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The prevalence of oral ulceration in Swedish horses when ridden with bit and bridle and when unridden

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Abstract

Oral soft tissue ulcers are common disorders of horses, but it is unclear if their prevalence is increased by riding horses with a bit and bridle. Oral examinations were performed on 113 horses and ponies, all which had received routine dental floating, that were divided into four groups depending on when they had last been ridden with a bit and bridle. The subjects comprised: group 1, a randomly selected population of ridden horses; group 2, a group of horses examined after being rested at pasture for 5 weeks; group 3, the previous group following 7 weeks of riding with a bit and bridle, and group 4, brood mares that had not been ridden for at least 11 months. Lip and intraoral soft tissue lesions were recorded at seven pre-determined locations, with lesions classified as large or small; acute or chronic.

The examinations showed that horses that were currently being ridden with a bit and bridle had a significantly higher prevalence of large and acute buccal ulcers opposite the maxillary Triadan 06 teeth and of the commissures of the lips, as compared to horses that were not being currently ridden. It was concluded that using a bit and bridle can cause oral ulceration even in horses that have regular prophylactic dental floating. It is suggested that riding tack should be individually fitted for each horse and also that prophylactic dental treatments should be individually adapted for each horse.

Keywords: Equine dentistry; Oral ulceration; Bit-induced oral injury

Introduction

Lip, buccal and tongue ulcers and abrasions (oral ulcers) are regarded as a very common equine oral disorder worldwide (Lundström and Pettersson, 1988, 1990; Allen, 2004; Stubbs, 2004). Oral ulcers can have many causes, including autoimmune, nutritional, neoplastic and traumatic aetiologies (Easley, 2005a). However traumatic oral ulcers are by far the most common type and many are caused by a noseband pressing the horse's cheeks against sharp areas of the lateral aspect of the rostral maxillary teeth (Dixon, 2000), and also by badly fitting bits and poor riding technique (Bennett, 2001). Although most horses with buccal ulcers do not show obvious signs of oral pain, areas of ulcerated mucosa that are being rubbed against dental protuberances are very likely to cause discomfort, and it has been suggested that oral ulcers are the most common cause of oral pain in the horse (Knottenbelt, 1999). The removal of dental overgrowths by routine floating can reduce oral ulceration (Fischer and Easley, 1994; Scoggins, 2001; Allen, 2004). Creation of 'bit seats' of the upper and lower Triadan 06s is also performed to allegedly improve bitting comfort (Scoggins, 2001; Stubbs, 2004), but this procedure is very seldom performed in Swedish horses.

The prevalence, type and location of oral ulcers in horses ridden with a bit and bridle and in horses that are unridden do not appear to have been reported. The hypothesis of the present study was that working a horse with bit and bridle will increase the prevalence and severity of oral ulcers. Accordingly, the aim of this work was to determine if the frequency and location of oral ulcers

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differed between horses that were not worked and those that were currently being ridden with a bit and bridle.

Materials and methods

The oral cavities of a total of 113 horses, divided into four groups, were examined. Of these, four horses and one pony in group 1 were examined after they had been euthanased following acute traumatic injuries unrelated to the oral cavity or the digestive tract, whilst the remaining horses had clinical examinations. None of the horses were being fed high concentrate rations. No signs of oral disorders had been observed by owners/riders immediately prior to the examination in any of the animals. All horses had previously had prophylactic dental floating, but not within 2 months of the current examinations.

The clinical examinations, except in one placid horse, were performed following sedation with 10–15 μg/kg IV detomidine (Domosedan, Orion Pharma) and were conducted by one veterinarian (AT). After fitting a Haussman gag, the oral cavity was rinsed with water and examined using a bright light source; a dental mirror was not used. The following findings were recorded as being present or absent: halitosis; occlusion (i.e. overbite, neutral, or underbite); presence of deciduous cheek teeth ('caps'); presence of 1st premolar ('wolf teeth'); bit-related abnormal wear of Triadan 06s; other cheek teeth wear abnormalities, including focal overgrowths ('hooks'), steps, wave mouth, shear mouth; oral mucosal lesions gingivitis/periodontal disease and dental fractures.

Oral ulceration was classified by location of lesion, size and whether acute or chronic (i.e. having thickened or fibrotic edges). Evidence of previous buccal ulcers, i.e. local buccal mucosal thickening and scarring was also recorded. Ulcers <0.5 cm diameter were classified as small and those >0.5 cm diameter as large. Seven sites of ulceration were recorded including the tongue, lip commissures, hard palate, bars of mouth (physiological diastema), buccal mucosa lateral to 06, buccal mucosa lateral to 07–11, and mucosa caudal to the 11s. Examples of ulcers are given in Fig. 1. Horses were divided into two groups, <6 years of age and 6 years and older. The animals were further divided into groups based on when they had last worn a bit and bridle, with two groups currently being ridden and two currently not being ridden (see below):

Group 1

Group 1 consisted of 36 horses and 34 ponies of various breeds (median age 10, range 3–18 years). They included 27 females, 41 geldings and two stallions from 17 yards in the Uppsala and Skövde areas, with a median of one horse (range 1–34) per yard. All animals were used for general riding and had been ridden with a variety of bits and bridles within 2 weeks of this examination, and 81% (57/70) had more than one rider. Routine dental floating intervals in these cases varied between 6 and 24 months.

Group 2

Group 2 consisted of 23 Swedish Warmblood geldings, (median age 12, range 5–18 years) that were all housed in the same stable and normally used by multiple riders for general riding work. These 23 horses were examined after being fully rested at pasture for 5 weeks. All had routine dental floating 3 months prior to the current examination.

Group 3

Group 3 comprised the 23 horses in group 2, which were examined after they had been working for 7 weeks following the above examination. All 23 horses were ridden with a loose-ring snaffle bit, with a simple jointed mouthpiece and a traditional bridle with an English noseband.

Group 4

Group 4 consisted of 20 Swedish Warmblood brood mares, (median age 6, range 4–16 years), all from the same yard. The mares had all worked with bit and bridle prior to going to stud, which was at least 11 months prior to this study, and all had routine dental floating 6–12 months prior to the current examination.

Statistical methods

The mean number of ulcers per horse was recorded by sites and a total was obtained for all locations. Because of a non-normal distribution of ulcer data, the difference in numbers of ulcers per horse when resting and when working was compared between groups using the Wilcoxon matched pair signed rank sum test. The Mann–Whitney test was used to compare the number of ulcers per horse in the ridden groups (1 and 3), versus the non-ridden brood mares (group 4). Both these tests were used for comparisons of total number ulcers, acute/chronic ulcers, large/small ulcers, small acute/large acute/small chronic/large chronic ulcers. *P*-values <0.05 were considered significant.

The prevalence of acute or chronic large ulcers and only small ulcers in all horses were determined for all locations. Exact binomial 95% confidence intervals (CI) were constructed for these prevalences. Fisher's exact test was used to check for influence of breed (horse vs. pony), age (<6 years vs. ⩾6 years), gender (males vs. females) and dental occlusion (normal, overbite or underbite) with respect to horses having any ulcers, any large or small ulcers, any acute or chronic ulcers and any ulcer by location (06s region, 07–11 region, caudal to 11s, commissures of lip, tongue and hard palate.)

Results

General findings

No halitosis was recorded in any horse/pony. A neutral bite was present in 97, overbite in 14 and two animals had underbite. Retained deciduous teeth were present in two subjects and 30 still had wolf teeth. Abnormal bit-related

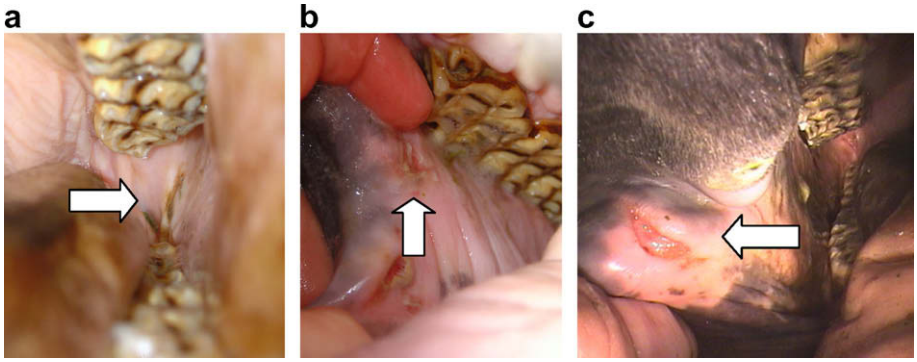

Fig. 1. (a) Buccal ulcer caudal to 311; (b) buccal ulcer opposite 106; (c) ulcer of the commissures of lips.

wear of Triadan 06s was only seen in subjects ⩾6 years (25 in group 1, 9 in group 2). Other dental wear abnormalities were present in 18 horses and were evenly distributed between different ages and groups.

Soft tissue lesions

No horses had ulceration of the bars of the mouth. The number of ulcers per horse opposite maxillary 06 and 07–11 regions, and commissures of lips are shown in Table 1, and the prevalence of ulcers is presented in Table 2. The prevalence of ulcers and statistical associations between horses and ponies are presented in Table 3.

Group 1 (ridden)

Thirty-seven animals had one ulcer and 24 had 2–3 ulcers. Scars from healed ulcers were present in 5/9 without ulcers. In total, 66/70 animals (94%) had ulcers or evidence of previous oral ulceration. Eight (73%) of the subjects with an overbite and 38 (66%) of those with a neutral bite had buccal ulceration opposite the 06s. Buccal ulceration opposite the 07–11 region was present in two (18%) cases with an overbite and 17 (29%) with a neutral bite. Periodontitis/gingivitis was present in 17 subjects, two had small acute tongue ulcers and three others had small acute ulcers in the hard palate and six horses had fresh ulcers caudal to maxillary 11s.

Group 2 (not ridden)

Of the 23 horses five had only one ulcer whilst 16 (70%) had 2–3 ulcers. Scars from previous ulcers were present both in horses with and without ulcers. Ulcers opposite 06s were present in two horses with an overbite and in 13 with a neutral bite. Buccal ulcers opposite the 07–11 region were present in 14 horses with a neutral bite and one horse with underbite. One horse had periodontitis/gingivitis and another had a small acute ulcer caudal to maxillary 11. No ulcers were found in the hard palate or tongue.

Group 3 (ridden)

One horse had a single ulcer and all others had 2–6 ulcers each. All horses had buccal ulcers opposite the maxillary 06s. Buccal ulcers opposite the 07–11 were present in two horses with overbite, one with underbite and 17 (85%) with a neutral bite. One horse had a large chronic ulcer caudal to maxillary 11s and two had periodontitis/gingivitis. One horse had an acute small tongue ulcer and another had a small acute hard palate ulcer.

Group 4 (not ridden)

Seven horses had a single ulcer and three had two ulcers. Scars from previous ulcers were present in one horse without ulcers. In total, 11/20 animals (55%) had ulcers or evidence of previous oral ulcers. Buccal ulcers opposite 06s were present in one horse with overbite and in three horses with a neutral bite. Ulcers opposite 07–11 were present in six of horses with a neutral bite. One horse had small acute ulcer caudal to 11s. Caps were present in four mares, and one of these had periodontitis.

Between–population comparisons

Comparisons of the number of ulcers/horse, between actively ridden horses (Groups 1 and 3) and brood mares (group 4) (Table 1) showed all parameters, except for total number of horses with chronic ulcers ($P = 0.61$), differed

Table 1
Number of ulcers per horse, for all locations where at least ten ulcers were found in total, with total numbers of ulcers given in brackets.

	Group	Ulcers	Small ulcers			Large ulcers		
			Total	Acute	Chronic	Total	Acute	Chronic
In all locations	1	1.3 (89)	0.8 (54)	0.8 (53)	0.0 (1)	0.5 (35)	0.3 (22)	0.2 (13)
	2	2.1 (48)	1.0 (24)	0.9 (21)	0.1 (3)	1.0 (24)	0.7 (15)	0.4 (9)
	3	3.8 (87)	1.1 (25)	0.9 (21)	0.2 (4)	2.7 (62)	1.5 (35)	1.2 (27)
	4	0.7 (13)	0.5 (9)	0.1 (2)	0.4 (7)	0.2 (4)	0.2 (3)	0.1 (1)
Opposite 06	1	0.7 (46)	0.4 (26)	0.4 (26)	0	0.3 (20)	0.2 (12)	0.1 (8)
	2	1.0 (24)	0.7 (15)	0.6 (14)	0.0 (1)	0.4 (9)	0.3 (6)	0.1 (3)
	3	1.8 (41)	0.7 (15)	0.6 (14)	0.0 (1)	1.1 (26)	0.8 (19)	0.3 (7)
	4	0.3 (5)	0.2 (4)	0.1 (1)	0.2 (3)	0.1 (1)	0	0.1 (1)
Opposite 07–11	1	0.4 (27)	0.2 (15)	0.2 (14)	0.0 (1)	0.2 (12)	0.1 (7)	0.1 (5)
	2	0.9 (21)	0.3 (8)	0.3 (6)	0.1 (2)	0.6 (13)	0.3 (7)	0.3 (6)
	3	1.4 (33)	0.1 (3)	0.1 (2)	0.0 (1)	1.3 (30)	0.5 (12)	0.8 (18)
	4	0.4 (7)	0.2 (4)	0	0.2 (4)	0.2 (3)	0.2 (3)	0
Lip commissures	1	0.1 (4)	0.0 (2)	0.0 (2)	0	0.0 (2)	0.0 (2)	0
	2	0.1 (2)	0	0	0	0.1 (2)	0.1 (2)	0
	3	0.4 (10)	0.2 (5)	0.1 (3)	0.1 (2)	0.2 (5)	0.2 (4)	0.0 (1)
	4	0	0	0	0	0	0	0

Table 2
Prevalence of total, acute and chronic ulcers, with 95% confidence intervals (CI) in the four groups, for locations with at least six horses with ulcers found in total. Proportions (%) of the groups with large ulcers, of those with any ulcers (total) are also shown.

	Group	Number of horses	All ulcers				Acute ulcers				Chronic ulcers			
			Total		Large	Only small	Total		Large	Only small	Total		Large	Only small
			%	95% CI	%	%	%	95% CI	%	%	%	95% CI	%	No.
Opposite 06 region	1	70	54	42–66	47	53	46	34–58	38	62	10	4–20	100	0
	2	23	70	47–87	44	56	60	31–73	33	67	20	5–39	75	25
	3	23	100	85–100*	74	26	100	66–97	70	30	25	7–44	80	20
	4	20	20	6–44	25	75	5	1–25	0	100	15	3–38	33	67
	AR	93	66	55–75	57	43	56	45–66	50	50	13	7–21	92	8
Opposite 07–11 region	1	70	29	18–41	45	55	23	14–34	31	69	7	2–16	80	20
	2	23	65	43–84	73	27	40	16–57	63	38	40	16–57	75	25
	3	23	87	66–97	95	5	45	20–61	78	22	65	34–77	100	0
	4	20	30	12–54	50	50	15	3–38	100	0	15	3–38	0	100
	AR	93	43	33–54	70	30	27	18–37	48	52	19	12–29	94	6
Caudal to 11s	1	70	9	3–18	17	83	9	3–18	17	83	0	0–5*	0	0
	2	23	4	1–22	0	100	5	1–22	0	100	0	0–15*	0	0
	3	23	4	1–22	100	0	0	1–22	0	0	5	0–15*	100	0
	4	20	5	1–25	0	100	5	1–25	0	100	0	0–17*	0	0
	AR	93	8	3–15	29	71	30	2–14	17	83	5	0.3–6	100	0
Lip commissures	1	70	4	1–12	33	67	4	1–12	33	67	0	0–5*	0	0
	2	23	9	1–28	100	0	10	1–28	100	0	0	0–15*	0	0
	3	23	30	13–53	29	71	25	7–44	20	80	10	1–28	50	50
	4	20	0	0–17*	0	0	0	0–17*	0	0	0	0–17*	0	0
	AR	93	11	5–19	30	70	40	4–16	25	75	10	0.3–8	50	50
∑ All locations	1	70	87	77–94	47	53	73	61–83	37	63	12	9–28	92	8
	2	23	91	72–99	67	33	85	52–90	53	47	50	23–66	80	20
	3	23	100	85–100*	91	9	100	85–100*	74	26	80	47–87	94	6
	4	20	50	27–73	40	60	25	9–49	60	40	25	9–49	80	20
	AR	93	90	82–95	60	40	80	70–87	50	50	30	21–40	93	7

* One-sided 97.5% CI. Actively ridden (AR) stands for a combination of group 1-riding horses and group 3- geldings ridden, showing all the actively ridden horses in the study.

Table 3
Prevalence and statistical associations between horse/pony, gender and age group vs. ulcer type location within group 1 ($n = 70$). *P*-values are from Fishers exact test, which are shown together with actual numbers of horses and percentages.

Variable	Horse		Pony		*P*	Females		Males		*P*	<6 years		⩾6 years		*P*
	n	%	*n*	%		*n*	%	*n*	%		*n*	%	*n*	%	
Ulcer category	36		34			27		43			9		61		
Acute	25	69	25	74	0.79	23	85	27	63	0.06	7	78	43	70	1.00
Chronic	10	28	2	6	0.02	3	11	9	21	0.35	2	22	10	16	0.64
Large	19	53	10	29	0.06	12	44	17	40	0.80	4	44	25	41	1.00
Small	17	47	19	56	0.49	14	52	22	51	1.00	5	56	31	51	1.00
06 region	24	67	14	41	0.05	10	37	28	65	0.03	7	78	31	51	0.17
07–11region	12	33	8	24	0.43	11	41	9	21	0.10	3	33	17	28	0.71
Caudal to upper 11	3	8	3	9	1.00	4	15	2	5	0.20	1	11	5	8	0.58
Lip commissures	2	6	1	3	1.00	1	4	2	5	1.00	0	0	3	5	1.00
Tongue	2	6	0	0	0.49	0	0	2	5	0.52	1	11	1	2	0.24
Hard palate	1	3	2	6	0.61	2	7	1	2	0.55	1	11	2	3	0.34
Total	35	97	26	76	0.01	25	93	36	84	0.47	9	100	52	85	0.59

significantly. For both total and acute numbers of ulcers, respectively, the *P*-values were <0.0001. For large ulcers, the *P*-value was 0.004, for small ($P = 0.04$), for small acute ulcers ($P = 0.0009$), for small chronic and large acute ulcers, respectively, ($P = 0.03$), and for horses with large chronic ulcers the *P*-value was 0.03.

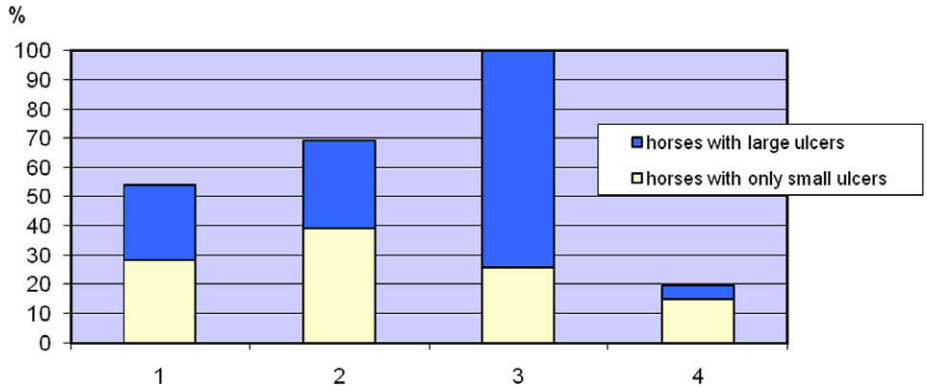

Fig. 2. Proportion of horses in each group with buccal ulcers opposite Triadan 06s.

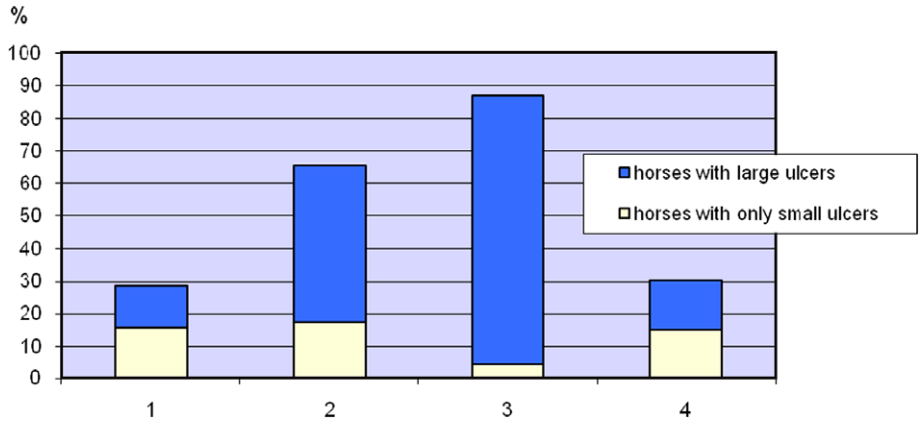

Fig. 3. Proportion of horses in each group with buccal ulcers opposite Triadan 07-11.

Statistical differences were found for all comparisons between the same group of horses when rested (group 2) and ridden (group 3) with regard to the total number of ulcers, except for small ulcers ($P = 0.78$), small chronic ulcers ($P = 1.00$) and small acute ulcers ($P = 1.00$). In the pair wise comparison between the total number of ulcers the P-value was 0.0004, acute ulcers ($P = 0.03$), chronic ulcers ($P = 0.02$), large ulcers ($P = 0.0004$), large acute ulcers ($P = 0.008$) and large chronic ulcers ($P = 0.01$).

The numbers of horses with ulcers in the 06 and 07–11 regions are presented in Figs. 2 and 3. Table 2 shows the prevalence of ulcers, with 95% CI, by location and whether acute or chronic within location. Judging by the CI, the prevalence of total and acute ulcers opposite the 06 location differed significantly between groups 1 and 4. Contrary to the findings in group 4, group 1 had significantly fewer horses with chronic than acute ulcers. The prevalence of lesions varied significantly between horse and pony and gender, but not by age group (Table 3).

Discussion

The prevalence of ulcers was significantly higher in horses ridden with a bit and bridle compared to horses that were not currently ridden. Horses with ulcers also had a significantly higher frequency of both acute and large buccal ulcers opposite the maxillary 06s. There was also a tendency of more ulcers in the commissures of the lips in ridden those compared to those not currently ridden. These data confirm that riding horses with a bit and bridle is a high risk factor for the development of oral ulceration in horses.

The presence of oral ulcers (mostly small) in group 4 (non-ridden brood mares) was unexpected, particularly as all had regular routine prophylactic dentistry. Currently in Sweden, this primarily involves removing sharp enamel points along the buccal side of maxillary and lingual side of the mandibular cheek teeth in all horses. Even though all brood mares were housed on the same establishment, which might have influenced the results, their prophylactic treatment was similar to all the other horses in the study. Thus, the high prevalence of oral ulceration found could suggest that routine floating has a limited effect on the prevalence of oral ulcers in both ridden and unridden horses. Furthermore, the real prevalence of caudally-located ulcers (e.g. ulcers caudal to 11s) might have been even higher because a dental mirror was not used in this study.

According to Stubbs (2004), the two major goals in equine dentistry are to relieve oral pain and to correct or

prevent bite abnormalities. The findings of this study suggest that we should re-examine our current techniques of dental prophylaxis in order to reduce the high prevalence of buccal ulceration. Perhaps a more individual approach to the choice and fitting of bits and bridles, and a more evidence-based approach to prophylactic dentistry to address the specific problems of each horse would be more effective than the current standardised prophylactic floating procedure, at least as currently practiced in Sweden.

Surprisingly, ridden horses had significantly higher numbers and larger ulcers than ponies. This may be because in this study many ponies (all in group 1) were from a large riding school with good management, in comparison to many of the horses that came from a very large number of stables with likely variations in the quality of management. It is also possible that the children who ride the ponies are less aggressive riders than adults. Also, and in contrast to expectations, the results showed that horses in a riding school that have many different riders do not necessarily have increased buccal ulceration compared to horses ridden by a single rider.

Comparison of the frequency and localisation of ulcers in mares versus geldings and stallions in this study was made difficult because all horses in groups 2 and 3 were geldings and all horses in group 4 were mares. Stallions are often considered to be more difficult to handle than mares or geldings and the different tack used for them, such as stallion bits, might cause increased oral ulceration. No comparison could be made, however, because the study only included two stallions.

There were no significant differences in the prevalence of oral ulceration between age groups. It has been suggested that horses are more prone to oral ulceration when they are shedding their deciduous teeth (Allen, 2004) but our results do not support this, although the younger age group (<6 years old) would also include horse with permanent dentition. A larger study of younger horses may provide further information. Buccal ulcerations opposite the 06s were more common in horses with overbite. This may be due to a higher risk of localised pressure on the cheeks by the tack when there is a rostral overgrowth of the upper 06s, which is common in horses with overbite. No horses in our study showed any obvious signs of oral problems and this questions whether these soft tissue lesions actually do causes discomfort as is commonly claimed (Knottenbelt, 1999; Easley, 2005b), or alternatively whether horses just endure the pain from these lesions endure the pain from these lesions since the riders/owners are incapable to read the signs of discomfort.

Conclusions

Riding a horse with bit and bridle can cause ulcers of the oral mucous membranes. The current, standardised prophylactic dentistry practiced in Sweden is not effective in preventing such oral ulceration in ridden horses.

Conflict of interest statement

None of the authors of this paper has a financial or personal relationship with other people or organisations that could inappropriately influence or bias the content of the paper.

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