Can horse-owners be trained to evaluate facial expressions in photographs of ridden horses?

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BACKGROUND: Musculoskeletal pain is a common cause of poor-performance. Many horse-owners fail to recognise lameness. Treatment is reliant on recognising that a horse is in pain and veterinary investigation is required. A sizable population of horses with lameness are still in ridden work (Greve and Dyson, 2014; Dyson and Greve, 2016), suggesting a need to improve horse-owner education in the recognition of pain. A Facial Expression of Ridden Horses Ethogram has been published (Mullard et al., 2017). This showed that the total pain score was higher in horses experiencing musculoskeletal pain compared with non-lame horses and after abolition of pain using diagnostic analgesia.

Figure 1a.

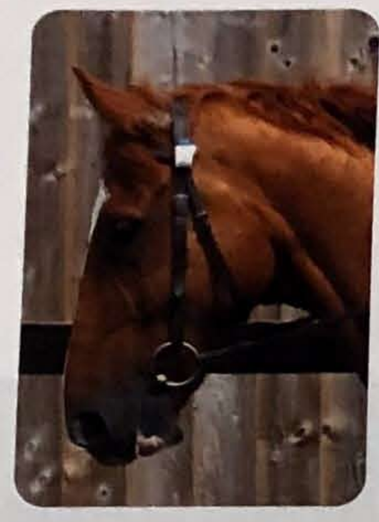


Figure 2.

AIMS:

i) To evaluate the ability of horse-owners to apply a ridden-horse facial expression ethogram compared with a trained analyst
ii) To determine if by application of a pain-score to each facial expression, lame and non-lame horses could be differentiated
iii) To identify improvements for future training

METHODS

Training: Volunteer horse-owners received on-line training on using a Facial Expression of Ridden Horses ethogram, adapted from Mullard *et al.*, (2017). It contained 5 categories: Head, Ears, Eyes, Lips, Mouth and Tongue. For each expression within the categories, the participants could select "Yes", "No", "I can't see" and "Unsure" depending on which expressions they identified in the corresponding horse.

Application of training: Each participant applied the ethogram to one full head photograph of up to 60 randomized, lame (Figure 1a,b) and non-lame (Figure 2) ridden horses. A trained analyst (SJD) also assessed all photographs of the heads.

Assignment of pain score: The expressions that horse-owners identified were then used to assign a pain score for each horse based on Dyson et al (2018).

Data analysis: Participants' results for each facial area were compared with the trained analyst using Fleiss Kappa analysis. The median of all participants' facial pain scores for each horse were compared by Mann-Whitney U (Wilcoxon rank-sum) test.

FIGURE 3. Median pain scores of 60 horses calculated from the facial ethograms completed by horse-owners'. a) lame n=40 or b) non-lame n=20 horses. The median is shown by the vertical line within the grey box, which represents the 1st to 3rd quartiles. Whiskers of the box plots represent the 5-95th percentiles. Outliers beyond this are coloured blue. The red stars represent SJD's pain score for each horse.

Figure 3
a) Lame Horses

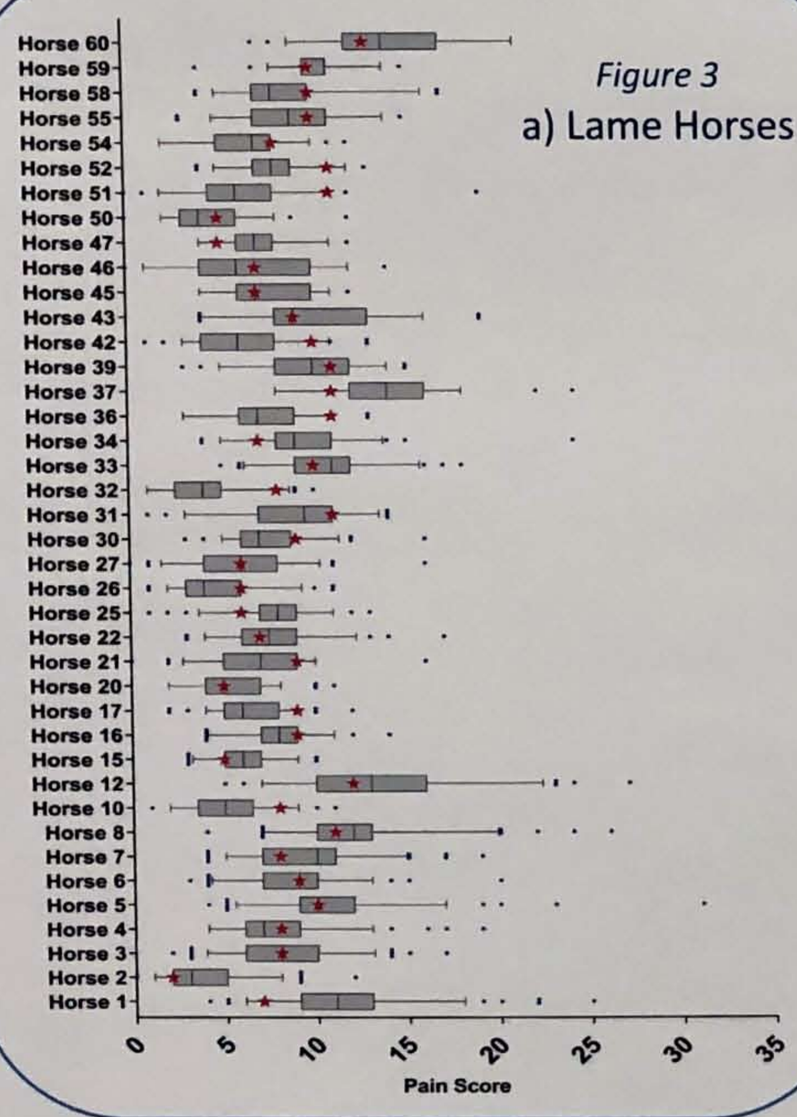
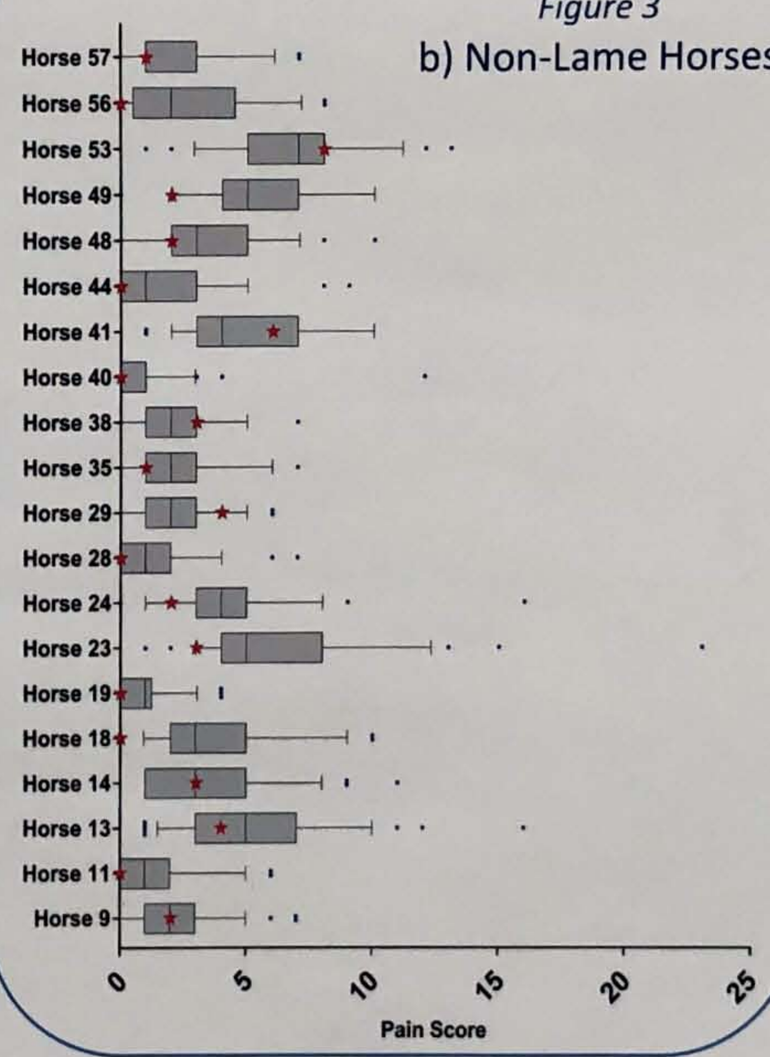


Figure 3
b) Non-Lame Horses



RESULTS

- A total of 134 horse-owners completed the study.
- Compared with the trained analyst's (SJD) scores:
  - Kappa analysis of the ethogram scores demonstrated excellent agreement for tongue (>0.81), moderate for head, ears and lips (0.41-0.6) but fair for eyes, nostrils and mouth (0.2-0.4).
  - Facial pain score analysis showed good agreement in 59/60 horses i.e. SJD's score lay within the 95th percentile of horse-owners' scores (Figure 3).
- The median pain scores for lame and non-lame horses were significantly different for both SJD and participants ($p<0.001$).

DISCUSSION: Horse-owners could be trained to evaluate the facial expression in photographs of horses' head and the ethogram scores for each region of the head showed excellent to fair agreement with a trained assessor. A limitation was the angle photograph of each horse's head which prohibited scoring of some categories. The majority of horse owners were able to assign pain scores to photographs that were similar to Dr Dyson's pain score; however the ranges varied considerably among horses. With assessment of pain or lameness, there is often some inter-assessor disagreement (Fuller *et al.*, 2006), although for some horses this appeared to be more apparent than others. Nevertheless, the horse-owners were still able to distinguish a higher median pain score in lame compared with non-lame horses.

Figure 1b.

CONCLUSIONS: Training of horse-owners in the recognition of facial pain in photographs of ridden horses is feasible and pain scores that the horse-owners produced were comparable with those of an expert equine clinician (SJD). Overall, these data suggest that the training and ethogram can be used by horse owners to produce a meaningful pain score that could help them identify musculoskeletal pain in ridden horses.

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