May)
- Summer (June, July, August)
- Autumn (September, October, November)
- Winter (December, January, February)
- Unknown (started less than a year ago)

Which weather conditions, if any, do you associate with headshaking in your horse? *Tick all that apply.*

- Sunshine
- Rain
- Wind
- Cold
- Heat
- Other

If you selected Other, please specify:

Which of these best describes your horse whilst headshaking? *Tick all that apply.*

- Vertical (up and down) head movements
- Horizontal (side to side) head movements
- Rotational (circular) head movements
- Acting as though an insect has flown up the nose
- Excessive rubbing of the muzzle
- Striking at the nose with the forelimbs
- Excessive and persistent snorting
- Low head carriage
- An anxious expression
- Submerges muzzle in water
- Other

If you selected Other, please specify:

Does your horse headshake at the following times?

	Head shaking seen			
	Yes	No	Don't know	Not applicable
When lunged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When ridden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When turned out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the stable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The following practical grading system has been devised to help classify the severity of headshaking.

Grade 0 - there is no headshaking.

Grade 1 - there is headshaking, only at exercise but sufficiently mild that the horse may be ridden.

Grade 2 - there is headshaking at exercise to a severity as to make ridden exercise unsafe or impossible.

Grade 3 - there is headshaking even at rest.

Based on the above grading system, please indicate the usual severity of headshaking under the following circumstances:

	During the day	At night	Indoors	Outdoors	Without a nose net	With a nose net	In open spaces	Next to hedgerow
Grade 0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grade 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grade 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grade 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Based on the above grading system, please indicate how severe your horse's headshaking usually is at the following times of the year:

	Season			
	Spring (March, April, May)	Summer (June, July, August)	Autumn (September, October, November)	Winter (December, January, February)
Unsure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grade 0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grade 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grade 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grade 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Based on the above grading system, please grade how severe your horse's headshaking is, or has been, when at its worst.

- Grade 0
- Grade 1
- Grade 2
- Grade 3

Has your horse been seen by a vet for the complaint of headshaking?

- Yes
- No

If yes, which of the following tests were performed? *Select all that apply.*

- Dental examination
- Radiographs (x-rays) of the head
- Endoscopy of the head (camera up nose)
- Ophthalmologic (eye) examination
- Ear examination
- Computed tomography (CT) of the head
- Nerve blocking
- Other

If you selected Other, please specify:

Has a cause been diagnosed? If so, please tick the **main cause** from the list below or add other if unlisted.

- The cause remains unknown
- Dental disease
- Sinus problem
- Neck pain
- Ocular (eye) problem
- Problem associated with the guttural pouch(es)
- Allergy
- Trigeminal mediated (Idiopathic) headshaking
- Temporomandibular joint (jaw) pain
- Behavioural
- Other

If you selected Other, please specify:

Which, if any, of the following treatments were trialled?

- Eye mask
- Nosenet
- Phenylbutazone (bute)
- Steroids
- Antihistamines e.g. periactin, cyproheptadine, carbamazepine
- Gabapentin
- Surgery for placement of coils
- EquiPENS
- Other

If you selected Other, please specify:

Thinking about the effects of these treatments please grade the average severity of headshaking signs seen whilst on treatment. Grade for applicable treatments only. As a reminder the grading scheme is as follows:- Grade 0 - there is no headshaking. Grade 1 - there is headshaking only at exercise but sufficiently mild that the horse may be ridden. Grade 2 - there is headshaking at exercise to a severity as to make ridden exercise unsafe or impossible. Grade 3 - there is headshaking even at rest.

	Eye mask	Nosenet	Phenylbutazone (bute)	Steroids	Antihistamines	Gabapentin	Surgery for placement of coils	EquiPENS	Other
Grade 0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grade 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grade 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grade 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sarcoids

Reminder- for the purposes of this survey **sarcoids** are fibroblastic tumours of the equine skin that have been diagnosed by a vet; either based upon appearance or biopsy results.

Has your horse ever had sarcoids? * *Required*

- Yes, in the last year
- Yes, more than a year ago
- Not since I have had him/ her
- My horse/pony is no longer alive as a result of sarcoids

Sarcoid questions

What age was your horse when you first noticed a sarcoid or sarcoids?

At what time of year did you first notice a sarcoid or sarcoids on your horse or pony?

What colour is your horse?

- Grey
- Chestnut
- Bay
- Black
- Roan
- Palomino
- Skewbald
- Piebald
- Brown
- Dun
- Spotted
- Other

If you selected Other, please specify:

Are you aware whether your horse has any relatives that also suffer from sarcoids? *Tick all that apply.*

- Unsure
- The dam (mother)
- The sire (father)
- Half brother

- Half sister
- Full brother
- Full sister

What is the distance to the closest cattle farm from where your horse is kept?

Please indicate which part of the body is, or has been affected. *Select as many options as apply.*

- Around or close to the eye
- Face (but not close to the eye)
- Ear
- Neck
- Sternum/ chest
- Girth
- Flank
- Sheath
- Mammary
- Axillary (armpit region of front leg)
- Inguinal (groin region)
- Upper limb (on or above the knee or hock)
- Lower limb (below the knee or hock)
- Other

If you selected Other, please specify:

Which of the following best applies to your horse? *Tick all that apply*

- My horse has sarcoids but these do not cause us a problem at present
- My horse has sarcoids and these are unsightly/ cause a cosmetic problem
- My horse has sarcoids and these interfere with where I want to put tack
- My horse has sarcoids and these are causing a problem through bleeding or ulceration
- My horse has sarcoids and I believe this will affect his or her resale value

Other

If you selected Other, please specify:

Have you had a vet examine your horse for sarcoids?

- Yes
 No

If yes, was a biopsy taken to confirm diagnosis?

- Yes
 No
 Don't know

Have any treatments been tried? If so please indicate response to treatment

	Outcome					
	Not tried	Complete success	Some success	No improvement	Made things worse	Other
Traditional surgery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Laser surgery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ligation (tying off or use of rubber bands)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cryotherapy (freezing)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
AW4-LUDES (Liverpool) cream	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Xterra cream	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Iridium wires	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High Dose Radiation (HDR) therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photodynamic therapy (PDT)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strontium therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BCG vaccine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Intra-lesional injection of chemotherapy e.g. mitomycin



Feel free to list any additional treatments not included in the list above, and response to treatment here.

Final question

How did you **first** hear about this survey?

- Through a friend
- Via an online equestrian forum
- Advertised in "Horse and Hound" magazine
- Advertised in "Your Horse" magazine
- Advertised in another magazine
- Via social media (facebook or twitter page)
- Other

If you have any brief comments regarding the survey that you would like to leave, please feel free to do so below.

Free prize draw

<https://svs.onlinesurveys.ac.uk/prize-draw-details>

Thank you for completing this survey. Your help is greatly appreciated. If you would like to be entered into a free draw for an iPad pro, follow the link above to enter your details.

Key for selection options

1.a.i - If your horse was sold or has died, how old was he/she when you last owned him/her?

- A foal 0-5 months of age
- A foal 6-11 months of age
- 1 year of age
- 2 years of age
- 3 years of age
- 4 years of age
- 5 years of age
- 6 years of age
- 7 years of age
- 8 years of age
- 9 years of age
- 10 years of age
- 11 years of age
- 12 years of age
- 13 years of age
- 14 years of age
- 15 years of age
- 16 years of age
- 17 years of age
- 18 years of age
- 19 years of age
- 20 years of age
- 21 years of age or older

2 - How old is your horse this year?

- 1 year
- 2 years
- 3 years
- 4 years
- 5 years
- 6 years
- 7 years
- 8 years
- 9 years
- 10 years
- 11 years
- 12 years
- 13 years

14 years
15 years
16 years
17 years
18 years
19 years
20 years
21 years or older

5 - How old was the horse when you got him or her?

Home bred
Less than 1 year
1 year
2 years
3 years
4 years
5 years
6 years
7 years
8 years
9 years
10 years
11 years
12 years
13 years
14 years
15 years
16 years
17 years
18 years
19 years
20 years
21 years or older

6 - During what season of the year did you purchase this horse?

Spring (March, April, May)
Summer (June, July, August)
Autumn (September, October, November)
Winter (December, January, February)
Don't remember
Not applicable (homebred)

7 - Which UK region is this horse kept in for most of the year?

Northern Ireland
Scotland
Wales
North East England
North West England
Yorkshire and the Humber

East Midlands
West Midlands
South East England
South West England
Greater London
East Anglia

15 - In which month did your horse first have laminitis?

January
February
March
April
May
June
July
August
September
October
November
December
Don't know

16 - In which year did your horse first have laminitis?

2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
More than 10 years ago
Don't know

18 - What was your horse mainly used for before his or her laminitis? *Select one box only.*

Eventing (affiliated)
Show jumping (affiliated)
Dressage (affiliated)
Hacking
General riding/ unaffiliated competition
Hunting
Showing
Polo
Dressage
Racing (includes flat, national hunt and point to point)
Endurance

Breeding
Youngstock
Non- ridden companion
Other

26 - In which month did headshaking first begin?

January
February
March
April
May
June
July
August
September
October
November
December
Don't know

27 - In which year did headshaking first begin?

2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
More than 10 years ago

37 - What age was your horse when you first noticed a sarcoid or sarcoids?

Less than 1 year of age
1 year of age
2 years of age
3 years of age
4 years of age
5 years of age
6 years of age
7 years of age
8 years of age
9 years of age
10 years of age
11 years of age
12 years of age
13 years of age

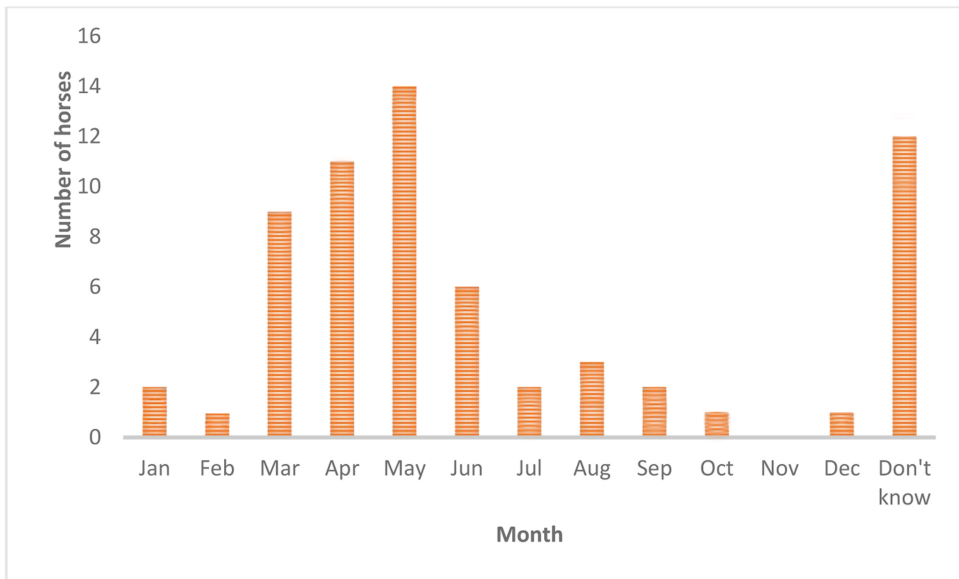
14 years of age
15 years of age
16 years of age
17 years of age
18 years of age
19 years of age
20 years of age
21 years of age or older
At purchase

38 - At what time of year did you first notice a sarcoid or sarcoids on your horse or pony?

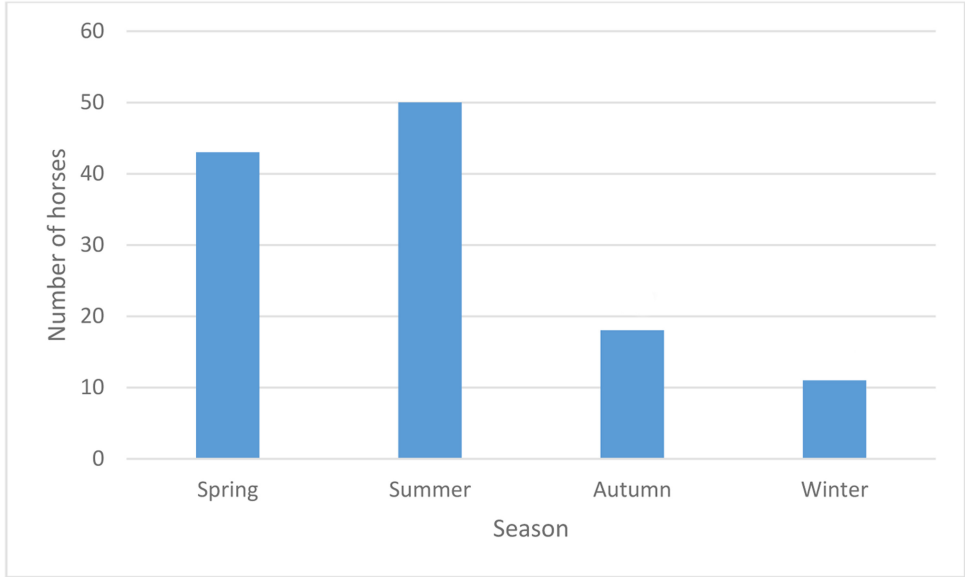
Spring (March, April, May)
Summer (June, July, August)
Autumn (September, October, November)
Winter (December, January, February)
Can't remember
Unsure - they were present when I bought him or her

41 - What is the distance to the closest cattle farm from where your horse is kept?

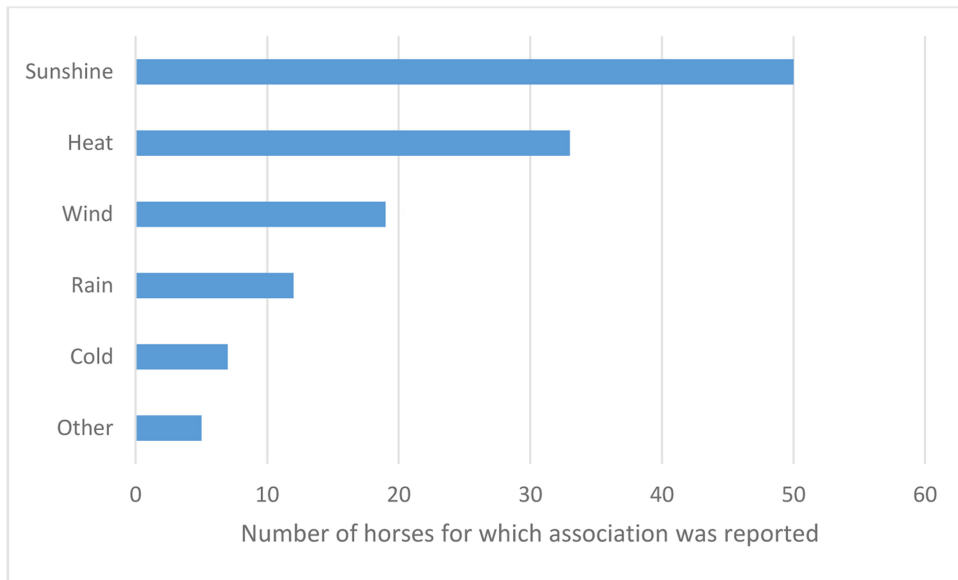
My horse is kept on a cattle farm
Less than 1 mile
Between 1 and 5 miles
Between 6 and 10 miles
Greater than 10 miles
Unsure



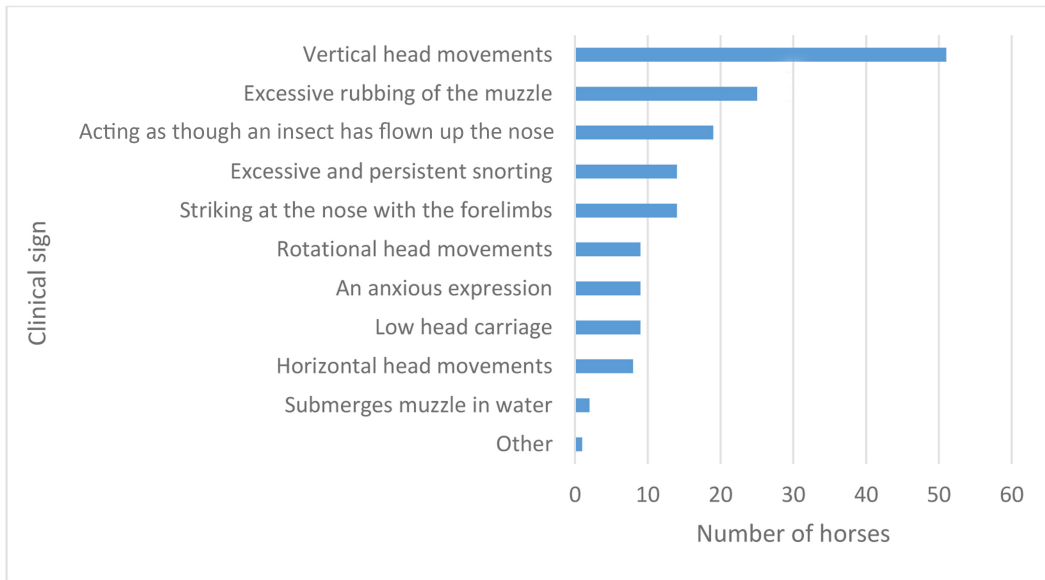
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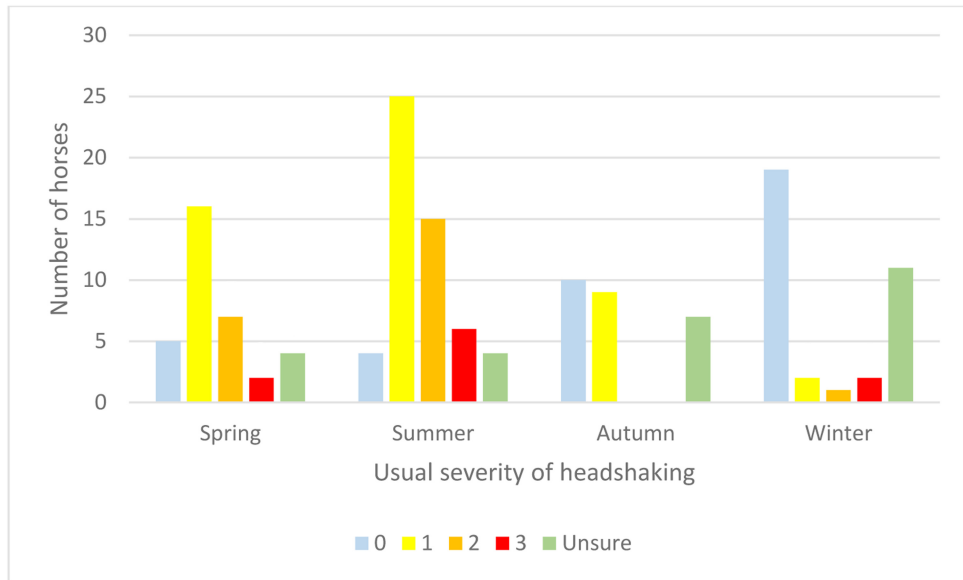
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