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# The use of bits in showjumping and its implications for equine welfare

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**Summary:** This study was conducted to investigate bit use in equestrian sports, focusing on welfare and performance. The multi-faceted study combines a literature review, survey, and video analyses. It evaluates research on physiological and behavioral effects of bit use, discussing concerns and benefits. The survey involved 250 equestrians, gathering data on experiences, opinions, and practices regarding bit usage. Results demonstrate that different bits are used during competitions and that riders prioritize factors like horse satisfaction, consistent connection, and chewing behavior when riding at home, while show use focusses on factors like control. Video analyses showed high conformity between the veterinary expert and show jumper, indicating a high degree of the results' reliability and validity (Cohen's kappa coefficient of 0.82). Pelham and loose ring bits were most used (25.4% and 18.3% respectively). 3-ring and full cheek bits were associated with the most aversive movements, particularly through opening of the horse's mouth. Other aversive movements included putting ears back, tail swishing, and head tilting. The study highlighted the need for understanding bit preferences in various settings and cautioned against generalizing bit usage based solely on show observations. It also emphasized the potential for developing new designs that prioritize horse comfort and responsiveness, to enhance communication and partnership between horses and riders.

**Keywords:** bits, well-being, horses, show jumping, ethogram, aversive movements, animal welfare, rider-horse interaction

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## Introduction

Bits are used in equestrian sports to communicate with horses. While a wide range of bits, made from various materials, are utilized in equitation today, there remains only a limited understanding of their functioning within the oral cavity and how horses subjectively respond to them [1].

Studies have indicated that the interplay between factors like bit configuration, rein forces, the position of the horse's head and neck, as well as the biodynamic of both horse and rider can influence individual motion patterns and interactions between the horse and rider [2,3,4]. Riders can use the pressure exerted by the bit to communicate with the horse; however, it can also cause discomfort to the horse, particularly when bits are used incorrectly, for example in wrong sizes or types for the individual horse's mouth [4]. Concerns regarding the welfare of horses in relation to the use of bits include mouth injuries, pain or discomfort, and can impair the horse's ability to breathe or swallow properly [5,6]. The type of bit used can cause a significant impact on both the location and severity of oral lesions [7]. For example, ported curb bits are often associated with significant damage to the bars of a horse's mouth, while snaffle bits often cause tears in the buccal mucosa [1,7]. The double-jointed snaffle bit is designed with comfort in mind, as it aims to distribute pressure more evenly across the horse's tongue compared to a single-jointed snaffle. Research has highlighted that the length of the central link in a double-jointed snaffle plays a crucial role in how pressure is distributed on both the tongue and bars [8]. Furthermore, bit materials influence a horse's acceptance of the bit. Recent explorations into innovative materials for bits, including copper, leather, and synthetic options have been conducted with the aim of prioritizing the horse's well-being. Titanium has emerged as a noteworthy contender for horse bits, owing to its resistance to mechanical compression and its characteristic lightness [9]. Irrespective of the materials used, it appears that as the rein length shortens, both rein tension and instances of aversive behavior rise [10,11,12]. Rein tension varies during horseback riding due to rider cues, the horse's stride cycle, and the horse's response to bit pressure [13]. It is also linked to gait and the rider's skill level [14].

To assess whether a horse is at ease with the specific bit type, material composition, or rein tension, a thorough analysis of the horse's behavior is imperative. Discomfort in ridden horses can be assessed using facial expressions (FEReq) as described by *Mullard* et al. 2016 [15]. This ethogram considers features like eyes, ears, mouth, nostrils, tongue, muzzle, and head position relative to the vertical. *Dyson* et al. 2017 applied FEReq to discern lameness in horses, successfully distinguishing between lame and non-lame horses. Key indicators of pain included head position relative to the bit, head twisting, asymmetrical bit placement, ear position, and eye features [16]. Building on this, *Dyson* et al. 2018 utilized video footage to develop a pain scoring system based on aversive movements of horses, incorporating facial, body, and gait markers for comprehensive assessment. The study demonstrated good intra-observer repeatability, underscoring the effectiveness of this approach in detecting discomfort in ridden horses [17].

Adapted from rabbits, species-specific "grimace scales" offer several advantages over conventional pain assessment methods [18]. They are less time-consuming, easy to train observers in, tap into our natural inclination to focus on the face when assessing pain, and can effectively evaluate a range of pain levels [19]. Also, they enhance observer safety by eliminating the need to approach and palpate the painful area [20].

Building on the insights gained from previous studies on assessing discomfort in ridden horses, particularly through facial expressions and aversive movements, this investigation specifically centers on the aversive movements exhibited by horses in high-level showjumping competitions, as observable in video recordings. The pain assessment tool used in this study was based on the ridden horse pain ethogram invented by *Dyson*, 2022 [21]. Various other pain assessment tools were considered, including the Horse Grimace Scale (HGS) proposed by *Dalla Costa* et al., 2014, the Equine Utrecht University Scale for Composite Pain Assessment (EQUUS-COMPASS), and the Equine Utrecht University Scale for Facial Assessment of Pain (EQUUS-FAP) [23]. However, it was noted that *Dyson*'s ridden pain ethogram proved to be the most user-friendly when analyzing videos. This focused investigation is specifically limited to international showjumping competitions, where riders possess the highest level of expertise and equipment is rigorously regulated by the Fédération Equestre Internationale (FEI).

Prior to video analysis, both amateurs (defined as riders riding as an activity for pleasure, not as a job) and professional riders (defined as riders working in the horse industry) were interviewed to gain additional insights into their approaches to bit selection and usage. In this study, the following Research Questions (RQs) were addressed: (RQ1) Are there differences in preference of using certain bits for different horses and for riding at home or at a show, (RQ2) If so, what reactions of a horse are important for rider when choosing a bit at home or at a show and (RQ3) Does the choice of a bit have an effect on the horse’s avoidance or discomfort behaviors.

## Materials and methods

To investigate the bit use in equestrian sports and effects on welfare and performance, the study combined an online survey (Study 1) to address RQ1 and RQ2 and video analysis (Study 2) to address RQ3. The survey was designed to provide a comprehensive understanding of riders' preferences and use of bits, including their reasons for choosing particular bits, their thoughts on different aspects of bit design and use, and the factors that influence their decision-making. The study received approval from the Ethics Commission of the Freie Universität Berlin in accordance with European and German animal welfare regulations. Data were collected by observing publicly available videos, rendering informed rider consent unnecessary.

### Study 1: Online survey

*Participants*

The participants were 250 riders of all ages and experience levels, including both amateurs and professionals. Recruitment was conducted through a variety of channels, including social media platforms, equestrian forums, local riding clubs, and professional networks. Participants were asked to share the survey with their colleagues and equestrian networks to help ensure a diverse and representative sample.

To participate in the study, participants were required to have experience riding horses and using bits. To ensure that the sample group was diverse and representative of the broader equestrian community, efforts were made to recruit participants with a range of experience levels and backgrounds. Furthermore, the participants were asked whether they had ridden a competition in the past 12 months and with how many horses they competed. This ensured survey participants were active in the past year, so they knew about the newest regulations in equestrian sports.

*Materials*

The survey was designed with the platform SurveyMonkey and the questions were asked in English. The survey consisted of 12 questions, including both open-ended and multiple-choice questions. The questions were designed to elicit information on why riders use certain bits, how they think about bits, and what factors influence their decision-making. Respondents could select the multiple-choice answers on “Why are you using different bits in different horses” with possible responses “Because horses react differently” ,”Because not all bits are allowed on shows”, ”Because I use different bits at home than I use on shows”, “Because I want to ride young horses with different bits than older horses.” Open-ended follow-up questions were analyzed included prompts such as "Why do you use a different bit at home than on a show?" and "Why are you using different bits in different horses?".

In addition, riders were asked about the importance of certain factors when choosing a bit at home or at a show. The riders were asked to rate 6 factors (e.g. “I can turn the horse easily”, “The horse chews on the bit”) and rate those answers from one to six (from 1 = not important to 6 = very important). The questions were asked twice, with the first round directed to the riders in their home-riding context, while the second round required them to answer as if they were on a show.

*Data Collection and Analysis*

The survey was conducted online. The data was collected anonymously and collated in an Excel spreadsheet and analyzed using statistical software (IBM SPSS Statistics, Version 28.0). Descriptive statistics were used to summarize the sample. To address RQ1, descriptive analysis was conducted on an overview of percentages of endorsement of the multiple-choice questions on each of the four answers and the open-answer questions. The results were evaluated quantitatively by calculating the frequencies and percentages of individual responses. The qualitative responses were subjected to a thematic analysis to identify the respondents' underlying motivations and practices.

To address whether the importance of the horse's reactions differs when riders choose a bit for riding at home or at a show (RQ2), mean scale scores on each of the factors were compared between home and at a show, using paired-samples T-tests. In addition, Signed-rank tests were used to compare ranks in importance between home and shows. This test assumes the items were measured on an ordinal scale. If the p-value of the result was below .05, differences between home and shows can be assumed for this particular reaction.

## Study 2: Video analysis

*Study Design*

This study was designed to assess the prevalence of aversive movements in horses competing in seven events in Europe on the final day of the show. To investigate the horse's reactions to different bits, a total of 268 videos of seven outdoor and indoor CSI events in Europe were watched and evaluated by a rider and a veterinarian. To make sure the participants were on a similar level of experience, only the grand prix was watched, meaning the riders had to qualify successfully for this competition.

Shows included in the study:
1. Riesenbeck Finale CSI** March 27$^{th}$, 2022
2. Z Tour CSI*** Zangersheide April 17$^{th}$, 2022
3. CSI Deurne April 24$^{th}$, 2022
4. Peelbergen CI**May 8$^{th}$, 2022
5. CSI Madrid* May 15$^{th}$, 2022
6. CSIO Rome May 29$^{th}$, 2022
7. Knokke Hippique June 26$^{th}$, 2022

The horses observed in the videos had the following age and gender distribution: 25% mares, 46% geldings, and 29% stallions born between 2000 and 2014 ($M_{age}$ = 11.56, $SD_{age}$ = 2.22, Median = 11). In total, fifteen types of bits were identified in the videos. For an overview of the types of bits identified, see Table 2 (left column).

*Materials*

The pain assessment tool used in this study was based on the ridden horse pain ethogram invented by *Dyson* (2022). Videos were rated (0 = no, 1 = yes) on the following 11 items:The Ridden Horse Pain Ethogram: (adapted from *Dyson* et al. 2022)
1. Repeated changes of head position (up/down)
2. Head tilted or tilting repeatedly (left/right)
3. Ears rotated back behind vertical
4. Mouth opening with separation of teeth, for > 10 s
5. Bit pulled through the mouth
6. Tongue exposed
7. Tail swishing repeatedly (up/down, side/to side)
8. Tempo must be reduced visibly several times (> 1)
9. Sudden change of direction, against rider's cues
10. Horse canters in cross canter for more than 5 strikes
11. Reluctance to move forward (has to be kicked/verbal encouragement)

*Data Analysis*

Inter-rater reliability was tested using the Cohen's kappa, where inter-rater agreement is substantial with values above .60 and almost perfect above .80. If inter-rater agreement was assumed (kappa > .60), the ratings of both raters were used for analysis. Chi-square tests of independence were conducted between the frequency of selected Ridden Horse Pain behaviors (1 = yes, 0 = no) between the 15 types of bits that were used at the watched shows. As a measure of effect size, the Cramer's V was used. Patterns of over- and underrepresentation were inspected to compare bits on the frequency with which aversive movements were registered.

## Results

*Study 1*

Participant Characteristics

The study included a total of 250 riders who completed the survey. Of these, 30% (n = 75) were professional showjumpers and 70% (n = 175) were amateurs. In terms of competition experience, 12% (n = 30) of riders had competed in less than 5 competitions in the past 12 months, 20% (n = 50) had competed in 5–10 competitions, and 68% (n = 170) had competed in more than 10 competitions. Professional riders were significantly more likely to have competed in more than 10 competitions in the last 12 months, as indicated by a chi-square test, $\chi^2$ (2) = 12.69, p < .001.

Most riders (54%, n = 135) reported competing with 2–5 horses, while 26% (n = 65) competed with only one horse and 20% (n = 50) competed with more than 5 horses. Professional riders were significantly more likely to compete with more horses than amateurs, as indicated by a chi-square test, $\chi^2$ (2) = 94.91, p < .001.

Research Question 1

Most riders (92%, n = 230) reported using different bits for different horses. The primary reason cited for this was that horses respond differently to different bits (89%, n = 223), rendering individual decisions in bits used. Additionally, 44% (n = 110) of riders reported using different bits at home than they did during competitions. Also, 39% (n = 98) of the riders said they were using different bits for young horses than for older ones. 25% (n = 63) of the riders said that they could not use certain bits because they are not allowed to do so on shows (Figure 1).

The respondents gave various reasons when asked why they were using different bits at shows than at home. Reasons included: (1) certain bits are not allowed at shows (N = 18), (2) the horse is more energetic and excited at shows (N = 42), (3) they have different expectations for control at shows (N = 22), and (4) there are different requirements for show jumping than for base work at home (N = 21). The main reason to use a different bit at shows than at home was that the bit at a show should have more impact, giving the riders more control in unfamiliar or challenging situations (to manage horses that are more excited at shows compared to at home). Other reasons included wanting to be able to quickly react to different situations and to provide variety for the horse. Some riders reported using the same bit for both training and shows (4.5%), while others used different bits to prevent the horse from becoming desensitized to a particular bit. In regard to bit material, 48.4% of the riders use metal and rubber bits, 3.6% use leather and metal, 0.4% use only leather, 2.8% only rubber, 31.2% only metal and 13.6% of the riders use all.

Research Question 2

Table 1 shows the means and standard deviations on the 6-point interval (higher scores indicating a higher importance) for each factor of riding a horse at home and at a show, including difference tests using paired-sample t-tests and signed rank tests. Apart from "Having a consistent connection to the horse's mouth", there were significant differences in the importance of the reaction at home or at a show (all $p < .05$). At shows, the responses indicated that more importance was given to the controllability and maneuverability (easy to be turned), and that the horse gives the rider pressure on the bit. At home, the

**Table 1** Mean scores on the perceived importance of six reactions on bits riding a horse at a show and at home. Results of the paired-samples statistics compare the means riding at a show and at home (N = 250).

| Reaction | home | | shows | | | Paired-samples T-test | | | Signed-rank test | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | MD | T-value | df | p-value | Z-value | p-value |
| The horse is easy to control | 4.18 | 1.21 | 4.97 | 1.10 | -0.79 | -9.97 | 249 | <.001 | -8.61 | <.001 |
| The horse can be turned easily | 3.69 | 1.28 | 4.67 | 1.24 | -0.98 | -11.90 | 248 | <.001 | -9.78 | <.001 |
| The horse is satisfied with the bit | 5.59 | 1.03 | 5.33 | 1.11 | 0.26 | 5.97 | 249 | <.001 | 5.57 | <.001 |
| The horse gives me pressure on the bit | 4.03 | 1.25 | 4.44 | 1.16 | -0.41 | -6.23 | 246 | <.001 | -5.69 | <.001 |
| The horse chews on the bit | 4.27 | 1.25 | 4.12 | 1.29 | 0.14 | 2.49 | 248 | .013 | 2.63 | .009 |
| Having a consistent connection to the horse's mouth | 5.22 | 1.07 | 5.19 | 1.04 | 0.03 | 0.67 | 248 | .503 | -0.60 | .547 |

Note. SD = Standard Deviation; MD = Mean Difference; importance measured on an interval between 1 (not important) and 6 (important)

**Table 2** Frequencies and percentages of the fifteen bits in the videos (left column), number of aversive movements reported per bit, and the total number of movements rated per bit (11 by both raters for every horse, right column).

| | | | Aversive movement reported | | | | |
|---|---|---|---|---|---|---|---|
| | | | No (=0) | | Yes (=1) | | Total |
| bit | N horses | % | n | % | n | % | N movements |
| 3-ring bit | 10 | 3.7 | 172 | 78.2% | 48 | 21.8% | 220 |
| curb gag | 25 | 9.3 | 455 | 82.7% | 95 | 17.3% | 550 |
| d-bit | 5 | 1.9 | 91 | 82.7% | 19 | 17.3% | 110 |
| egg butt | 13 | 4.9 | 260 | 90.9% | 26 | 9.1% | 286 |
| elevator | 21 | 7.8 | 403 | 87.2% | 59 | 12.8% | 462 |
| full cheek | 21 | 7.8 | 356 | 77.1% | 106 | 22.9% | 462 |
| hackamore | 10 | 3.7 | 214 | 97.3% | 6 | 2.7% | 220 |
| hackamore combi | 6 | 2 | 106 | 80.3% | 26 | 19.7% | 132 |
| kimblewick | 11 | 4.1 | 213 | 88.0% | 29 | 12.0% | 242 |
| loose ring | 49 | 18.3 | 912 | 84.6% | 166 | 15.4% | 1078 |
| pelham | 68 | 25.4 | 1255 | 83.9% | 241 | 16.1% | 1496 |
| rnf bit | 2 | .7 | 41 | 93.2% | 3 | 6.8% | 44 |
| swales bit | 5 | 1.9 | 99 | 90.0% | 11 | 10.0% | 110 |
| twin bit | 2 | .7 | 34 | 77.3% | 10 | 22.7% | 44 |
| weymouth | 20 | 7.5 | 376 | 85.5% | 64 | 14.5% | 440 |
| Total | 268 | 100.0 | 4987 | 84.6% | 909 | 15.4% | 5896 |

highest sample mean was found when the horse was satisfied with the bit ($M = 5.59$, $SD = 1.03$), and was significantly higher than at shows 5.33 ($SD = 1.11$). This is the same as with the importance of chewing on a bit ($M_{home} = 4.27$ vs $M_{show} = 4.12$).

*Video analyses*

Research Question 3

The results of the study indicate a high level of agreement between the veterinary expert and the show jumper, with 95% consensus. The calculated Cohen's kappa coefficient of 0.82 indicate a high level of agreement between the two parties in assessing the behaviors. Hence, the results can be understood to be both valid and reliable.

However, when examining specific behaviors, it was observed that the two parties were least in agreement regarding the assessment of behaviors related to the movement of the ears. The Cohen's kappa coefficient for these behaviors was the lowest, measuring 0.61.

The analysis of the most commonly used bits revealed that the Pelham bit (Figure 2, left) was utilized most frequently, accounting for 25.4% of total observations. The loose ring snaffle (Figure 2, right) bit was also widely employed, representing 18.3% of the recorded instances. The curb gag bit was employed in 9.3% of the cases. The full cheek elevator and Weymouth bits were used to a lesser extent, each accounting for approximately 8% of the observations.

Prior to analyzing the specific bits, the overall frequency of aversive movements exhibited by the horses was assessed. In total, 909 (15.4%) out of 5,896 observations showed an aversive movement (Table 2). A Chi-square test on independence indicated significant differences between the individual bits, $\chi^2$ (15) = 98.41, $p < .001$; Cramer's $V = .13$. Upon examining the individual bits, it was found that the 3-ring bit and full cheek bit (Figure 3) were the bits most commonly associated with aversive movements, each accounting for more than 20% of the observations.

Aversive movements were seen in the range 10–20% for several bits (shown in table 2). Among the observed bits, the egg butt, RNF bit (Butterfly flip bit), and hackamore (Figure 4) demonstrated the least aversive movements. However, it should be noted that there were only two observations with the RNF bit, limiting the validity of this finding.

Upon detailed analysis of the aversive movements observed in the subjects, it becomes evident that the most frequently observed movement is the opening of the mouth, which occurred 254 times, accounting for 47.4% of the total instances. This aversive behavior was most observed with the 3-ring bit, occurring in 65% of the cases. Additionally, the opening of the mouth was observed in conjunction with the Curb gag and Weymouth bit (Figure 5) in 60% of the instances, the Kimblewick bit in 54.5% of the instances, and the Pelham bit in 50% of the instances.

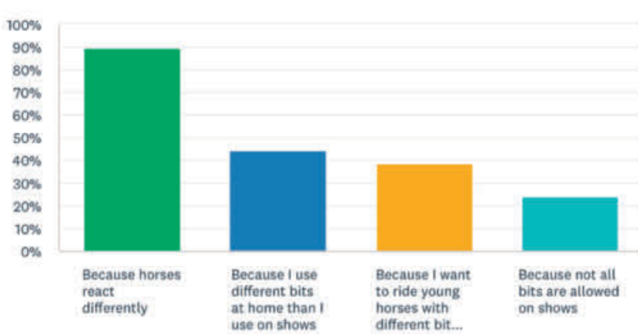


**Fig. 1** Why do you use different bits in different horses? (More than one answer could be chosen).

**Fig. 2** Examples of the Pelham snaffle bit (left) and the Loose ring snaffle bit (right).

**Fig. 3** Examples of the 3-Ring bit (left), and the Full cheek bit (right).

**Fig. 4** Examples of the Eggbutt (left), the RNF bit (middle) and, the Hackamore (right).

**Fig. 5** Examples of the Curb Gag (left) and the Weymouth and Bradoon (right).

Opening the mouth as an aversive movement was not observed when the hackamore was used. The majority of horses did not display any aversive movements (Table 2).

## Discussion

The study revealed compelling insights into the considerations riders take into account when selecting bits for their horses, both in everyday training sessions at home and during competitions. A notable observation was that 89 % of respondents acknowledged that horses show different reactions to different bits. This emphasizes the critical importance of customizing bit selection according to the specific preferences and needs of each individual horse, with the goal of enhancing their comfort and performance. Furthermore, 44 % of riders reported using different bits at home compared to during competitions. This indicates a nuanced consideration of the demands and expectations inherent to show environments when choosing a bit, but it also puts scientific findings gathered on showground in perspective. *Björnsdóttir* et al. 2014 investigated bit-related lesions in Icelandic competition horses, where they found that the type of bit plays a significant role in both the location and severity of these lesions [7]. Given the practice of utilizing distinct bits during competitive events compared to the horses' primary training environment at home, attention must be directed towards assessing the time when the wounds occurred first and the alignment of wounds with the selected bit. The main reason riders use a different bit at shows than at home was that the bit at a show should have more impact, giving the riders more control in unfamiliar or challenging situations. Focusing only on the bits used in showjumping competitions may not provide a complete understanding of how various bits are used in this sport, and it may not accurately reflect the welfare implications. The complexity surrounding horse welfare and its interplay with riders' behavior and bit selection is a critical aspect to consider. It is evident that riders adapt their approach based on the demands of different sport formats, often prioritizing increased control, particularly in competitive settings. In the observed shows, the Pelham bit emerged as the predominant choice, closely followed by the loose ring bit. However, when surveying the riders, a noteworthy discrepancy arose as the riders preferred the loose ring bit over the Pelham. It is important to note that the survey did not explicitly specify whether the respondents were referring to show conditions alone or including training sessions as well. Furthermore, it is possible that the Pelham bit sees more frequent use in competitions at the grand prix level. Riders participating in lower-level competitions may not utilize the Pelham as extensively. Since we lack information regarding the specific competition levels of the riders in our survey, this constitutes a limitation in our study and for the subsequent comparison. We must consider the possibility that the observed bit usage at shows may not accurately represent the entirety of a horse's ridden life. Also, it is imperative to explore whether a proficiently trained horse, adequately prepared for competing at a specific level, can effectively perform on a lighter bit while maintaining control. A less experienced horse or one challenged by the competitive environment might exhibit heightened conflict behavior, potentially unrelated to the bit itself. Furthermore, the consideration of physiological stress indicators, such as cortisol levels, alongside observed behavioral responses is crucial to draw a full picture on this topic [24]. In addition, a rider with advanced skills shows better coordination with the horse, maintaining a steady rhythm and connection [25]. They also have more consistent posture in their trunk and limbs [26], greater control over the horse's head position, and can generate more forward movement [27] compared to less experienced riders. Riders with less expertise may struggle to independently manage their arms and hands, in contrast to those with more skill [28]. They may also face challenges in directing or straightening the horse using other aids. These factors can lead to an unstable head position, causing the bit to be pulled to one side or causing the horse to show aversive movements [21].

It is interesting to note that our survey revealed that the loose ring bit and egg butt are considered to be the lightest bits. These findings align with the regulations set by the Deutsche Reiterliche Vereinigung e.V. (2023), which allows these bits in the lower-level classes, typically attended by amateur riders or by experienced riders with young horses. Loose O-shaped bit rings are proposed to facilitate direct force transmission without leveraging action [8]. However, a more recent study has indicated that these loose O-ring bits can also induce mild poll pressure through a pulley-like transfer of approximately 20% of the applied rein forces [29]. In addition, when we look at the aversive movements associated with these bits on a grand prix level, it becomes clear that they are not completely harmless. Even among riders competing at the highest level of showjumping, the loose ring bit still resulted in a notable percentage of aversive movements exhibited by horses. Mouth opening was the most frequent observed aversive movement. This behavior may be attributed to various factors such as musculoskeletal discomfort [17], discomfort from the bit or other oral issues [30], excessive rein tension [14] or the influence of the rider's hands [10].

The hackamore shows lower occurrence of aversive movements in general. No horse ridden with a hackamore showed mouth opening. The hackamore combi, which combines elements of the hackamore and a bit, also performs well in this regard, even though the horse has a bit in the oral cavity. It's worth mentioning that in Germany, the hackamore and hackamore combi are restricted from use in classes under 125 cm. This implies that only horses with extensive training and riders possessing a higher level of expertise are eligible to use them.

It is worth noting that this study would have benefitted from a consistent testing approach, involving the same horses with various riders and different bits to ensure a more comprehensive evaluation.

Additionally, it is important to acknowledge that the study did not include a ground examination to assess the overall fitness and health of the horses, which could have provided valuable context for interpreting the observed aversive movements. Despite limitations, this study provides crucial insights into how specific bits influence aversive movements in horses. Collaboration among experts in equipment design, veterinarians, riders, and researchers is key to developing solutions that improve communication while safeguarding the horse's welfare. This approach opens avenues for a nuanced examination of materials, constructions, and pressure distributions on equine responses.

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