Final report

Project title: Improving riding schools' knowledge base to enhance horse welfare and human-horse communication

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Part 1: Detailed summary

Short description in Swedish or Norwegian of

- *objective/hypothesis*
- *method incl. no studied horses/other*
- *if the project was executed as planned, please specify possible deviations*
- *project results, including preliminary results with description of needs for the latter to be confirmed*
- *potential for implementation in the practical horse sector; which efforts towards implementation has been performed within the project, and what remaining efforts is necessary for future implementation?*

Mål/hypotes

Hästsporten är drabbad av allvarliga olyckor. Dessutom äventyras många hästars välbefinnande vilket visar sig genom tecken på stress och obehag, framför allt under ridning. Forskning visar att båda fenomenen många gånger beror på brist på kommunikation mellan ryttare och häst orsakad av otillräcklig kunskap och förståelse för hästens beteende och inlärning.

Syftet med projektet var, att tillsammans med ryttare på ridskolor och deras ridlärare identifiera kunskapsluckor avseende hästens beteende, hästvälfärd samt inlärning och ryttar-häst kommunikation. Baserat på den insamlade informationen ville vi tillsammans med ridlärare och deras elever analysera hur aktuell forskning kan komplettera ridskolornas praktiska kunskap och vilka pedagogiska verktyg som är bäst lämpade för att lära ut evidensbaserad kunskap i ridskolans miljö. På sikt förväntas projektet bidra till ökad teoretisk och praktisk kunskap hos ryttare och hästägare och därigenom till förbättrad välfärd för både hästar och människor.

Följande hypoteser har formulerats och testats under projektet:

1. Det finns en bristande överensstämmelse mellan vetenskaplig teori och dess tillämpning i ridskolepraxis som förhindrar att positiva förändringar kommer till stånd när det gäller hästvälfärd och förbättrad kommunikation mellan ryttare och häst.
2. Det är möjligt för ryttare och forskare att bygga broar mellan vetenskapliga rön och praktisk hästverksamhet.
3. Ridskoleelever utvecklar en bättre teoretiskt och praktisk förståelse för hästars beteende, välfärd och kommunikation mellan ryttare och häst efter att ha deltagit i ett skräddarsytt utbildningsprogram som består av både teori och praktiska moment jämfört med elever från en kontrollgrupp.

Metoder

Projektet genomfördes i tre faser:

1. **Kartläggning av nuvarande undervisningsmetoder:** Vi samlade data från lärare och elever på ridskolor via webbenkäter med frågor som belyste deras upplevelser av undervisning i två ämnen, d.v.s. hästars beteende/välfärd och inlärning/kommunikation.
2. **Workshop med intressenter**: Ridskolelärare, elever och forskare (18 deltagare) samlades för att diskutera hur man bäst kan integrera evidensbaserad kunskap i ridskoleundervisningen samt vilka konkreta pedagogiska verktyg som kan användas för att underlätta undervisningen.
3. **Implementering och utvärdering av ett undervisningsprogram**: Ett skräddarsytt undervisningsprogram som utvecklades tillsammans med ridlärare testades på två ridskolor (två kontrollgrupper med 7-8 ryttare vardera, respektive två interventionsgrupper med 8 ryttare vardera) och inkluderade både teori och praktiska moment. Programmet fokuserade på hästens beteende, välfärd och inlärning samt ryttarens kommunikation med hästen. Elevernas kunskap och attityder utvärderades före och efter utbildningen via enkätfrågor.

Projektfaserna 1 och 2 byggde på varandra för att tillsammans kunna utforma ett undervisningsprogram i fas 3, med syfte att uppnå en mätbar kunskapsutveckling. Såvitt vi vet var detta den första studien i sitt slag som kombinerar teorier från Equitation Science (tvärvetenskapligt forskningsområde som objektivt studerar människa-häst interaktioner för att förbättra välfärd, kommunikation och träningsmetoder) med praktisk kunskap för att utveckla ett pedagogiskt program för ridskolor.

Projektets genomförande och eventuella avvikelser från projektplanen

Projektet var planerat att genomföras på två år, men av olika anledningar tvingades vi ansöka om 1-års förlängning. Orsaken var delvis att projekt på ridskolor är utmanande att genomföra eftersom vi var beroende av att det skulle passa in i deras ordinarie verksamhet. För att få fram så relevanta och samtidigt publicerbara resultat som möjligt genomförde vi en pilotstudie i fas 3 av projektet, en intervention bestående av teoretisk och praktisk undervisning. Målet var att testa upplägget av ett skräddarsytt utbildningsprogram i samarbete med en ridskola, deras lärare och en grupp med tio ryttare, vilket sträckte sig över flera veckor när vi följde deras ordinarie

schemalagda veckovisa ridlektioner. Generellt tog det längre tid än förväntat att etablera kontakt med ridskolorna för att kunna genomföra studien.

Innehållet i det pedagogiska materialet som vi planerar att erbjuda ridskolor vid projektets slut anpassades löpande under interventionen, som pågick från slutet av februari 2024 till juni 2024. Under hösten har vi fokuserat på statistisk bearbetning av resultaten och vidare sammanställning av utbildningsmaterialet för ridskolor. I allt övrigt har projektet genomförts enligt plan. Vi har sammanställt data från projektfas 1 (enkätstudie med syfte på att kartlägga pedagogiska metoder som används för undervisning av hästkunskap, dvs. hur hästar lär sig, bedömning av hästvälfärd och häst-människa interaktioner) i form av ett manuskript för vetenskaplig publicering. Workshopen (projektfas 2) med syfte att diskutera och analysera hur vetenskap kan komplettera ridskolornas teoretiska och praktiska kunskapsbas genomfördes i november 2023. Interventionen och datainsamlingen på två ridskolor slutfördes i juni och analys och sammanställning av data har skett inom resterande period av projektets förlängning.

Projektets resultat inklusive preliminära resultat med beskrivning av behov för att de senare ska kunna bekräftas

Fas 1 - Kartläggning av nuvarande undervisningsmetoder:
Resultaten från enkätundersökningen visade bland annat en tydlig skillnad mellan hur mycket ridlärare uppskattade att de undervisade i ämnena hästars beteende/välfärd och inlärning/kommunikation och hur eleverna uppfattade undervisningen. Elever uttryckte ett större intresse för avsuttna lektioner än vad lärarna förväntade sig. Majoriteten av ridlärarna insåg vikten av att sprida evidensbaserad kunskap men många upplevde det som utmanande att implementera detta i praktiken.

Hypotes 1, att en bristande överensstämmelse mellan vetenskaplig teori och dess tillämpning i ridskolepraxis förhindrar positiva förändringar gällande hästvälfärd och förbättrad kommunikation mellan ryttare och häst, kan därmed antas.

Fas 2 - Workshop med intressenter:
Ridskolelärare, ridskoleelever och forskare deltog i en mycket lyckad workshop där det fanns en stor samsyn om hur man bäst kan integrera evidensbaserad kunskap i ridskoleundervisningen samt vilka konkreta pedagogiska verktyg som kan användas för att underlätta undervisningen.

Hypotes 2, att det är möjligt för ryttare och forskare att bygga broar mellan vetenskapliga rön och praktisk hästverksamhet, kan delvis antas, men här kvarstår en hel del arbete.

Fas 3 - Implementering och utvärdering av ett undervisningsprogram:
Resultaten från undervisningsprogrammet visade att attityder till hästvälfärd förbättrades hos elever i interventionsgruppen jämfört med kontrollgruppen. Däremot påvisades signifikanta skillnader i kunskapsnivån, d.v.s. ökad kunskap, endast vid analys inom grupperna, både inom kontrollgruppen och interventionsgruppen, men inte mellan grupperna. Således kan bara att vara delaktig i studien ha bidragit till att öka kunskapen hos deltagarna i kontrollgruppen genom gruppdiskussioner och egen kunskapsinhämtning. Generellt uppskattade eleverna i interventionsgruppen särskilt kombinationen av de teoretiska och de interaktiva praktiska inslagen i utbildningen.

Hypotes 3, att ridskoleelever utvecklar en bättre förståelse för hästars beteende, välfärd och kommunikation efter att ha deltagit i ett skräddarsytt utbildningsprogram, kunde bekräftas delvis och ytterligare studier krävs för att undersöka om kunskapsökningen leder till bestående förändringar i praktiken.

Sammanfattningsvis pekar projektets resultat på vikten av att inkludera elevernas perspektiv för att skapa engagerande och effektiva utbildningar samt att stödja lärare med undervisningsmaterial som underlättar implementeringen av både teoretisk och praktisk kunskap som är i linje med de senaste vetenskapliga framstegen. För att möta detta behov utvecklades inom ramen av projektet ett undervisningsmaterial i form av diskussionskort baserade på de tio träningsprinciperna från International Society for Equitation Science (ISES). Dessa kort är utformade för att uppmuntra dialog, reflektion och praktisk tillämpning av kunskap.

Framöver bör fokus ligga på att utvärdera de långsiktiga effekterna av sådana undervisningsinsatser, särskilt för nybörjare och ryttare i olika åldrar och med varierande erfarenheter. Det är också viktigt att hantera de hinder som kvarstår för att ge ridskolelärare bättre stöd och resurser att integrera evidensbaserad kunskap i undervisningen samt att möta elevernas intresse. Sammantaget visar projektet att det finns en stor potential att förbättra utbildningen på ridskolor. Det kan bidra till bättre hästvälfärd, ökad säkerhet och mer kunniga och engagerade ryttare.

Potential för implementering inom den praktiska hästsektorn: Vilka insatser har gjorts inom projektet för att underlätta implementering, och vilka ytterligare insatser krävs för framtida implementering?

Projektet visade en betydande potential för att implementera forskningsresultat i den praktiska hästsektorn, särskilt inom ridskolor. Det identifierades kunskapsluckor särskilt kring hästens beteende, välfärd, inlärning och ryttare-häst kommunikation. Genom en kartläggning av nuvarande undervisningsmetoder, en workshop med intressenter och en implementering av ett skräddarsytt utbildningsprogram, skapades en grund för förbättrad undervisning som integrerar evidensbaserad kunskap.

Resultaten visade att eleverna uppskattade kombinationen av teori och praktiska moment och att attityder till hästvälfärd förbättrades i interventionsgruppen. Dock behövs ytterligare insatser för att säkerställa långsiktiga effekter och övervinna hinder för implementering i ridskolepraxis, särskilt att stödja ridlärare med pedagogiska verktyg och undervisningsmaterial. Diskussion och reflektion kring forskningsbaserade träningsprinciper, såsom de från International Society for Equitation Science (ISES), framhölls som särskilt värdefulla när de presenterades i ett första utkast i form av inplastade diskussionskort för lärare, ryttare och andra företrädare inom hästsverige.

För framtiden föreslås fokus på långsiktig utvärdering av liknande utbildningars effekter, anpassning för ryttare med olika erfarenhet samt fortsatt utveckling av stöd till ridlärare för att möjliggöra hållbara förändringar. Projektet har därigenom potential att bidra till förbättrad hästvälfärd, ökad säkerhet och engagerade ryttare i ridskoleverksamheten.

Part 2: Main report (max. 10 pages)

Introduction

Military traditions, norms, and beliefs continue to influence equestrian sports and riding instruction, often resulting in traditional views being taken for granted without critical examination. Yet, growing concern for horse welfare has prompted a shift away from traditional explanations of equestrian practices, focusing instead on human-horse interactions through the frameworks of animal welfare science and human-animal studies.

Knowledge and skills are recognized as essential drivers of human behaviour change, particularly in improving animal welfare, including horse welfare (1). However, research indicates that many riders possess insufficient knowledge of equine behaviour and how horses learn, which can result in inappropriate training and management practices and thereby compromised horse welfare. For example, equestrians often fail to recognize or misinterpret behaviours that are indicative of stress, such as mistaking a horse's forwardness or high energy levels as signs of happiness (2). Other studies reveal that familiarity with learning theory, as it applies to horse training (3), remains relatively low among both amateur and professional riders (4). Contrary, equestrians also overestimate their understanding of horse behaviour and training (5), making them less aware of how these knowledge gaps may negatively influence their practices. This has significant welfare implications, as evidenced by signs of discomfort and stress in horses during ridden activities (6) and groundwork training (7) or equipment-related injuries (8). Furthermore, compromised horse welfare and ineffective communication between humans and horses have been linked to alarmingly high rates of human accidents (9).

In summary, we suggest that education in horse behaviour, how horses learn, and human-horse communication is important for improving both horse welfare and human safety. At the same time, this can serve to engage in dialogue with researchers and industry stakeholders within the equine sector. Riding schools offer an ideal platform to promote such education and facilitate dialogue. In Sweden alone, there are around 450 riding schools affiliated with the Swedish Equestrian Federation (10), delivering approximately five million riding lessons yearly (11). This represents a unique opportunity to reach a wide audience of riders by equipping riding schools with the knowledge and support needed to effectively teach best practices.

Thus, the objective of this project was to enhance communication between riders and horses by supporting the adoption of evidence-based practices in the handling and training of horses within riding schools through close collaboration with teachers and their pupils.

In order to do this, we first (*Phase 1*) assessed teaching strategies and practical tools currently used at Swedish riding schools to implement knowledge in the two subject areas: horse behaviour and welfare (BW); learning theory and human-horse communication (LC). Second (*Phase 2*), we discussed the results from Phase 1 with riding school teachers, riding school pupils and researchers to reach consensus on what pedagogic tools may best achieve implementation of evidence-based knowledge in these subjects. Third (*Phase 3*), we evaluated a co-developed theoretical and practical hands-on teaching program, implemented at two riding schools, to assess its effectiveness in enhancing knowledge and shaping attitudes towards horse welfare.

Material and methods

Phase 1. Mapping educational practices at Swedish riding schools from both teachers' and pupils perspectives

We developed two online questionnaires to explore perspectives on the two key areas of BW and LC. These subjects were chosen due to their potential to improve horse and rider welfare, training outcomes, and ethical practices. Questionnaire 1 (42 questions) targeted riding school teachers, while questionnaire 2 (34 questions) gathered responses from pupils. Questions for each target group were similar to allow comparison between groups of respondents but were also adjusted to apply to the specific roles, experiences, and perspectives of teachers and pupils within the riding school environment.

The questionnaires included four sections: demographics, information about subject teaching, perceived knowledge gain, and interest/barriers in providing and/or participating in subject teaching. Participants referred to their riding school activities during spring 2022. Most questions were closed-ended, with an optional "other" category for comments. Likert scales (1 = strongly disagree, 5 = strongly agree) measured agreement or disagreement with statements concerning opinions. For example, teachers were asked if they offered separate non-riding lessons on BW or LC (yes/no), while pupils indicated if they attended such lessons (yes/no/not provided for their age group/school). Both groups were asked if these topics were integrated into regular riding lessons or other activities (e.g., groundwork, stable tasks). Teachers were then asked if they felt pupils learned enough, and pupils were asked how they perceived their own knowledge gain when BW and LC were taught alongside other activities (yes/no/don't know).

Interviews with three riding school teachers and two pupils informed about the question design, which was then piloted with project group members (teachers, equine and social science researchers) and pupils not involved in the project. Riding teachers (18+ years old) and pupils (15+ years old) were invited to participate in this study. The questionnaires were developed using the online survey tool Netigate (Netigate AB, Stockholm, Sweden). The Swedish Equestrian Federation shared the questionnaire links via newsletters, the Swedish University of Agricultural Sciences (SLU) via the project page, and the links were further distributed via HästSverige, equestrian magazines (Hippson, Tidningen Ridsport), social media, and personal contacts. The questionnaires were available online between May-June 2022.

Data analyses was based on descriptive statistics and Pearson chi-squared tests. The data was handled anonymously, and no personal or sensitive information was collected.

Phase 2. Workshop to facilitate discussions on current and future teaching strategies

We organized a 1-day focus-group workshop at SLU aiming to discuss teaching proposals that may best achieve implementation of evidence-based subject knowledge in everyday riding school practice. Further workshop questions included, for example: How can we overcome perceived barriers in theoretical and practical teaching? How can we encourage riding schools/instructors to offer more teaching in the selected subject areas and motivate pupils to participate? What educational tools can facilitate the implementation of evidence-based knowledge? How can increased collaboration between researchers and riding teachers help enhance the knowledge base of riding schools?

The workshop was attended by 18 participants, representing riding school teachers, head of schools, pupils, and researchers. Group discussions were rotated with Mentimeter exercises and a lecture was given by Andrew McLean (co-applicant) to present teaching approaches and the Australian Pony Club syllabus. Workshop results were not formally analyzed but were used to inform the development of a teaching program for Phase 3.

Phase 3. Implementing and evaluating the co-developed teaching program

Building on insights from Phases 1 and 2, we implemented and evaluated a teaching program at two riding schools. Riders participated in a theory lesson on previously identified topics, with the Five domains model (12) and the 10 Training principles developed by the International Society for Equitation Science (ISES, https://www.equitationscience.com/ises-training-principles) serving as frameworks. Pupils also participated in two practical sessions: a ridden lesson with focus on rider-horse communication, and observation and evaluation of horses' responses, and a groundwork session introducing positive reinforcement and demonstrating negative reinforcement training. This set-up, including questions, were piloted at one riding school. Each session lasted for one hour and took place before or after the pupils' weekly riding lesson.

We hypothesized that pupils of the intervention group would gain a better theoretical and practical understanding of horse behaviour, welfare, learning and rider-horse communication than pupils from a control group at the same school. Evaluation was based on a questionnaire provided for both groups once before the intervention started and once directly afterwards, i.e. after 4-5 weeks. Questions evaluated knowledge and attitudes toward training methods relevant to pupils' experiences at the school, as well as general horse welfare.

Examples of knowledge questions:

- Is training with pressure-release the same as using negative reinforcement when handling and/or riding horses? (yes - score 2 [correct answer], no - score 0, don't know - score 1)
- Does this scenario correctly describe the use of positive reinforcement training? - Imagine that you want to take the horse out of its stall. You put pressure on the lead rope attached to the halter and immediately release it as soon as the horse takes a step forward. (yes - score 0, no - score 2 [correct answer], don't know - score 1)

Examples of attitude questions:

- How do you view the use of food rewards as a training method when handling and/or riding horses? (score 1 - very unfavorable to score 4 - very favorable)
- A horse that repeatedly tosses its head while riding may do so because it … performs a learned behaviour | tries to irritate the rider | challenges the rider's leadership | expresses frustration, discomfort or pain | challenges the rider's dominance | don't know (score 1 - very unlikely to score 4 - very likely)

For statistical analyses, scores from all knowledge questions (total 7) were summed up for each respondent and analyzed separately, along with the sum of scores for attitude questions (total 7). This approach avoided comparing individual questions pre- and post-intervention and thereby multiple testing. Furthermore, analyses included only participants who completed the questionnaires both at pre- and post-intervention, as not all pupils were able to attend each session. The Wilcoxon rank-sum test was used to compare questionnaire results between the control and intervention group and the Wilcoxon signed-rank test to assess differences within groups. All responses were analyzed anonymously.

Results and discussion

Phase 1. Mapping educational practices at Swedish riding schools from both teachers' and pupils perspectives

The questionnaire received responses from 387 riding school teachers and 589 pupils, with 199 teachers and 368 pupils' completing it in full. The majority of respondents, over 95%, were female, with the largest age group being 46-55 years old. Most of the teachers had more than

16 years of teaching experience (58.3%, 116/199), and the majority of pupils reported 16 or more years of riding experience (47.3%, 174/368). Below we are presenting some example results.

Teachers and pupils were asked if BW and LC were taught during riding and/or unmounted lessons, including general horse care. Chi-square analysis showed significant differences between teacher and pupil responses for BW (χ^2= 66.61, df=2, p<0.001) and LC (χ^2=43.24, df=2, p<0.001), with teachers believing they taught these topics more than pupils felt they were taught. The findings suggest a discrepancy between teachers' perceptions of their teaching efforts and pupils' experiences that these subjects may not be sufficiently addressed. This misalignment may indicate gaps in communication and teaching clarity, for example, if teachers do not explicitly emphasize these subjects during lessons, pupils may overlook or undervalue the information, or the teaching methods may fail to engage them effectively. Alternatively, pupils may have higher expectations for focused teaching on BW and LC than what is currently being provided. This discrepancy is further highlighted by responses to a question about satisfaction with the teaching of BW and LC. Teachers reported significantly higher satisfaction levels compared to pupils for both BW (χ^2=99.48, df=3, p<0.001) and LC (χ^2=138.17, df=3, p<0.001), suggesting a potential gap between the perceived quality of teaching and pupils' learning experiences.

Another question investigated teachers' opinions on how interested they thought pupils are in attending additional unmounted subject lessons. The same question was provided to pupils asking whether they would attend such lessons. There was a significant association between teachers' and pupils' responses both for BW (x2 = 99.48, df = 3, p < 0.001) and LC (x2 = 138.17, df = 3, p < 0.001), implying that pupils were more interested in attending subject lessons than teachers expected (see table 1).

Table 1. Teachers' (n = 199) and pupils' (n = 368) responses on the general level of perceived interest in attending additional offered subject lessons.

Subject	**Behaviour & Welfare**		**Learning & Communication**	
Category	Teacher	Pupil	Teacher	Pupil
Uninterested	37.7 (75)	13.9 (51)	34.7 (69)	10.4 (35)
Neutral	33.7 (67)	16.3 (60)	36.7 (73)	11.9 (40)
Interested	23.6 (47)	67.1 (247)	23.6 (47)	75.7 (255)
No opinion	5.0 (10)	2.7 (10)	5.0 (10)	2.1 (7)
Total	199	368	199	337

Over 80% of teachers (81.4%, 162/199) rated the dissemination of evidence-based knowledge in BW and LC as very important, with none considering it unimportant. However, less than half (42.7%, 85/199) found implementing such knowledge in riding school teaching easy, while 34.7% (69/199) considered it neutral, 17.6% (35/199) found it difficult, and 5% (10/199) had no opinion.

Figure 1 highlights the key sources of knowledge acquisition for teachers and pupils. Most teachers relied on colleagues (69.9%, 139/199), followed by books (68.8%, 137/199), and veterinarians or farriers (64.3%, 128/199). Pupils primarily turned to their riding teachers or trainers (67.7%, 249/368), equestrian journals (57%, 208/368), and friends or equestrian peers (48%, 174/368). These differences in knowledge sources between teachers and pupils highlight the pivotal role of riding teachers in shaping pupils' understanding. Providing teachers with

better access to evidence-based information and teaching tools can improve education, support best practices, and benefit rider learning and ultimately horse welfare.

In summary, collecting data via questionnaires can be valuable for reaching a large number of respondents and integrating diverse perspectives, but it can also present challenges in interpreting results. For example, teachers and pupils completed separate questionnaires, limiting direct comparison of their perspectives. Significant differences found in responses between teachers and pupils may thus indicate a real gap in perspectives or reflect differences in interpretation of survey questions. Additionally, the questionnaires may have attracted respondents that were already enthusiastic about these subjects, potentially skewing results towards a higher demand for further subject teaching, particularly among pupils. Furthermore, the age distribution of respondents, with a predominance of experienced individuals, may not adequately capture the experiences and opinions of novice riders, leaving their perspectives underrepresented. Despite these limitations, our data provides important insights into current teaching practices and highlight opportunities to enhance education in riding schools.

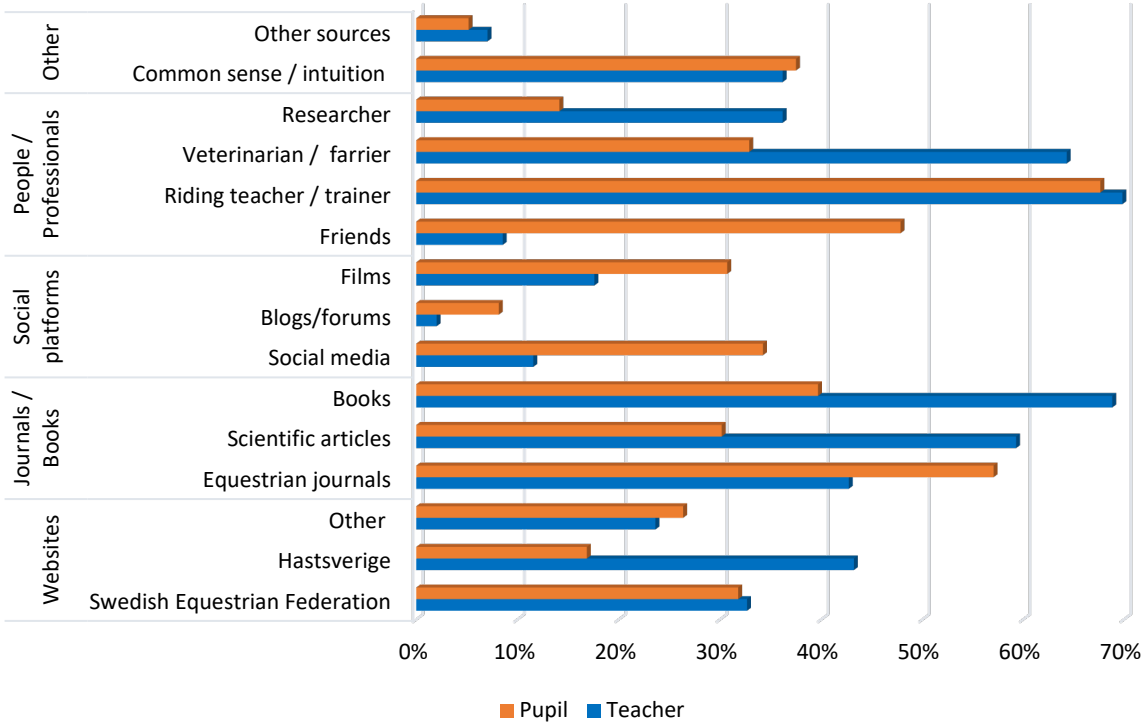

Figure 1. Teachers' (n = 199) and pupils' (n = 368) responses on preferred sources of knowledge gain. Respondents could select from multiple sources.

Phase 3. Implementing and evaluating the co-developed teaching program

Overall, pupils' feedback about the intervention was positive, as reflected in comments from the evaluation form. For example, one pupil highlighted the appreciation for the mix of theory and practice, while another remarked that everything was enjoyable and recommended implementing this education at other schools.

Results showed no significant differences in knowledge scores between the control and the intervention group (W=58.5, p=0.122). However, a statistically significant improvement in attitudes toward positive animal welfare was observed in the intervention group. This suggests that the intervention effectively promoted better attitudes aligned with welfare-enhancing principles. Thus, simply being part of the intervention group and participating in discussions

and joint activities might have positively affected participants' attitudes towards horse welfare without a direct effect on their factual knowledge. The latter could be explained by a high baseline knowledge in both groups which may have limited the detectable impact of the intervention as our knowledge questions may not have been sensitive enough to capture more nuanced improvements. Nevertheless, significant improvements in knowledge were observed within groups when comparing pre- and post-scores (pre- and post-control W=35, p=0.010; pre- and post-intervention W=53.5, p=0.005; see figure 2). This suggests that simply participating in the study, regardless of being in the intervention or control group, may have encouraged learning over time. Participants might have sought out information independently or discussing topics with peers after seeing the initial questions. This indicates a general educational effect rather than one specific to the intervention. However, this effect was not observed for attitude scores within the control group (pre- and post-comparison: W=10, p=0.062), but it was evident in the intervention group. This supports the earlier finding that the teaching intervention successfully promoted a shift in attitudes toward improved horse welfare.

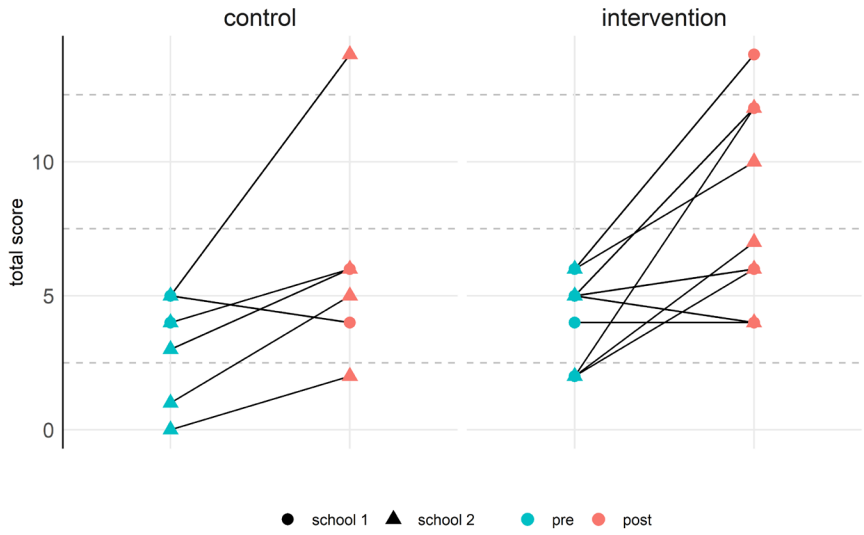

Figure 2. Sum of knowledge scores for pupils in the control and intervention group. High scores correspond to correct answers.

Conclusions

The project results highlight that there is significant potential to enhance education at riding schools by incorporating more unmounted lessons and practical exercises that implement knowledge of horse behaviour, welfare, learning theory and rider-horse communication, as these subject areas are currently underutilized. Pupils have expressed a strong interest in such an education, which can create opportunities to develop and test various teaching approaches.

The intervention significantly improved pupils' attitudes toward positive horse welfare, showing that structured teaching programs like this can effectively promote welfare perspectives. However, while 81% of riding teachers acknowledged the importance of disseminating evidence-based knowledge, only 43% found it easy to implement, reflecting the challenges of applying scientific principles in riding school practice. Addressing these gaps by supporting teachers and aligning education with pupils' interests could further improve teaching quality, enhance learning outcomes, and advance both horse and rider welfare.

Relevance for the practical horse sector incl. recommendations

Describe how the project results can be used in the practical horse sector, what is needed for the results to be implemented, and (if applicable) what needs further investigation after the project.

The results of this project provided important insights into the current teaching practices at riding schools based on questionnaire data and a field study. Key findings, such as the discrepancy between teachers' and pupils' perceptions of learning outcomes, highlight the need for more explicit teaching in the subjects that were addressed in this project, i.e., horse behaviour and welfare, and learning and communication. Moreover, the project demonstrated the value of combining theoretical lessons with practical teaching approaches to facilitate learning and enhance pupils' attitudes toward horse welfare.

Research suggests a notable gap between the knowledge equestrians believe they possess and their actual understanding of horse behaviour and training methods. They misinterpret or fail to recognize stress behaviours in horses, sometimes viewing signs of discomfort as indications of a horse's enthusiasm or willingness. Moreover, limited familiarity with learning theory and its application to horse training compromises horse welfare and, in some cases, leads to increased human accidents.

Thus, education in these subjects has emerged as a key strategy for improving both horse welfare and human safety. Riding schools are uniquely positioned to deliver this education and integrate evidence-based knowledge into equestrian education. However, since teachers indicated that implementing such knowledge can be challenging, it is essential for researchers, practitioners, and teachers to engage in dialogue and knowledge exchange to collaboratively guide improvements in teaching methods. We have already addressed this recommendation as part of this project by developing teaching material designed for easy implementation in riding schools or used by other equestrian stakeholders actively involved in teaching. The material is designed as durable plastic cards that deliver information and promote learning through discussion questions, exercises, and activities designed to facilitate practical application of knowledge and encourage dialogue. In particular, these cards provide a deeper understanding of the ISES 10 fundamental training principles (https://www.equitationscience.com/ises-training-principles), essential for responsible and effective horse training. Each card introduces one training principle and offers practical examples to help apply it in training horses. The front page explains the core idea of the principle and its role in promoting horse welfare whereas the back page provides deeper insights with examples, tips, discussion questions, and practical exercises to help reflect and integrate the principle into training practice (see figure 3).

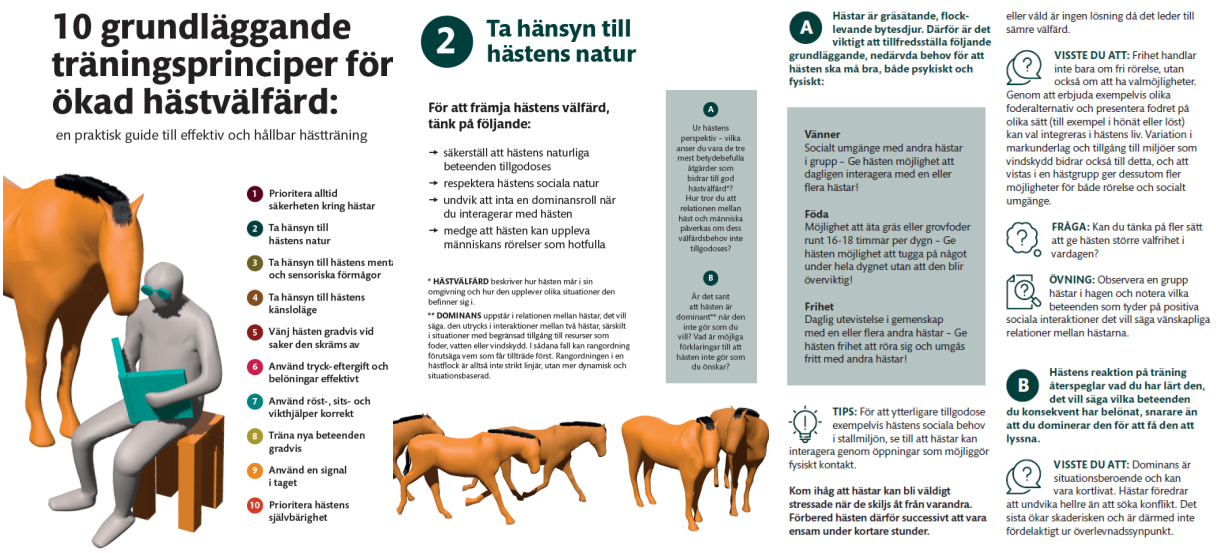

Figure 3. Extract of the teaching material developed as part of the project "Improving riding schools' knowledge base to enhance horse welfare and human-horse communication". Design Linda Eriksson.

This material has the potential to become a cornerstone in bridging science and practice, further facilitating ethical horse training. After completion of this project, it will be continuously developed through dialogue with researchers, riders, teachers, and others passionate about improving horse welfare and training practices. This initiative could also pave the way for future research projects to further validate the material and its application, particularly in riding schools. Effectiveness could be measured through questionnaires (see Phase 3), but could be further expanded by interviewing riders and teachers, as well as assessments of rider-horse interactions and training outcomes to provide a more comprehensive evaluation. Another avenue for future investigation is whether teaching interventions promote long-term changes in attitudes and behaviours among riders, teachers, and other equestrian stakeholders. Additionally, exploring the experiences and opinions of different age groups, particularly novice riders who were underrepresented in the current data, would provide a more balanced perspective. Investigating why teachers find implementing evidence-based knowledge challenging and identifying practical solutions or additional resources to better support and tailor educational strategies to their needs would also be critical for enhancing the effectiveness of such interventions.

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Part 3: Result dissemination

State all result dissemination from the financed project into the appropriate section, including information as indicated in each section. Additional rows can be added to the table.

Scientific publications, *published*	*Author(s), year, title, journal, Vol, No, pp., doi-link*
	Lina Nyberg, Tanja Linnavalli, Elke Hartmann, Mirjam Kalland. 2023. Finish and Swedish riding school pupils' motivation towards participation in non-riding education. Frontiers in sports and active living 5, 2023. University of Helsinki, Finland. https://doi.org/10.3389/fspor.2023.1232428
	Lina Nyberg, Mari Zetterqvist Blokhuis, Andrew McLean, Elke Hartmann. 2025. Rider education at Swedish riding schools: comparing teachers' and pupils' perspectives. Accepted for Publication, PlosOne. 2026 Feb 27;21(2):e0331059. doi: 10.1371/journal.pone.0331059
Scientific publications, *manuscript*	*Author(s), title*
Conference publications/ presentations	*Author(s), year, title, conference name, location and date, (link if applicable)*
	Zetterqvist Blokhuis M, Wolframm I, Hartmann E, editors. Improving riding schools' knowledge base to enhance horse welfare and human-horse communication. Equine Culture in Transition: Decent work, decent leisure, decent lives 2025; Manchester Metropolitan University, UK.

	Mari Zetterqvist Blokhuis, Lina Nyberg, Elke Hartmann, 2024. Mapping Educational Practices at Swedish Riding Schools From Teachers' and Pupils' Perspectives: A Descriptive Study, 33rd International Society for Anthrozoology conference, Hartbury, UK, 27-30 June, p. 55. https://isaz.net/news-events/past-conferences.html
	Mari Zetterqvist Blokhuis, Lina Nyberg, Andrew McLean, Inga Wolframm, Elke Hartmann, 2024. Hur kan mer kunskap om hästars beteende, inlärning och kommunikation mellan människa och häst leda till ökad hästvälfärd för våra ridskolehästar? Horse Welfare Summit Flyinge, 13-14 September 2024. https://flyinge.se/kalender/horse-welfare-summit/
	Elke Hartmann, Lina Nyberg, Mari Zetterqvist Blokhuis. Lost in translation? Improving the science-based practical knowledge in Swedish riding schools by implementing and evaluating a co-developed teaching program. 6th Annual Animal Welfare Science Symposium, SLU, Uppsala, 8 June 2023.
Other publications, *media etc.*	*Title, year/date, place of publication (link if applicable)*
	Utveckling av undervisningen av hästvälfärd på ridskolor, från forskning till vardag - nytt undervisningsmaterial framtaget – HästSverige, 25 November 2025 https://hastsverige.se/news/utveckling-av-undervisningen-av-hastvalfard-pa-ridskolor-fran-forskning-till-vardag-nytt-undervisningsmaterial-framtaget/
	Nytt undervisningsmaterial ska stärka hästvälfärden på ridskolor – Hippson 27 November 2025 https://www.hippson.se/nyheter/nytt-undervisningsmaterial-ska-starka-hastvalfarden-pa-ridskolor
	Leder ökad kunskap till bättre hästvälfärd? Nummer 11, 2024. Tidningen Ridsport. https://www.tidningenridsport.se/battre-liv-for-ridskolans-hastar/
	Ridskolors hästvälfärd studeras i enkät: "Bidra till teoretisk och praktisk kunskap". 16 Juni 2022, Hippson. https://www.hippson.se/forskning/ridskolors-hastvalfard-studeras-i-enkat-bidra-till-teoretisk-och-praktisk-kunskap
	Nytt projekt ska öka välfärden för ridskolehästar. 14 December 2022, Tidningen Ridsport. https://www.tidningenridsport.se/nytt-projekt-ska-oka-valfarden-for-ridskolehastar/
Oral communication, *to horse sector, students etc.*	*Title, year/date, group presented to (link if applicable)*
	Lost in translation? Improving the science-based practical knowledge in Swedish riding schools by implementing and evaluating a co-developed teaching program. 29 Mars 2023, HUMSAM (Humaniora och Samhällsvetenskap) online-meeting, SLU, Uppsala.
	Hur kan mer kunskap om hästars beteende, inlärning och kommunikation mellan människa och häst leda till ökad hästvälfärd för våra ridskolehästar? 26 November 2024, Swedish Equestrian Federation, Utbildningssektion, online-meeting.
Student theses	*Author/Student, co-authors/supervisors, year, title, type of thesis (doi/link if applicable)*

Other	Communication of research results to the public and horse industry will continue as soon as the scientific publication is available via PlusOne and open access.