

Short Communication

Prevalence of dental disorders in an abattoir population of horses in South Africa by oral examination of intact and bisected heads

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Highlights

- The prevalence of dental disorders in an abattoir population of horses was determined.
- Findings during oral examination of intact and bisected heads were also compared.
- Older horses had a higher prevalence of infundibular caries, diastemata and fractures.
- *Gasterophilus* larvae were detected in 20% of the heads examined.
- Oral examination of intact heads was adequate for diagnosing gross disorders.

Abstract

Dental care is an integral part of equine veterinary practice. The objectives of this cross sectional study were to describe the prevalence of dental disorders in an abattoir population of horses, and to compare oral examination of intact and bisected heads. Heads from 40 horses were examined, 19 males and 21 females, divided into immature, adults and older horses. Older horses in this abattoir population had a significantly higher prevalence of infundibular caries (91.7%), diastemata (66.7%) and fractures (58.3%), whereas dental wear disorders affected all age groups. *Gasterophilus* larvae were detected in 20% of the horses. The oral examination performed on intact heads was adequate for diagnosing gross disorders, but further examination is needed for reliably diagnosing minor disorders.

Keywords: Dental disorders, horse, oral examination, post-mortem

Dental disorders are commonly found during routine dental examination in equine practice (Brigham and Duncanson, 2000a; Walker et al. 2012) and during cadaver examinations (Anthony et al., 2010; Gere and Dixon, 2010). However, no studies have reported the extent of differences between ante- and post-mortem oral examinations, which is an important consideration when comparing data. The objectives of this study were to investigate the previously undetermined prevalence of dental disorders in different age groups of an abattoir population of South African horses, and to compare post-mortem oral examination of intact heads with examination of bisected heads.

A cross-sectional prevalence study was conducted on 40 heads from horses originating from a rural area that were consigned for routine slaughter between March and November 2012. An equal gender distribution, and between three age groups (immature: 2-5 years; adult: 6-14 years; older: ≥ 15 years) was targeted. Age was estimated from incisor dentition (Easley et al., 2011). Gender and body condition score (BCS) (9 point scale) were recorded ante-mortem. The study was approved by the University of Pretoria Animal Ethics Committee (Study V049-12).

Selection of heads for intact oral examination was based on ability to insert and open a Hausmann's gag following removal of a PVC cylinder placed in the mouth after slaughter. Heads were packed in bags with only the muzzle protruding to blind observers and examined using a gag, headlamp, dental mirror, and dental probe by two observers with a time limit of 5 min per head. Thereafter heads were severed transversely behind the incisors and bisected sagittally using a band saw. A detailed examination of the bisected oral cavity, using a dental probe to explore periodontal

pockets, was performed by two observers. Parasites detected in the oral cavity were placed in formalin for species determination.

The findings of each observer during the examination on intact heads were recorded on separate, standardised dental charts. Following examination on bisected heads, joint findings were recorded on a separate chart and used for prevalence analysis. Disorders considered to have arisen during the slaughter process, such as acute incisor fractures, were not included. The Kruskal-Wallis test was used for the comparison of scores between categories of factors and the Chi-square test used to test for associations between BCS and gender or age. Kappa statistics were used for comparison of examination on intact and bisected heads. Commercial statistical software (Stata 12, StataCorp, USA) was used for all analyses. Significance level was set at $P < 0.05$.

Forty horses were included, 19 males (5 stallions and 14 geldings) and 21 females, divided into: immature: 13 horses (6 males and 7 females), median age 3.0 years; adults: 15 horses (7 males and 8 females) median age 9.0 years; and older horses: 12 horses (6 males and 6 females) median age 17.5 years. The median BCS for all horses was 4/9. Median BCS for the immature, adult and older groups were 4/9, 5/9 and 3/9, respectively. No significant differences in BCS were observed between age groups or between gender groups.

Fifteen heads underwent examination intact and bisected, and 25 heads were only examined as bisected heads. Prevalence of dental wear disorders and other dental disorders detected in the incisors and cheek teeth in the 40 horses is summarised in

Table 1. Focal overgrowths at Triadan 106 and 206 were associated with focal overgrowths at Triadan 311 and 411 in four (25%) horses with focal overgrowths. The mean number of lesions per affected horse for periodontal pockets, diastemata, infundibular caries and fractures was 3.8, 2.8, 3.3, and 1.5, respectively. The prevalence of dental wear disorders and other dental disorders by age group, and statistical comparison between age groups, is summarized in Table 2. The Kappa statistics for the oral examination on intact heads compared to oral examination on bisected heads are summarised in Table 3.

Table 1.

Prevalence (%) of dental wear disorders and other dental disorders detected in the incisors and cheek teeth during oral examination of an abattoir population of 40 horses, examined between March and November 2012 in South Africa. (Number of horses affected in brackets)

Classification	Dental disease ^a	Total % prevalence	95 % CI
Dental wear disorders	Sharp enamel points	97.5% (39)	0.868; 0.999
	Wave mouth	57.5% (23)	0.409; 0.730
	Focal overgrowths	40.0% (16)	0.249; 0.567
	Step mouth	15.0% (6)	0.057; 0.298
	Smile mouth	15.0% (6)	0.057; 0.298
	Ramped overgrowth	10.0% (4)	0.003; 0.197
	Slant mouth	7.5% (3)	0.016; 0.204
Other dental disorders	Periodontal pockets	70.0% (28)	0.534; 0.834
	Diastemata	40.0% (16)	0.241; 0.559
	Infundibular caries	35.0% (14)	0.206; 0.517
	Fractures	27.5% (10)	0.146; 0.439
	Buccal abrasions	17.5% (7)	0.073; 0.328

^a As defined by Easley et al. (2011)

Table 2.

Prevalence (%) of dental wear abnormalities and other dental disorders detected in the incisors and cheek teeth during oral examination of an abattoir population of 40 horses by age group. Horses were examined between March and November 2012 in South Africa. Number of horses affected in brackets and 95% CI.

Dental disease	Prevalence by Age Group			Probability (KW χ^2)
	Immature (2-5 years) (n = 13)	Adults (6-14 years) (n = 15)	Older (\geq 15 years) (n = 12)	
Sharp enamel points	92.3% (12) 0.639; 1.00	100.0% (15)	100.0% (12)	NS (2.08)
Wave mouth	53.8% (7) 0.251; 0.807	53.3% (8) 0.266; 0.787	66.7% (8) 0.349; 0.901	NS (0.57)
Focal overgrowths	23.1% (3) 0.050; 0.538	40.0% (6) 0.163; 0.677	58.3% (7) 0.277; 0.848	NS (3.23)
Step mouth	15.4% (2) 0.019; 0.454	0.0% (0)	33.4% (4) 0.099; 0.651	NS (5.67)
Smile mouth	7.7% (1) 0.002; 0.360	13.4% (2) 0.017; 0.405	25.0% (3) 0.055; 0.572	NS (1.48)
Ramped overgrowth	0.0% (0)	20.0% (3) 0.043; 0.481	8.4% (1) 0.002; 0.385	NS (0.0)
Slant mouth	7.7% (1) 0.002; 0.360	0.0% (0) 0.016; 0.0405	16.7% (2) 0.021; 0.484	NS (2.61)
Periodontal pockets	84.6% (11) 0.546; 0.981	53.3% (8) 0.265; 0.787	75.0% (9) 0.428; 0.945	NS (3.36)
Diastemata	38.5% (5) 0.139; 0.684	20.0% (3) 0.043; 0.481	66.7% (8) 0.349; 0.901	<0.05 (5.92)
Infundibular caries	7.7% (1) 0.002; 0.360	13.4% (2) 0.017; 0.405	91.7% (11) 0.615; 0.998	<0.001 (23.69)
Fractures	7.7% (1) 0.002; 0.360	13.4% (2) 0.017; 0.405	58.3% (7) 0.278; 0.848	0.014 (8.49)
Buccal abrasions	15.4% (2) 0.019; 0.454	20.0% (3) 0.043; 0.481	16.7% (2) 0.021; 0.484	NS (0.55)
<i>Gasterophilus</i> larvae	38.5% (5) 0.139; 0.684	13.4% (2) 0.017; 0.405	8.4% (1) 0.002; 0.385	NS (4.10)

NS □ not significant at $P < 0.05$

Table 3.

Kappa statistics comparison between oral examination of intact heads and oral examination of bisected heads.

Dental disease	Kappa value	95 % confidence interval	Rating ^b
Rostral focal overgrowth	1.000		Perfect
Fractures	0.775	0.477; 0.848	Substantial
Age	0.665	0.580; 0.845	Substantial
Periodontal pockets lingual side	0.537	0.100; 0.722	Moderate
Ramped overgrowth	0.477	-0.482; 0.482	Moderate
Caudal focal overgrowths	0.423	0.318; 0.451	Moderate
Buccal abrasions	0.286	-0.047; 0.325	Fair
Slant mouth	0.286	-0.023; 0.451	Fair
Diastemata	0.231	0.154; 0.325	Fair
Infundibular caries	0.231	-0.071; 0.286	Fair
All teeth erupted	0.205	0.100; 0.323	Fair
Sharp enamel points	0.154	-0.111; 0.229	Slight
Wave mouth	0.149	0.100; 0.459	Slight
<i>Gasterophilus</i> larvae	0.100	-0.125; 0.177	Slight
Periodontal pockets buccal side	-0.071	-0.125; -0.023	Poor

^b Landis and Kock, 1977

Gasterophilus larvae were found in periodontal pockets in eight (20.0%) of the horses. Up to 80% of the heads examined in May and June (winter in the Southern Hemisphere) had larvae in the oral cavity with each pocket containing up to 15 larvae. Larvae were identified as second instar *G. nasalis* and *G. pecorum*. One horse had multiple larger larvae attached to the soft palate (Fig. 1).

Fig. 1.

Gasterophilus larvae attached to the soft palate. Rostral is to the right.



The older age group in this abattoir population had a significantly higher prevalence of cheek teeth diastemata (66.7%), infundibular caries (91.7%) and fractures (58.3%). Dental wear disorders and other dental disorders were found widespread within the study population examined. Dental wear disorders were found in all age groups with a higher prevalence than in other abattoir population studies (Brigham and Duncanson, 2000b; Anthony et al., 2010).

Gasterophilus intestinalis, *G. nasalis*, *G. haemorrhoidalis*, *G. inermis*, and *G. pecorum* have been reported in the horse (Principato, 1989). Osterman Lind et al. (2012) recently reported *Gasterophilus* larvae to be commonly found in the oral cavity during routine dental examinations. Similar to a previous report (Smith et al., 2005) *Gasterophilus pecorum* were also found in the soft palate, which might indicate a migration route that involves attachment to the soft palate. The prevalence of *G. pecorum* is generally low, consequently there are few reports of this parasite and the

clinical implications of larvae affecting the soft palate are currently undetermined. A seasonal pattern was noted in the present study as larvae were only found during the winter months.

The abattoir origin and relatively low number of horses enrolled in this study is recognized as a limitation for generalizing the study conclusions, particularly as the horses enrolled were considered likely to have received little or no routine dental care, and no ante-mortem oral examination was possible. Nonetheless, a 5-minute oral examination with a Hausmann's gag, headlamp and mirror may be sufficient to detect obvious disorders in similar populations. However, minor disorders are less likely to be detected during time-limited examination and more time, as well as additional diagnostic imaging modalities should be utilised to facilitate detection of less obvious disorders, or multiple lesions.

Conflict of interest statement

No conflict of interest is declared.

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