

Is a mounted award ceremony in equestrian sport relevant to animal welfare?

H Gehlen^{*†}, C Thöne-Reineke[‡], R Merle[§], S Pichon[#] and H Linnenbrügger[†]

[†] Equine Clinic, Free University Berlin, Oertzenweg 9b, D-14163 Berlin, Germany

[‡] Institute of Animal Welfare, Animal Behaviour and Laboratory Animal Science, Free University Berlin, Germany

[§] Institute for Veterinary Epidemiology and Biostatistics, Free University Berlin, Germany

[#] Private veterinary practice, Sommerhausen, Germany

* Contact for correspondence: Heidrun.Gehlen@fu-berlin.de

Abstract

Severe accidents befalling both horses and riders have been observed during award ceremonies in equestrian sports. We hypothesised that such ceremonies and subsequent laps of honour pose a significant risk to the well-being of horses, riders and third parties. Tournament riders' opinions were sought and analysis of accidents undertaken via an online questionnaire completed by 700 tournament riders participating in dressage and showjumping in Germany. While 31.3% of the riders reported feeling tense themselves during award ceremonies, greater tension was reported in the warm-up area and throughout the competition itself. In contrast, 48% of horses were at their most tense at award ceremonies and displayed the greatest amount of stress during the lap of honour. Sixty percent of survey participants felt award ceremonies created an increased risk of injury with riders citing stressed horses as being the principal cause. Only risks associated with the warm-up area were noted by a greater proportion of riders (66.6%). The most frequent cause of accidents at award ceremonies was deemed to be kicks. Horse participation at award ceremonies was deemed to be important for spectators and sponsors and, although over half the riders were in favour of compulsory participation with a horse, they expressed the desire for exceptions to be permissible by judge(s). This study supported the hypothesis that mounted award ceremonies have a negative impact on horse welfare.

Keywords: animal welfare, award ceremony, equestrian sport, horse, injury, stress

Introduction

Overview

The domestication of the horse dates back approximately 5,500 years (Outram *et al* 2009) and the process has seen the horse evolve from being draught or pack animals and meat suppliers to sports and leisure animals thereby forcing them to adapt to artificial, human-made environmental conditions (Hirschberg 2010). The Animal Welfare Act in Germany (in its currently valid 2021 version) has established, *inter alia*, that it is the responsibility of humans to protect the life and well-being of an animal and that inflicting pain, suffering or damage to an animal is forbidden. The extent to which horse usage causes the animal to suffer and be harmed has to be assessed in light of this basic principle. This is especially relevant in the case of competitive equestrian sports events, where horses are routinely exposed to physical and psychological stress. Therefore, Mellor's Five-Domain model (Hemsworth *et al* 2015; Mellor & Burns 2020), which integrates biological, functional and affective state orientations, could be applied

to equestrian sports events whereby the welfare implications to horses of human-animal interactions could be assessed, effectively and systematically.

Inextricably linked to equestrian sport events, award ceremonies became the focus of attention especially following the dramatic events of 2019 when a young rider tragically died after a fall with her horse during such a ceremony in Neuenkirchen, Germany (Osnabrück Police Inspection 2019). And, in another incident, a kick to the head of a tournament helper occurred at the award ceremony of the dressage team at the Olympic Games in Rio de Janeiro in 2016 (The Sun 2016). In the aftermath of these and other similar incidents, the frequency of media discussions on the subject increased rapidly (eg in the Reiterjournal, 6/2018, or in the St GEORG, 6/2019). Nevertheless, the 2018 Performance Test Regulations (Leistungs-Prüfungs-Ordnung: LPO) of the German Equestrian Federation (FN) define the award ceremony, including the lap of honour with the horse, under § 59, No 2.1, as part of the performance test (Leistungs-Prüfung: LP) and regard it as obligatory.

The nature and behaviour of the horse

During its evolution, the horse has developed into a steppe and flight animal with highly adapted sensory organs and behaviours (European Commission Discussion Paper 2019). Therefore, it is hardly surprising that every horse confronted with a sudden acoustic stimulus (applause played four times in a row) and rapid movement of an object (in the study a swimming toy pulled at a speed of 3.65 m s^{-1} , which may be comparable to waving flags, jumping spectators or running children) reacted with a flight response (Goslar 2011). This inevitable flight instinct can lead to the sudden escalation of situations of potential danger to humans and that cause stress to the animal. Knowledge of horses' physiological behaviour patterns is crucial in helping enable reliable classification of welfare. Sport horses must attain a high physical and psychological level during training and competition. Stress, defined as deviation from the normal state of rest (Selye 1955), can be measured through changes in behaviour, reactions of the autonomic nervous system, the neuroendocrine system and/or the immune system to so-called 'stressors' (Selye 1955; Carstens & Moberg 2000; de Camp 2020). To date, the literature covering equine stress has focused mainly on measures of heart rate, heart rate variability and cortisol levels (Christensen *et al* 2005; Niederhöfer 2009; Schmidt *et al* 2009, 2010; Stucke 2012; Stehouwer 2014). Apart from these objective measurements, behavioural observations are revealing. According to Bohnet (2007), traits such as tense body muscles, a raised neck, widened nostrils and wide-open eyes when viewed in context, allow assumptions to be drawn regarding horses' state of mind. The expression of defensive aggression, irritation, fear or panic is considered emotionally unpleasant (Bohnet 2007). Von Borstel *et al* (2009) compiled a list of behaviours from various studies which can all be signs of stress, discomfort, frustration or conflict. Among those listed are attempted tempo changes, walking backwards, bucking or laid-back ears. Kienapfel (2011) applied a behavioural catalogue with defined behaviours to the assessment of the 'discomfort' of the horse in the warm-up area. The intensity of the behaviour shown differs greatly between individuals: it can be relatively subtle or clearly shown to be a reactive behaviour (Marr & Krüger 2016).

Aim of the work

There have been no detailed studies carried out into the stress levels of horses and riders during award ceremonies and little research into injuries incurred either. With this in mind, tournament participants were surveyed as part of a bachelor's thesis in the Department of Equine Sciences at the Free University of Berlin, to gauge the experiences and opinions of dressage riders and showjumpers. This formed the basis of this study, evaluating the physical risk and mental stress associated with award ceremonies as well as the possible negative effects on horses' welfare. The hypotheses were that: (i) stress levels differ between different disciplines and levels of performance and that horses at higher performance levels are less stressed during the award ceremony; and (ii) that the award-giving ceremony and subsequent lap of honour pose a risk to horses, riders and third parties.

Materials and methods

Study questionnaire

A detailed questionnaire was developed for this purpose and put online using the survey tool Limesurvey 3 of the Institute of Veterinary Epidemiology and Biometry of the Free University Berlin during July 2019. It was disseminated via social media (Facebook) and an equestrian magazine (St GEORG). The questionnaire consisted of a total of 63 questions and any that were incomplete were omitted from the evaluation. Only dressage and showjumping riders who participate in riding tournaments and had already been placed were included in order to obtain homogeneous groups for the evaluation. Accordingly, the first questions, regarding tournament participation, placing and dressage/showjumping competitions, were set up as compulsory filter questions. The horse-related questions had to be answered for the horse with which they were currently (July 2019) placed most often (and, thus, participated most often in award ceremonies), to obtain the most accurate information possible.

Riders were asked about their riding qualifications. In Germany there are seven different performance categories (LK 1 [high] to 7 [low]) which depend upon the previous two years' performance badges and tournament successes. Additionally, they were questioned about the difficulty levels of the tournaments they have participated in with the horse. These are categorised from easy to challenging as E = preliminary, A = novice, L = elementary, M = medium and S = advanced.

Sub-questions regarding injuries, systematic desensitisation of the horse, dispensation and discipline-specific queries were displayed by means of set conditions (filter functions) and only accessible if previous answers were correct. Questions were mainly closed with the additional option of 'No answer.' Half-open questions contained the answer option 'Other' with a comment field. Two open questions rounded off the survey in case additional comments were required. Multiple answers were possible for a number of questions.

Statistical analysis was performed using IBM SPSS® Statistics Version 22 and graphs were generated using Microsoft Excel® 2019. Crosstabs were generated and possible associations were tested using the Chi-squared test. *P*-values of < 0.05 were assumed to be statistically significant.

Ethical approval

No personal or sensitive data were collected in the study. Participation was voluntary and anonymous. Prior to starting the questionnaire, participants were informed in detail about the aims of the study and the evaluation of the data. Consent had to be actively given by each participant.

Thus, due to the nature of the study only including data from questionnaires, ethical approval was not required according to the German animal welfare law and since neither personal rights nor German and European data protection laws could be violated, we did not apply for institutional ethical approval.

Results

Questionnaire

The questionnaire was accessed 1,147 times and a total of 700 questionnaires evaluated. Of these, 663 participants were female (94.7%) and 35 male (5%). Further general results are presented in Table 1.

Stress for the rider at tournaments

The self-reported stress for the riders was generally higher in the test ($n = 387$; 55.3%) and warm-up ring ($n = 344$; 49.1%) than in the award ceremony ($n = 219$; 31.3%). However, the option 'very tense' was chosen most often for the award ceremony. A significant association was found between the tension throughout the tournament itself and during the award ceremony ($P < 0.001$). A definite connection was also demonstrated between the specific discipline and the tension at the award ceremony ($P < 0.001$). Showjumpers were significantly calmer and less tense than the dressage riders. In percentage terms, 14.4% of the dressage riders ($n = 42/291$) stated that they were very calm, while 15.5% were very tense ($n = 45/291$). Among the showjumpers, 37.1% were very calm ($n = 63/170$) and 6.5% very tense ($n = 11/170$). A significant influence of the frequency of participation in competitions or the number of horses taking part on the tension in award ceremonies could not be found.

Over half (54.9%) chose the obligatory participation, including a lap of honour with horse. Dressage riders chose voluntariness of participation more often than expected, while showjumpers ticked this box less often than expected (Figure 1).

Risk assessment during tournaments

The risk of injury at the award ceremony was reported as high by 21% ($n = 147$) and increased by 39.6% ($n = 277$) of participants. Riding in the warm-up ring represented an increased risk of injury for 53% ($n = 371$) of the respondents (Figure 2). In comparison, the survey participants rated this as the riskiest scenario overall.

A significant association was shown between the risk assessment of the tournament and that of the award ceremony ($P < 0.001$). There was also an association between the rider's tension at the award ceremony and their risk assessment ($P < 0.001$). Showjumping riders rated the risk of injury at the award ceremony significantly more often than statistically expected as low to non-existent. Class M or S riders rated the risk of injury at the award ceremony higher than class E or A riders.

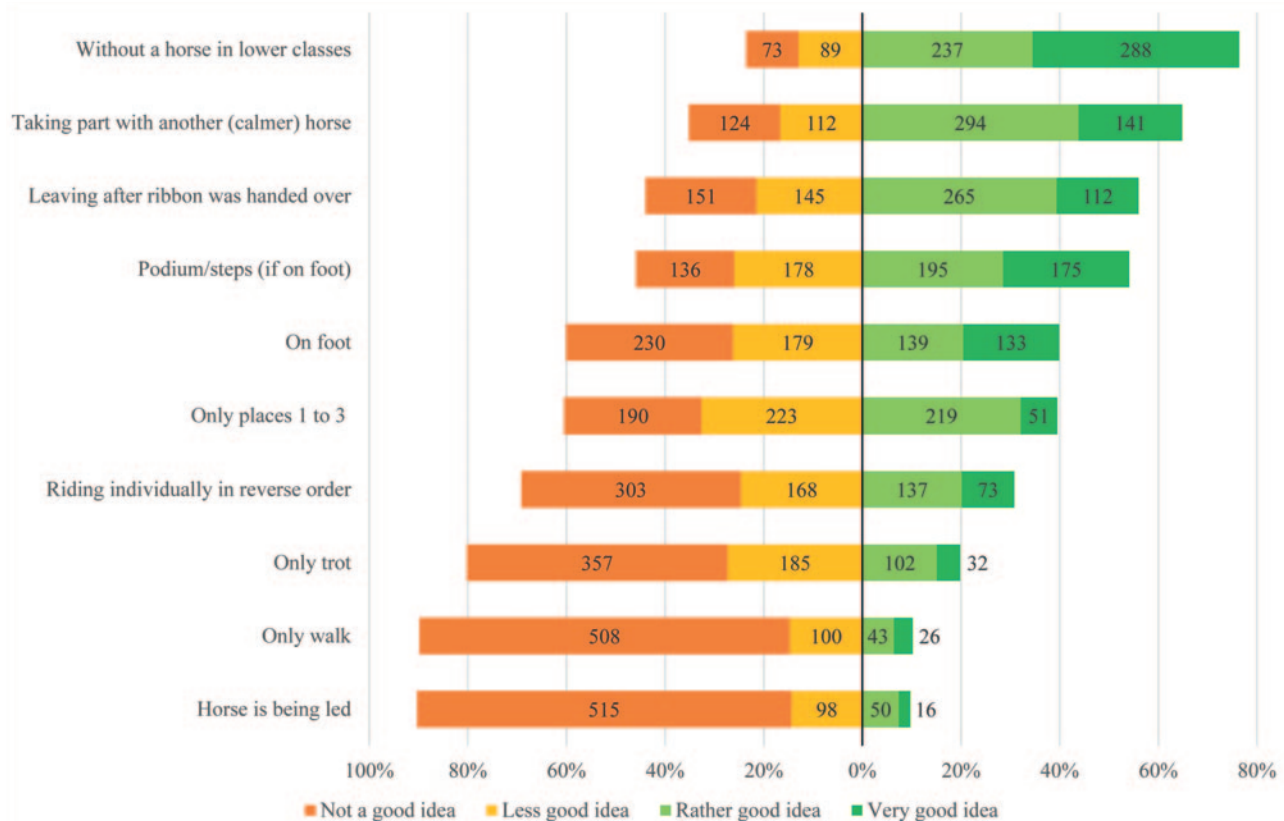
When asked whether judges and organisers complied fully with their obligation to ensure that award ceremonies were conducted in a safe and orderly manner, 59.4% ($n = 416$) of the tournament riders answered 'mostly' and 24.4% ($n = 171$) 'rarely.' That the placed riders themselves ensure a safe and orderly running of the award ceremonies was for 68.3% ($n = 478$) mostly and for 22.1% ($n = 155$) seldom the case.

Details on personal injuries as well as horses' injuries are presented in Table 2.

Table 1 General information on age/type of riders, years of riding experience, disciplines, tournaments per year, number of horses, performance classes and placings.

Factors	Number (%)
<i>Age of riders</i>	
18–30 years	402 (57.4%)
31–40 years	135 (19.3%)
41–50 years	82 (11.7%)
<i>Type of riders</i>	
Amateurs	626 (89.4%)
Professionals	72 (10.3%)
<i>Years of riding experience</i>	
< 11 years	72 (10.3%)
11–20 years	315 (45%)
> 20 years	311 (44.4%)
<i>Disciplines</i>	
Dressage	292 (41.7%)
Showjumping	170 (24.3%)
Dressage and showjumping	238 (34%)
<i>Tournaments per year</i>	
1–5	127 (18.1%)
6–15	366 (52.3%)
16–25	142 (20.3%)
> 25	54 (7.7%)
<i>Number of horses</i>	
1	324 (46.3%)
2	229 (32.7%)
≥ 3	147 (21%)
<i>Performance class dressage</i>	
6–4	563 (80.4%)
3–1	88 (12.6%)
Not specified	49 (7%)
<i>Performance class show-jumping</i>	
6–4	532 (76%)
3–1	63 (9%)
Not specified	49 (7%)
<i>Placings/class</i>	
E	–
A	181 (25.9%)
L	212 (30.3%)
M	165 (23.6%)

Figure 1



Evaluation of possible alternatives to the 'classic' award ceremony.

Injuries to third parties

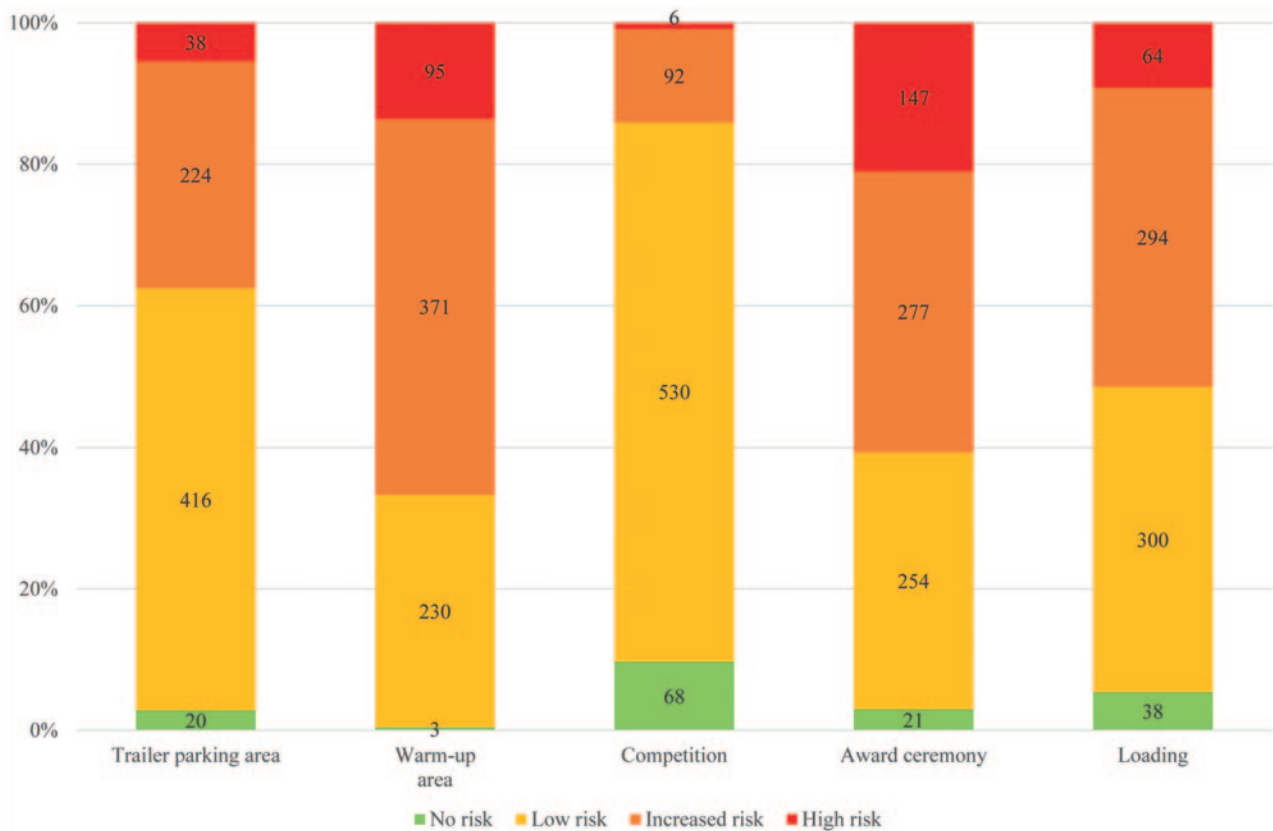
Two hundred and ninety-two respondents (41.7%) reported an accident befalling another rider at an award ceremony and 220 (31.4%) to another horse. Sixty-two respondents (8.9%) stated that a judge was injured by a horse, 35 (5%) observed injury to a course assistant and 34 (4.9%) to a spectator. Respondents who had already observed another rider or horse have an accident assigned a high risk of injury to the award ceremony significantly more often than participants who were yet to experience such a situation.

Behaviour of the horses

Riders generally rated their horses as only occasionally noise-sensitive ($n = 281$; 40.1%), reactive ($n = 282$; 40.3%) and overly attentive ('spooky') ($n = 240$; 34.3%). The horses were tensest at award ceremonies ($n = 336$; 48%); 16.7% ($n = 117$) were placed in the category 'very tense.' Specifically, 41.1% of the riders ($n = 288$) stated that their horse remained relaxed and attentive during award ceremonies, 25.6% ($n = 179$) said that the horse was tense, 14% ($n = 98$) stated that their horse enjoyed the award ceremony and 12.3% ($n = 86$) felt that their horse endured the award ceremony. Forty-six participants (6.6%) could hardly keep their horse under control during the award ceremony. Figure 3 shows which behaviour the riders surveyed

observed in their horses. The most common were 'backing off', followed by 'prancing' and 'starting to canter or trot.' A total of 42.9% ($n = 300$) of the respondents had already asked for special dispensation to be exempt from the award ceremony. And, in 53% ($n = 159/300$) of participants, the reason for this was a nervous, stressed or unmanageable horse. The request was granted in 94.3% ($n = 150/159$) of cases. There was a significant association ($P < 0.001$) between the tension of the horse at award ceremonies and tension in familiar surroundings and during the course of the tournament. Observing the tension at award ceremonies for each discipline, it was found that dressage horses were very tense more often than expected, in contrast to showjumpers. Showjumping horses were very relaxed more often than expected. It could be shown that the basic assessment of the riders about their horse is related significantly to the tension of the horse at the award ceremony ($P < 0.001$): horses that were said never to be noise-sensitive, reactive or overly attentive were significantly more often very calm. Horses that were described as 'often' exhibiting these characteristics were significantly more often tense. There was also a significant association between the rider's tension and that of the horse at the award ceremony ($P < 0.001$).

Figure 2



Assessment of the risk of injury during tournament situations.

Stressors for the horses

As reported by their riders, most horses showed signs of stress during the lap of honour ($n = 502$; 71.7%), followed by 65.7% ($n = 460$) during applause and 64% ($n = 448$) during waiting/standing still (Figure 4). In contrast to dressage horses, showjumping horses reacted without signs of stress more often than expected to spectators, music, the lap of honour and objects around the arena. They also reacted without reported signs of stress significantly more often than dressage horses in response to applause and voices from the loudspeakers. There was a significant association between tournament experience and reportedly stressed horses for the stressors of spectators ($P = 0.041$), music ($P = 0.029$), voices from loudspeakers ($P = 0.010$), attaching the ribbon to the horse's bridle ($P = 0.002$) and objects around the arena ($P = 0.001$). No significant connection to the other stressors could be proven. Behavioural abnormalities, as seen in Figure 3, were described more frequently than expected the higher the reported stress level in the lap of honour ($P < 0.001$).

Preparation for the award ceremony

Two hundred and twenty-one horses (31.6%) underwent systematic desensitisation, according to the respondents. Less than a quarter ($n = 49/221$; 22.2%) of the riders stated that they were preparing specifically for the award

ceremony. A significant influence of specific desensitisation compared to 'general' systematic desensitisation regarding tension at the award ceremony could not be found ($P = 0.855$). A significant association between systematic desensitisation of the horse and tension in the award ceremony could be found ($P < 0.001$). The attempt to gradually habituate the horse to different aversive experiences was carried out significantly more often with horses that were very tense at the award ceremony and significantly less often with very relaxed horses.

Discussion

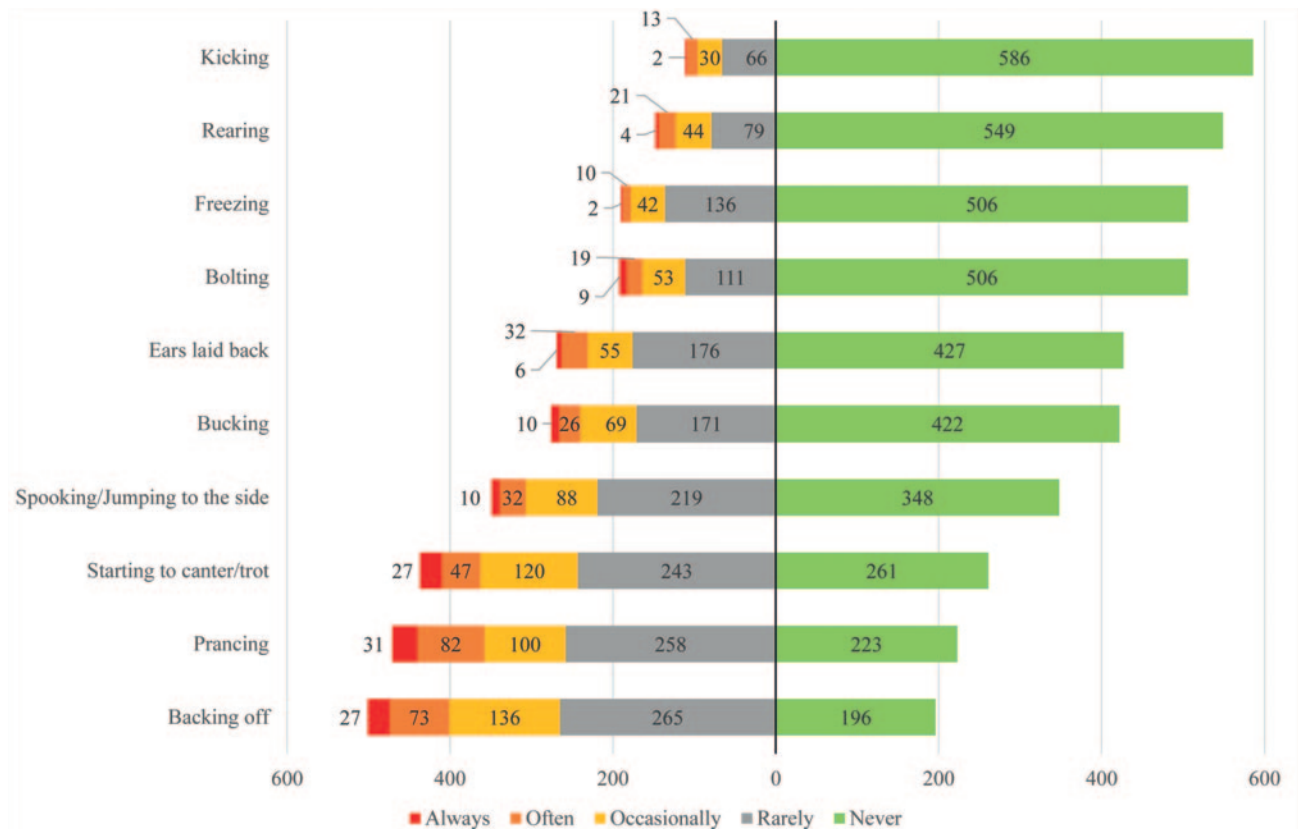
The hypothesis that the award-giving ceremony and, in particular, the lap of honour pose a risk for horses, riders and third parties was confirmed in this study suggesting a negative impact on horses' welfare.

Horse riding in general carries some risk of serious injury (Bleetman 2012; Zuckerman *et al* 2015; Chapman *et al* 2016; Bastard *et al* 2020). Literature from different countries worldwide reveals that most accidents happen to females, with children also at risk. The most common accident is when a rider falls from a horse, but unmounted humans are also at risk of injuries. Most of the injuries are uncomplicated, but serious injury and even death have been reported (Jagodzinski & De Muri 2005; Newton *et al* 2005;

Table 2 Details on personal injuries, injuries to individuals' own horse and to third parties during the award ceremony over an entire sports career.

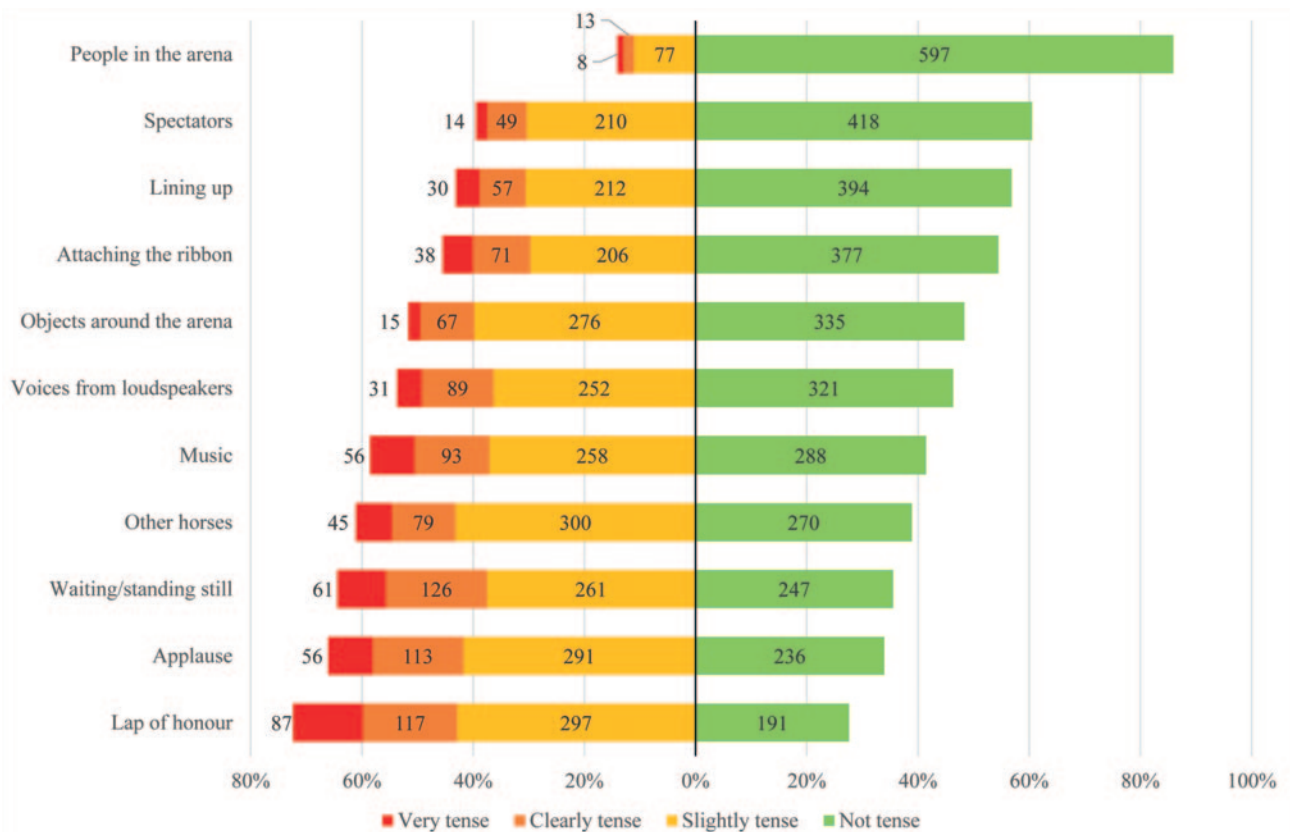
	Personal injuries	Horse injuries
Incidence	7.4%	7.6%
Triggers	Stressed horse (36.5%)	Stressed horse (64.2%)
	Rearing horse (30.8%)	Conflict with another horse (43.4%)
	Bolting horse (30.8%)	Fright (30.2%)
	Bucking horse (28.8%)	Bad ground conditions (15.1%)
Causes	Kicks (36.5%)	Kicks (58.5%)
		Collisions (34%)
Consequences	No injury (42.3%)	No injury (17%)
	Closed soft tissue injury (38.5%)	Lameness (50.9%)
	Cranio-cerebral trauma (13.5%)	Closed soft tissue injury (50.9%)
		Open soft tissue injury (32.1%)
		Veterinary care at the show (13.2%)
		Once veterinary care at home (26.4%)
		Several veterinary care at home (24.5%)
	Veterinary hospital care (3.8%)	

Figure 3



Behaviour of the horses at award ceremonies.

Figure 4



Stressors for the horses at award ceremonies.

Zuckerman *et al* 2015; Chapman *et al* 2016; Hall 2019). Various media reports in 2019 regarding serious accidents with fatal consequences at riding award ceremonies raised the question of whether award ceremonies induce too much stress and, therefore, represent too high a risk for both the horses and riders. The award ceremony with horses was seen as especially important for spectators and sponsors by the riders surveyed. Tournament organisers are, therefore, faced with the challenge of making an award ceremony attractive for spectators even without a horse. The opinion poll on regulations for the award ceremony in the German LPO 2018 showed that barely half of the respondents evaluated the current regulations positively.

Composition of the respondents

Despite the extremely good response with 700 fully completed questionnaires, the significance of the results has to be viewed critically, since the respondents represented a rather homogeneous group. Additionally, distributing the questionnaire via Facebook meant it was impossible to reach every tournament rider. The proportion of women surveyed was very high (94.7%) and this overrepresentation (FN membership figures for 2018: 540,690 women, 146,057 men) arose as a result of women generally being more keen to take part in surveys and perhaps provide different responses to men (Handelsblatt 2004). A study by

Ille *et al* (2014) showed no influence of gender on stress responses in female and male riders or in the responses of horses towards women and men. However, there might be gender-based divergences in the perception of stress that could have influenced the results of our survey because of its self-reporting nature.

Influence of tournament classes and the experience of the riders

The majority of the participants could call upon over eleven years of equestrian experience and memories may not always have been accurately recalled. Greater riding-specific skills in the elite rider may result in increased self-confidence (Strunk *et al* 2018). Unsafe behaviours around horses were associated with higher levels of equestrian experience as well as income from horse-related work and a general acceptance of danger and imminent injury during horse interactions (Chapman *et al* 2020). However, our study could not confirm that greater frequency of participation in competitions would lead to more relaxation among riders. Just over a quarter (27.3%) of the riders who participated at entry-level and beginners' (E/A) classes stated that they 'enjoyed' participating in lively award ceremonies with a fast lap of honour and loud music/applause, while riders with placings in higher classes considered them as 'not so good' more often than expected. We can only speculate

about the concepts responsible for this outcome. More experienced riders might be more sensitive to signs of stress from their equids, which could lead to their critical assessment of the ceremony. Another reason could be that riders with placings in higher classes normally use better trained and, thus, more valuable horses and consequently fear the increased risk of injury at such an event even more. Their personal positive experience, when participating in award ceremonies for the first few times, may also have diminished over the years, while the additional time effort and anticipated risk for participation in award ceremonies may be increasingly disturbing. The quality of the horse ridden could be an additional cause behind this critical evaluation, as Peeters *et al* (2013) found that horses that showed a higher increase in salivary cortisol performed better during competition. Additionally, the individual horse-human relationship could be influential here as could rider psychology and how they feel within the situation. A bad experience, for example, could influence their current feelings or *vice versa*. The stress level of horses and riders seems to correlate as cortisol levels revealed (Kang *et al* 2016).

Influence of disciplines

The award ceremony was more often regarded as less risky and even fun by showjumpers compared to dressage riders. The majority of the showjumpers (55.4%) and minority of the dressage riders (36%) considered the regulation 'award ceremony (including lap of honour) is part of the LP' as positive. Most of the showjumpers (72.7%) rejected the proposal regarding the lap of honour at a trot. The fact that showjumpers were more relaxed than dressage riders is probably due to the fact that their discipline is already riskier and they are not as pressured to have their horse under such strict stimulus control. Furthermore, the spectators in showjumping competitions are already cheering more loudly during the competition and the horses may already be better habituated to a different noise level and increased environmental stimuli than dressage horses.

Ceremony-related injuries

More than 7% of the riders and horses had already suffered an accident during an award ceremony. Since this figure covered their entire show career, it cannot be easily compared with the figures from the literature. The present paper dealt with all accidents that occurred during award ceremonies, even though they may not have required medical treatment. The severity of the accidents, classified according to Heitkamp *et al* (1998), was mainly due to injuries that did not require medical attention from a physician and, thus, contrary to the rather high-risk assessment for award ceremonies, no particularly high risk of injury could be determined. Kicks by horses were the most common cause of accidents (36.5%) but the rarest behaviour observed. This result suggests that kicks may be mostly performed in a targeted and accurate manner and are associated with a high risk of injury (Hawson *et al* 2010). Fleischer (2014) also assigned kicks a frequent involvement in injuries (25%). A small percentage (7.6%) of the riders reported that their horse had already suffered an accident at

one of their award ceremonies. This information is also retrospectively related to the entire (joint) show career. Stress played an even more significant role in the horses' (64.2%) compared to the riders' (36.5%) accidents. Due to the possibility of multiple answers to the trigger, cause and type of injury, a complex picture of the accident events is revealed, which should be examined in greater depth in further investigations in order to establish more precise associations. It was not possible to assign the accidents to a discipline, test class or the age/experience of the horse/rider based on this questionnaire because the information was collected retrospectively over the entire show career of the survey participants.

Limitations of the study

Participation in the study was voluntary. Although 700 valid questionnaires could be included, a selection bias between participants and non-participants must be considered. We assume that riders who had negative attitudes or bad experiences in the context of the award ceremony and lap of honour were more motivated to take part in the survey. It is well-known that the participation rate in surveys is higher among people who have strong emotions about the topic (Keusch 2015). Participants reported their own feelings and situations they experienced with their own horse, which is far from an objective assessment. In addition, people tend to remember extremely negative or positive experiences better than others. We suggest, therefore, that the picture that is drawn from this study is generally more negative than in reality.

The use of stress measurement methods would be useful in order to be able to draw conclusions about the stress level of horses and riders in award ceremonies (Kang *et al* 2016), independently of the subjective opinion of the tournament riders. On the other hand, it is questionable to what extent an invasive procedure itself causes stress. Additionally, it could be problematic to collect a sample from all horses participating in the award ceremony at the same time. This would be necessary in order to adjust and measure, for example, cortisol secretion after the onset of the stimulus/stress (Stucke 2012).

Animal welfare implications

The extent to which horse welfare is affected by participation in mounted award ceremonies can only be postulated due to the self-reported nature of the results but is clearly suspected by collecting subjective data in this study. The most common reason given by the riders for their horse's restlessness was the lap of honour (71.7%). This result is not surprising, since the lap of honour combines a large number of the stressors mentioned above: the horse gallops with other (possibly restless and unfamiliar) horses, the attaching of the ribbon with the applause of the spectators and accompanying music, possibly with the addition of voices from the loudspeakers. Applause was shown to trigger an escape reaction in 95.7% of cases in a test situation undertaken by Goslar (2011). When investigating the effect of systematic desensitisation, it could be shown that horses that had undergone this procedure presented themselves significantly more often as very tense. The tension of the horses might be

the reason for the attempt to gradually habituate them to different stimuli. In addition, these riders may have been more sensitised to recognise and assess tension, anxiety or stress in their horse. Nevertheless, a significant association was found between the rider's and the horse's tension in award ceremonies. The special nature of the human-horse relationship repeatedly raised the question of whether a transfer of mood or tension occurs between the partners, as was described in the literature (Hama *et al* 1996; Visser *et al* 2010; Chamove *et al* 2015; Scopa *et al* 2019). Von Lewinski *et al* (2013) did not find a connection in their work regarding stress transfer from riders to horses. Further research is needed to explore this question in the context of ceremonies.

Further research that assesses quantitative measures may be helpful in answering the remaining questions. Ideally, measuring cortisol concentrations from saliva swab samples, the use of Smardwatch®, infra-red measurements or eye blink rates and eyelid twitches would substantiate the conclusion of this study based on subjective sensations.

Outlook/possible improvements for award ceremonies

Discipline and sufficient distances must be observed in award ceremonies as kicks are associated with a high risk of injury (Schröter *et al* 2017; Ki *et al* 2018). Regulation of distance between pairs during the lap of honour, the opportunity to be afforded special dispensation from judges not to participate, better monitoring by the organisers or a prize-giving ceremony using podiums/steps on foot as the safest option would increase animal welfare.

It is also important that not only those in charge of the tournaments but also the riders themselves take responsibility for the horses' welfare. The optimal use of learning theory, understanding of physical signs of stress, and how emotional and motivational factors influence physiological arousal should be established in equestrian education to minimise the risk to humans and improve the well-being of the animals used for sports.

Declaration of interest

None.

Acknowledgements

All authors contributed to the design of the case report, preparation of the manuscript and final approval of the manuscript.

References

- Bastard C, Le Hanneur M, Pannier S and Fitoussi F** 2020 Radial neck fractures in children secondary to horse-riding accidents: a comparative study. *Orthopaedics and Traumatology Surgery and Research* 106: 1293-1297. <https://doi.org/10.1016/j.otsr.2020.04.021>
- Bleetman D** 2012 The equestrian sport-related injury workload of a regional doctor-led air ambulance unit. *Injury* 43: 2023-2025. <https://doi.org/10.1016/j.injury.2011.09.026>
- Bohnet W** 2007 Ausdrucksverhalten zur Beurteilung von Befindlichkeiten bei Pferden. *Deutsche Tierärztliche Wochenschrift* 114: 91-97. [Title translation: Expressive behaviour for the assessment of sensitivities in horses]
- Carstens E and Moberg GP** 2000 Recognising pain and distress in laboratory animals. *ILAR Journal* 41: 62-71. <https://doi.org/10.1093/ilar.41.2.62>
- Chamove A, Crawley-Hartrick O and Stafford K** 2015 Horse reactions to human attitudes and behavior. *Anthrozoös* 15: 323-331. <https://doi.org/10.2752/089279302786992423>
- Chapman M, Thomas M and Thompson K** 2020 What people really think about safety around horses: The relationship between risk perception, values and safety behaviours. *Animals (Basel)* 26: 10(12): 2222. <https://doi.org/10.3390/ani10122222>
- Chapman M and Thompson K** 2016 Preventing and investigating horse-related human injury and fatality in work and non-work equestrian environments: A consideration of the workplace health and safety framework. *Animals (Basel)* 6(6): 33. <https://doi.org/10.3390/ani6050033>
- Christensen JW, Keeling LJ and Nielsen BL** 2005 Responses of horses to novel visual, olfactory and auditory stimuli. *Applied Animal Behavioural Science* 93: 53-65. <https://doi.org/10.1016/j.applanim.2005.06.017>
- de Camp NV, Ladwig-Wiegard M, Geitner CIE, Bergeler J and Thöne-Reineke C** 2020 EEG based assessment of stress in horses: a pilot study. *Peer J* 8: e8629. <https://doi.org/10.7717/peerj.8629>
- European Commission Discussion Paper** 2019 *Guide to good animal welfare practice for the keeping, care, training and use of horses. Discussion paper.* https://ec.europa.eu/food/sites/food/files/animals/docs/aw_platform_res-lib_horses-guide.pdf
- Fleischer LE** 2014 *Verletzungsmuster bei Reitunfällen.* Dissertation, Universität zu Lübeck, Germany. [Title translation: Injury patterns in riding accidents]
- Goslar K** 2011 *Temperaments- und Charakterbeurteilung bei Reitpferden.* Dissertation Tierärztliche Hochschule Hannover, Germany. [Title translation: Temperament and character assessment in riding]
- Hall Angerås M** 2019 Skador inom ridsporten – förebyggande av största vikt. *Lakartidningen* 14: 116: [Title translation: Horse-related injuries - prevention very important]
- Hama H, Yogo M and Matsuyama Y** 1996 Effects of stroking horses on both humans' and horses' heart rate responses. *Japanese Psychological Research* 38: 66-73. <https://doi.org/10.1111/j.1468-5884.1996.tb00009.x>
- Handelsblatt Online** 2004 *Marktforschung: Hohe Motivation bei Umfragen.* <https://www.handelsblatt.com/unternehmen/management/marktforschung-hohe-motivation-bei-online-umfragen/2325806.html>. [Title translation: Market research, high motivation in surveys]
- Hawson L, McLean A and McGreevy P** 2010 The roles of equine ethology and applied learning theory in horse-related human injuries. *Journal of Veterinary Behavior-Clinical Applications and Research* 5: 324-338. <https://doi.org/10.1016/j.jveb.2010.06.001>
- Heitkamp HC, Horstmann T and Hillgeris D** 1998 Riding and handling injuries in experienced riders. *Der Unfallchirurg* 101: 122-128. <https://doi.org/10.1007/s001130050244>
- Hemsworth PH, Mellor DJ, Cronin GM and Tilbrook AJ** 2015 Scientific assessment of animal welfare. *New Zealand Veterinary Journal* 63: 24-30. <https://doi.org/10.1080/00480169.2014.966167>

- Hirschberg RM** 2010 Haustiere im Mittelalter: Das Pferd - Streitross, Lasttier, Opfertier. *Karfunkel – Zeitschrift für erlebbare Geschichte* 90: 100-106. [Title translation: Domestic animals in the Middle Ages: the horse- steed, beast of burden, sacrificial offering]
- Ille N, Aurich C, Erber R, Wulf M, Palme R, Aurich J and von Lewinski M** 2014 Physiological stress responses and horse rider interactions in horses ridden by male and female riders. *Comparative Exercise Physiology* 10: 131-138. <https://doi.org/10.3920/cepl43001>.
- Jagodzinski T and DeMuri GP** 2005 Horse-related injuries in children: a review. *WMJ (Official publication of the State Medical Society of Wisconsin)* 104: 50-54
- Kang OD and Yun YM** 2016 Influence of horse and rider on stress during horse-riding lesson program. *Asian-Australasian Journal of Animal Sciences* 29(6): 895-900. <https://doi.org/10.5713/ajas.15.1068>
- Keusch F** 2015 Why do people participate in Web surveys? Applying survey participation theory to Internet survey data collection. *Management Review Quarterly* 65: 183-216. <https://doi.org/10.1007/s11301-014-0111-y>
- Ki HC, Shin EK, Woo EJ, Lee E, Hong JH and Shin DH** 2018 Horse-riding accidents and injuries in historical records of Joseon Dynasty, Korea. *International Journal of Paleopathology* 20: 20-25. <https://doi.org/10.1016/j.ijpp.2017.12.001>
- Kienapfel K** 2011 Und was meinen Pferde dazu? Über das Ausdrucksverhalten von Pferden bei verschiedenen Halsstellungen. *Pferdeheilkunde* 27: 372-380. <https://doi.org/10.21836/PEM20110402>. [Title translation: And what do horses think about that? About the expressive behaviour of horses]
- Marr I and Krüger K** 2016 Non-invasive Stressanalyse bei Pferden. 9. Leipziger Tierärztekongress 2017 pp 117-121. Leipzig, Germany
- Mellor DJ and Burns M** 2020 Using the Five Domains Model to develop welfare assessment guidelines for Thoroughbred horses in New Zealand. *New Zealand Veterinary Journal* 68: 150-156. <https://doi.org/10.1080/00480169.2020.1715900>
- Newton AM and Nielsen AM** 2005 A review of horse-related injuries in a rural Colorado hospital: implications for outreach education. *Journal of Emergency Nursing* 31: 442-446. <https://doi.org/10.1016/j.jen.2005.08.009>
- Niederhöfer S** 2009 *Stressbelastung bei Pferden in Abhängigkeit des Haltungssystems*. Dissertation, Tierärztliche Hochschule Hannover, Germany. [Title translation: Stress exposure in horses depending on the husbandry system]
- Outram AK, Stear NA, Bendrey R, Olsen S, Kasparov A, Zaibert V, Thorpe N and Evershed RP** 2009 The earliest horse harnessing and milking. *Science* 323: 1332-1335. <https://doi.org/10.1126/science.1168594>
- Peeters M, Closson C, Beckers JF and Vandenheede M** 2013 Rider and horse salivary cortisol levels during competition and impact on performance. *Journal of Equine Veterinary Science* 33: 155-160. <https://doi.org/10.1016/j.jevs.2012.05.073>
- Osnabrück Police Inspection** 2019 *Neuenkirchen b Bramsche - Tödlicher Unfall bei Reitturnier*. <https://www.presseportal.de/blaulicht/pm/104236/4226807>. [Title translation: Fatal accident at horse show]
- Schmidt A, Hödl S, Möstl E, Aurich J, Müller J and Aurich C** 2010 Cortisol release, heart rate, and heart rate variability in transport-naive horses during repeated road transport. *Domestic Animal Endocrinology* 39: 205-213. <https://doi.org/10.1016/j.domaniend.2010.06.002>
- Schmidt A, Möstl E, Wehnert C, Müller J and Aurich C** 2009 Stress situations in 522 sport horses - influence of different stressors. *FN-Verlag of the German Equestrian Federation, Warendorf* pp 243-249.
- Schröter C, Schulte-Sutum A, Zeckey C, Winkelmann M, Krettek C and Mommsen P** 2017 Unfälle im Reitsport. *Der Unfallchirurg* 120: 129-138. <https://doi.org/10.1007/s00113-015-0074-z>. [Title translation: Equestrian accidents]
- Scopa C, Contalbrigo L, Greco A, Lanatà A, Scilingo EP and Baragli P** 2019 Emotional transfer in human-horse interaction: New perspectives on equine-assisted interventions. *Animals (Basel)* 26(9): 1030. <https://doi.org/10.3390/ani9121030>
- Selye H** 1955 Stress and disease. *Science* 122: 625-631. <https://doi.org/10.1126/science.122.3171.625>
- Stehouwer A** 2014 *Performance and stress levels of horses in a LI dressage competition compared for a cross-under bitless bridle and a bridle containing a snaffle bit*. PhD Thesis, University of Applied Sciences, The Netherlands
- Strunk R, Vernon K, Blob R, Bridges W and Skewes P** 2018 Effects of rider experience level on horse kinematics and behavior. *Journal of Equine Veterinary Science* 68: 68-72. <https://doi.org/10.1016/j.jevs.2018.05.209>
- Stucke D** 2012 *Überprüfung der Anwendbarkeit der Chronopsychobiologischen Regulationsdiagnostik (CRD) zur Beurteilung von Belastungssituationen und Bestimmung von Stressreaktionstypen bei Pferden*. Dissertation, Tierärztliche Hochschule Hannover, Germany. [Title translation: Review of the applicability of chronopsychobiological 541 regulation diagnostics (CRD) for the assessment of stressful situations and determination of 542 stress reaction types in horses]
- The Sun** 2016 *Horse boxed, Rio Olympics 2016: Brit groom Robbie Sanderson suffers head injury after being kicked by a horse during medal ceremony*. <https://www.thesun.co.uk/sport/tokyo-olympics-2020/1604370/rio-olympics-2016-brit-groom-robbie-sanderson-suffers-head-injury-after-being-kicked-by-a-horse-during-medal-ceremony/>
- von Borstel UU, Duncan IJ, Shoveller AK, Merkies K, Keeling LJ and Millman ST** 2009 Impact of riding in a coercively obtained Rollkur posture on welfare and fear of performance horses. *Applied Animal Behavioural Science* 116: 228-236. <https://doi.org/10.1016/j.applanim.2008.10.001>
- Von Lewinski M, Biau S, Erber R, Ille N, Aurich J, Faure JM, Möstl E and Aurich C** 2013 Cortisol release, heart rate and heart rate variability in the horse and its rider: Different responses to training and performance. *Veterinary Journal* 197(2): 229-232. <https://doi.org/10.1016/j.tvjl.2012.12.025>
- Zuckerman SL, Morgan CD, Burks S, Forbes JA, Chambless LB, Solomon GS and Sills AK** 2015 Functional and structural traumatic brain injury in equestrian sports: A review of the literature. *World Neurosurgery* 83: 1098-1113. <https://doi.org/10.1016/j.wneu.2014.12.030>