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The effects of feedback from horse welfare assessments

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Abstract

This study was designed to determine whether feedback from welfare assessments, using the Horse Welfare Assessment Protocol, affected actual horse welfare in 21 stables. After the first assessment, stable managers in the high feedback (HF; n = 10 stables) group were supplied with extensive information and support regarding the welfare measures and relevance of the results. The low feedback (LF; n = 11 stables) group only received the results without additional information. Upon re-assessment, six months later, no significant changes were seen in the stable overall (SO) score in either group. Significant changes occurred in individual measures; in the HF group more fresh-air inlets were open but water drinker function and ocular discharge deteriorated. In the LF group, the feeding troughs were cleaner but mane and tail condition deteriorated. Both groups had cleaner water troughs and less equipment chafing but the sum of relative air humidity (RH) and temperature (T) deteriorated. Significant decreases occurred in the stable welfare issues (SWI) score; the HF group decreased from 93.3 to 72.0 and the LF group from 113.3 to 91.3. There were also non-significant changes; in the HF group, 71 measures and five stables improved while 63 measures and five stables (50%) deteriorated. In the LF group, 65 measures and seven stables improved while 62 measures and four stables deteriorated. The observed improvements in both groups suggest that assessment alone (with no detailed feedback) might raise awareness but we cannot yet conclude whether or not the type of feedback affects overall horse welfare.

Keywords: *animal welfare, equine, Horse Welfare Assessment Protocol, improving horse welfare, protocol, welfare assessment*

Introduction

The domestication of the horse commenced thousands of years ago but their basic needs (eg social contact and long feeding time) remain relatively unchanged from that of feral free-living horses (Søndergaard *et al* 2004). These needs are not always met in contemporary horse-keeping in regards to resource availability and opportunities to express innate natural behaviours. The number of horses kept in Sweden is increasing and many more horses are now used recreationally (Braam 2010; Jordbruksverket 2015). The knowledge, education level and background of horse owners vary (Viksten *et al* 2016), as they also do for owners/managers of other animal species (Heleski & Zanella 2006). However, inadequate knowledge may result in owners making poor and scientifically unsound decisions concerning animal housing and management that may, in turn, cause welfare problems. Effective horse welfare assessment can identify problems and risk factors which might then be prevented by providing assessment outcomes and related information to owners (Visser *et al* 2014); informed management decisions may also directly improve welfare (Blokhuis *et al* 2010).

Several protocols have been developed to assess horse welfare (NEWC 2008; AHIC 2011; Wageningen UR 2012; AWIN 2015; Viksten *et al* 2017) but international standardisation and a gold standard for many of the measures used are lacking (Main 2014), thus hampering meaningful international comparisons. The recently developed Horse Welfare Assessment Protocol (HWAP) (Viksten *et al* 2017) was built based on the Wageningen UR (2012) protocol. Both protocols aimed to include more animal-based measures (eg coat quality, lameness, ocular discharge) and are developed in line with the Welfare Quality® (WQ) system (Blokhuis *et al* 2010). However, a standardised way of providing stable managers and horse owners with feedback from these systems, enabling and encouraging implementation of research outcomes, is lacking.

The inclusion of a feedback loop and assessment of system improvements over time may be a critical component to the holistic approach being advocated in animal welfare (Blokhuis *et al* 2003). This would also support the growing demand for the feedback of horse welfare assessment outcomes that supplies more than just a list of negative

Table 1 Increases and decreases in welfare scores between assessments presented as number of measures per stable and group. Stable managers' education and years of experience of keeping and working with horses are also shown. Trend in welfare measures indicates if the stable had more measures of improved (+) or deteriorated welfare (–).

Group	Stable number	Stable managers education and years of experience with horses	SWI score		Significant changes between assessments	Number of measures indicating improved welfare at 2nd assessment	Measures indicating deteriorated welfare at 2nd assessment	Trend in welfare measures
			First assessment	Second assessment				
HF	7	Basic, 25 years	7.1	6.5		6	11	–
	9	Basic, 20 years	3.4	3.9		2	6	–
	10	No education, 15 years	4.4	2.5		3	4	–
	11	Basic, 30 years	16.9	10.3		12	3	+
	14	Basic, 20 years	10.4	6.8		10	7	+
	16	Basic, 30 years	12.5	9.7		12	3	+
	22	Basic, 30 years	15.1	11.7		11	5	+
	23	Advanced, 40 years	11.8	12.8		5	10	–
	24	Basic, 30 years	8.4	5.3		7	3	+
	26	Basic, years unknown	3.2	2.6		3	11	–
		Sum of group	**93.3**	**72.0**	***P* < 0.05**	**71**	**63**	
LF	1	Basic, 30 years	16.0	11.5		14	5	+
	6	Basic, 20 years	5.6	4.8		3	4	–
	12	Basic, 31 years	6.3	3.2		9	7	+
	13	Advanced, 7 years	11.3	9.0		6	4	+
	15	Advanced, 20 years	4.5	4.0		3	1	+
	17	No education, 40 years	10.9	10.7		5	10	–
	18	No education, 20 years	11.7	11.5		11	10	+
	19	Advanced, 15 years	13.2	7.9		10	3	+
	20	Unknown	17.7	14.6		5	7	–
	21	Basic, 20 years	10.0	9.4		6	8	–
	25	No education, 30 years	6.0	4.8		5	3	+
		Sum of group	**113.3**	**91.3**	***P* < 0.05**	**65**	**62**	

aspects and non-compliances with legislation (Leckie 2001; Viksten *et al* 2016). However, a lack of specific advice on how improvements could be implemented and how non-compliances should be addressed may result in either no change in management or even alterations that decrease welfare or fail to prevent future welfare issues. A previous study by Viksten *et al* (submitted) revealed a preference for horse owners to receive feedback from welfare assessments. Based on those results, this study aims to compare the effects of two types of feedback, extensive and less extensive, on changes in actual horse welfare in a number of stables.

Materials and methods

This study was approved by the Uppsala Ethical Committee (permit numbers C145/11 and C319/11).

Twenty-one stables were used (three livery yards and 18 riding schools) with a total of 365 horses (aged 5–6 years; 251 geldings, 110 mares, four stallions) from various housing conditions (22 horses kept in group loose-housing, 283 single boxes, 60 single tie-up stalls). Stable managers had varying educational backgrounds and experience (Table 1).

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Table 2 The content of the feedback that the two groups received after the first assessment.

Group	HF (ten stables)	LF (eleven stables)
Content of feedback	1. Information document with welfare background of assessment measures 2. Microsoft Office Excel® sheet (computer file and a paper copy) with results from assessments per individual horse, an average for each measure for the stable and the average value of all participating stables (anonymous) in the study (benchmark) 3. Paper copies of completed HWAP scoring sheets for each horse 4. Support telephone call regarding results and feedback just after receiving the data and again three weeks later 5. Examples of specific solutions in relation to those measures where the average was below benchmark	1. Microsoft Office Excel® sheet (computer file and a paper copy) with results from assessments per individual horse

The stables had been previously assessed (Viksten *et al* 2016) and were re-assessed here using the same HWAP protocol (Appendix 1; see supplementary material to papers published in *Animal Welfare*; https://www.ufaw.org.uk/the-ufaw-journal/supplementary-material). The first assessments took place in January–March and the second roughly six months later in September–November 2014. The stables were divided into two groups by first pairing up those of approximately the same type (eg riding school) and number of horses. The stables in each pair were then randomly allocated to one of two groups of eleven and ten stables, respectively. Stable managers in the respective groups were provided with the assessment outcomes and one of two types of feedback within a month of assessment. The high feedback group (HF) received the results plus specific information and support regarding the outcomes, background information on the assessment measures and details of possible improvements, whereas the low feedback group (LF) only received the assessment results (Table 2). Both stables were given results of all individual horses.

The second assessment was conducted in the same way as the first. Horses that were assessed in only one of the two assessments, and measures where no welfare problems were observed during either assessment, were excluded from analysis (Appendix 1; https://www.ufaw.org.uk/the-ufaw-journal/supplementary-material). Similarly, measures such as housing or paddock size, ceiling height etc were excluded since such resources did not change between assessments.

The stable managers' formal education was divided into three categories: none, basic and advanced. Basic included: single courses on horse management (eg on feeding regimen), basic level courses for riding instructors (eg from the Swedish Equestrian Federation or Icelandic Horse Federation), and trainer education (level A-C or equivalent). Advanced level included university level education (BSc or MSc) in animal husbandry or other subjects associated with horse management.

Data management and statistics

All HWAP results (scores) were converted so that the scoring system for all measures used a 0–2 scale where 0 meant least negative impact on welfare (closest to ideal state) and 2 meant the most severe impact on welfare (farthest from ideal state). This meant that results from measures originally scored 0 or 1 were altered so that 0 remained 0 and score 1 was altered to 2. This was done to harmonise the scoring to a binary system of 0–2. The measure Body Condition Score (BCS), which was originally on a five-point scale with half-points in between (Carroll & Huntington 1988; Wright *et al* 1998) was altered so that 3 was scored as 0 (closest to ideal state), 2 and 4 were scored as 1, and 1 and 5 were scored as 2. Averages for each measure were calculated for every stable (all horses in the same stable). The score conversion served to enable the calculation of an average overall score for each stable (all measures included) and converted the scores to a continuous scale. These stable overall (SO) scores were analysed using a paired *t*-test (for normally distributed data) and a Wilcoxon signed rank test (for non-normally distributed data) to determine if significant changes had occurred between assessments. A Ryan-Joiner test was used to determine normality of the score distribution.

The averages of those measures which detected welfare problems (measures with an average above 0; ie occurrence of a welfare problem in the first assessment) were summed in each stable thereby converting data to a continuous scale. These stable welfare issue (SWI) scores for the first and second assessment, as well as for the high (HF) and low (LF) feedback groups, were then analysed using a paired *t*-test and a Wilcoxon signed rank test as above.

All analyses were run at 5% significance level using the statistical package Minitab® (version 16.1.0, Minitab Ltd, UK).

Table 3 Differences per welfare measure between assessments in the HF and LF group presented as the change in welfare issues (number of stables with issues in assessment one – number of stables with issues in assessment two).

Measures	Difference between assessments (change in number of stables)	
	HF	LF
Body condition score	–5	–3
Concentrate trough cleanliness	5	8*
Undisturbed feeding	–1	2
Estimated time with available roughage	1	1
Drinker function	–6	–3
Water cleanliness	7*	5*
Noise	–1	1
Sum of RH and T	–5*	–7*
Open fresh-air inlet	4*	3
Lameness	1	0
Hoof condition	–1	0
Wounds	1	–2
Bumping into things or slipping when moving to paddock	0	–1
Paddock surface quality	1	0
Coughing	1	0
Ocular discharge	–8*	–6
Nasal discharge	0	–1
Skin condition	0	3
Coat condition	1	2
Mane and tail condition	–5	–6*
Mould in stable	0	2
Condensation	1	3
Roughage without water	2	0
Mouth health	4	3
Equipment chafing	8*	5*
Back palpation	1	2
Rug cleanliness	1	0
Stereotypy	0	–1
Undesirable behaviour	–2	1
Enrichments	–2	0
Behaviour towards assessor	3	1
Possibilities for visual horizon	2	2

* Measures that differed significantly ($P < 0.05$) between assessments.

Results

Eighty-four of the 449 horses used in the first assessment did not participate here because they were ill, dead, re-homed, sold etc). This yielded a study total of 365.

Analyses of SO scores showed no significant differences. On the other hand, significant differences in individual measures between assessments were found in both feedback groups; (six in HF, five in LF); four of these measures coincided in both groups (Table 3). The HF group showed significant improvement in water trough cleanliness, equipment chafing and number of open fresh-air inlets but also significant deterioration in water drinker function, ocular discharge and the sum of relative air humidity (RH) and temperature (T). The LF group improved significantly in feeding and water trough cleanliness and in equipment chafing but deteriorated significantly in mane and tail condition and in the sum of RH and T.

The SWI scores were significantly improved between assessments in both the HF and the LF group. There were significant decreases between assessments in SWI median scores for both the HF (ten stables: $W = 5.0$; $P = 0.025$) and the LF (eleven stables: $W = 0.0$; $P = 0.004$) groups. Eight stables improved (SWI average closer to 0) and two deteriorated (average further from 0) in the HF group whereas all LF stables improved (Table 1).

There were also several non-significant changes in individual measures indicating both improved and deteriorated welfare; five (50%) stables improved and five (50%) deteriorated in HF whilst seven (64%) improved and four (36%) deteriorated in LF (Table 1). For some measures, more SO scores improved than deteriorated (eg water cleanliness, mouth health and equipment chafing): 17 (60.7%) in the HF group and 16 (57%) in the LF group. However, for other measures (eg BCS and ocular discharge), more stables deteriorated than improved; ten (35.7%) in HF and nine (32%) in LF, respectively.

Discussion

These findings reveal significant improvements between assessments in SWI scores regardless of the type of feedback the stable received. Although it cannot be ruled out that changes might have occurred even if there had been no feedback, changes in both groups suggest that the assessment alone might have worked to raise awareness and generate welfare improvements. This finding is in line with those from other research areas, such as healthcare and psychology (Ajzen 1985; Jansen *et al* 2010), that also found feedback to improve outcomes and implementations of new behaviours. Collectively, those studies suggested that many other factors can affect implementation of advice and behavioural change regardless of the amount of support and information given. For instance, according to the theory of planned behaviour (Ajzen 1985), factors such as attitude, perceived behavioural control, subjective norms and intentions are all important in the implementation of new knowledge. A system that aims to increase welfare will very likely require the provision of feedback capable of addressing the characteristics and requirements of individual animal owners rather than just supplying blanket information (Jansen *et al* 2010; Visser & Van Wijk-Jansen 2012).

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The significant improvements observed in both feedback groups involved features that could easily be improved without large financial investment or large structural and managerial changes, eg better trough cleanliness and opening more (existing) air inlets. The routines used for trough cleaning are easily altered and our results suggest that the stable managers became aware of the issues after the first assessment and took steps to improve their scores.

Clearly, non-managerial changes can occur between assessments which are independent of the type of feedback. For example, seasonal changes may have affected the welfare outcomes, as the stables were first assessed in winter and early spring, received feedback and were then re-assessed approximately six months later in the autumn. Both the reduction in equipment chafing after the first assessment and the more frequent ocular discharge in the HF group at the second assessment may have been due to seasonal effects. Direct and indirect seasonal effects, such as weather conditions (and time spent in stable), insect pressure, feed handling routines, ventilation and dust levels (which can irritate the horses' eyes [Wålinder *et al* 2011]) are independent of the type of feedback. More mane and tail scratching in the LF group at the second assessment also probably reflected greater insect pressure, occurrence of eczema or sun sensitivity due to the prevailing weather conditions (Scott & Miller 2011). Inclusion of such factors in longitudinal studies of the effect of feedback on welfare outcomes may better explain such outcomes.

High RH and T values in the stables were frequently observed; this reflected either a lack of ventilation or that existing systems required renovation or adjusted settings. Despite the opening of more fresh-air inlets after the first assessment the RH and T readings had worsened between assessments. This might have been caused by warmer weather and sub-optimal operation of the ventilation systems. Many owners described a relative lack of knowledge about ventilation, so advice was provided on how to decrease RH and T to an acceptable level. The advice was to increase airflow through the inlets (ie opening them more) or ensure greater mechanical ventilation efficiency by altering the setting according to the manufacturer's instructions (Ehrlemark 1994; Wålinder *et al* 2011; CIGR 2012). Managers were also advised to ask capable contractors for quotes on the costs of rebuilding or installing new ventilation.

No improvement of paddock surface quality was observed (eg reduction of deep mud, unevenness, rocks). Many stable managers were in direct charge and did not have to go through a lengthy decision-making process with a committee or individual horse owners before they could make changes. However, addressing such welfare issues requires sufficient funds, locating and hiring a suitable contractor, applying for permits and timing the effort when horses are either moved to another facility or on summer pasture. This may also explain why stables had not corrected their malfunctioning ventilation systems or paddock surfaces during the six months between assessments. Another possible reason for the lack of remedial action in some measures may have been that the managers did not believe in the results or the importance of the assessment or individual measure. However, although the education levels of staff were associated with the occurrence of injuries and other welfare issues in previous studies (Lönnell *et al* 2012), the present findings suggest that the managers' education and experience were not related to the implementation of improvements arising from the feedback, or the improvement of welfare scores.

The authors recognise that creating an overall score for the stables enables comparisons between stables but will however not enable a complete interpretation of results thereby suggesting improvements on welfare issues. For example, the managers will need to be made aware of how many animals score differently from normal and to what extent, which is important to include in feedback from assessments.

Successful implementation of evidence-based research outcomes in human healthcare routines (Rycroft-Malone & Bucknall 2010; Seers *et al* 2012) and in quality assurance programmes in the livestock industry (Edge & Barnett 2009) suggest that similar strategies could be applicable to the horse industry through educational programmes, dissemination of best practices for horse management etc. Although best practices that underpin legislation are sometimes available (eg in Sweden), their formulation is often vague and should be updated according to contemporary research outcomes. Ideally, too, stable personnel should take part in the actual assessments, receive detailed explanation of the findings, understand the information, and receive support that facilitates their improvement of horse management and welfare. Furthermore, provision of feedback with suggested changes and information on welfare should be tailored to the personality type of the person receiving feedback in order to improve managerial regimes (Jansen *et al* 2010). Factors such as their trust in external information, attitude towards the outside world, the social context and their ethical viewpoint on animal welfare (Heleski & Anthony 2012) also affect how animal owners perceive the information (Jansen *et al* 2010). Therefore, implementation strategies need to cater for different kinds of horse owners (and stable managers) (Visser & Van Wijk-Jansen 2012). Motivational factors must also be identified (Viksten *et al* submitted) because they are unlikely to be identical to those in the food-animal production sector where, for instance, pressure from interest groups and consumer awareness are more obvious (Blokhuis *et al* 2010).

Systems for assessing and improving horse welfare should also consider the industry's requirements. Ideally, the process should engage members of the horse industry, researchers, animal welfare assessors, healthcare personnel, agronomists, lobby groups and government representatives. Such a holistic approach, as advocated by Blokhuis *et al* (2003), would increase confidence among

the various interest groups in the assessment system and improvement strategies and thereby help to ensure their effective implementation.

The present findings indicate that feedback in general can have a helpful effect on horse management and welfare; we also identify room for improvement of welfare assessment systems. Continued research should facilitate a cycle of animal welfare assessment and improvement based on scientifically sound knowledge.

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