Exploring social behaviour and welfare of group housed horses (*Equus caballus*) during their free-time

Behavioural Patterns, Synchronisation and Time Budget

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Faculty of Veterinary Medicine and Animal Science,
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Exploring social behaviour and welfare of group housed horses (Equus caballus) during their free-time: Behavioural Patterns, Synchronisation and Time budget

Grupphållna hästars fritid och välfärd: beteendemönster, synkronisering och tidsbudget

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Abstract

Horses are highly social animals and their welfare depends on access to social interaction and freedom to behave naturally. Management systems that limit physical movement or social contact affect behaviour, time budgets, and horses' overall welfare. Understanding how horses spend their free time, and which factors affect their behaviour, is therefore important for evaluating welfare.

The aim of the study was to observe and analyse behavioural patterns, social interactions, and compare behaviour between daytime versus nighttime in group-housed horses during their free-time. In total, nineteen horses were observed using continuous 24-hour video recordings across multiple days, including both riding horses and Icelandic horses. The videos were analysed using BORIS with an ethogram, which comprised twenty-five defined behaviors.

The results showed that social behaviours occurred more frequently than solitary behaviours across all groups, with socially foraging and resting being the most common behaviours. Riding horses engaged in significantly more social locomotion, while Icelandic horses tended to spend more time resting socially. Mares and geldings behaved similarly overall, both showing a preference for social activity.

Foraging occurred mainly during the day while lying down was most common at night. Standing rest was evenly distributed across day and night. Affiliative behaviours, such as standing or lying in close proximity to another horse, were far more common than agonistic interactions, which mainly consisted of avoidance and retreat. Play and allogrooming were observed, but variation between individuals was considerable.

Continuous video observation provided detailed behavioural data but was limited by small sample size and camera visibility. Further research with larger and more diverse sample sizes as well as refining the method and reducing technical difficulties would improve the overall results. The findings from this study highlights natural behaviour, social dynamics, and diurnal rhythms in group-housed horses and can contribute to better management practices where equine welfare is prioritised by offering guidance for designing housing and management systems that align with horses' natural social organisation and diurnal activity rhythms.

Keywords: Horse welfare, behaviour, social behaviour, agonistic behaviour, affiliative behaviour, nighttime vs daytime, synchronisation

Table of contents

List of tables

List of figures

1. Introduction

The domestication of horses has altered their physique, but their behavioural needs likely remain unchanged (McGreevy 2012a; Mills & Redgate 2017). Horses have complex behavioural needs that must be met to ensure good welfare, and the housing of horses significantly influences their well-being (Hothersall & Casey 2011; Yngvesson *et al*., 2019; Ruet *et al*., 2020; Bradshaw-Wiley & Randle 2023; Robertson *et al*., 2024). Nowadays, very few horses are being kept in a way that allow them to fully perform natural behaviours such as foraging, roaming across large areas and social interactions with conspecifics (Hothersall & Casey 2011; Pessoa *et al*., 2016; Yngvesson *et al*., 2019; Ruet *et al*., 2020; Bradshaw-Wiley & Randle 2023; Seabra *et al*., 2023; Robertson *et al*., 2024).

In Sweden, all horses must be given the opportunity to move freely outdoors in their natural gaits on a daily basis (Regulation regarding changes in the Swedish board of agriculture's regulations [SJVFS 2019:17] regarding horse husbandry, item no. L101, hereafter referred to as L101). However, this is not always a requirement in other countries and pasture/paddock access and size, group composition, and feeding routines can influence how horses express natural behaviours. Therefore, understanding how horses spend their free time on paddock, and how factors such as breed, sex, and daily rhythm affect their behaviour, is important for evaluating welfare as discrepancies between behaviour expressed in captivity and horses' natural behavioural needs can compromise welfare.

1.1 Social behaviour in horses

Horses are fundamentally social animals with herd structures and hierarchies (McGreevy 2012a; McGreevy 2012b). In wild populations they form family groups and rely on the herd for safety from danger, companionship, and foraging (McGreevy 2012a; McGreevy 2012b). Social behaviours include agonistic behaviours such as fighting, herding, and displacing other horses and affiliative behaviours such as allo-grooming, play, bodily contact, and synchronisation, among others (Torres Borda *et al*., 2024).

Behavioural synchronisation is an important indicator of positive social bonds in a group of horses and could imply an environment with low stress (Hauschildt & Gerken 2015). A study by Hauschildt & Gerken (2015) studied synchronisation in horses and observed a group of Shetland ponies kept on pasture for two years. They found that the horses were more synchronised the second year which indicates that a group of horses that has coexisted for longer is more stable. They

also found that when kept on smaller pastures the behavioural synchronisation was not as high as on larger pastures, possibly because the smaller space can cause more interruptions of behaviour (Hauschildt & Gerken 2015). The study concluded that a lack of synchronisation can indicate an unstable group and therefore low welfare (Hauschildt & Gerken 2015). This is important to think about when re-grouping horses, introducing new horses to a stable group or splitting up friends as it can impact the welfare negatively (Hauschildt & Gerken 2015).

Active affiliative behaviours, like play and allogrooming, are usually not very frequent but they are considered indicators of a positive state of mind in the horse (Zeitler-Feicht *et al*., 2024; Torres Borda *et al*., 2024). Both play and allogrooming occur in foals, juveniles and adults and helps social bonds and reduces tension (McGreevy 2012b; McGreevy 2012d). Agonistic behaviours are normally less frequent than affiliative behaviours but are important for maintaining social hierarchies (McGreevy 2012b; Burla *et al*., 2016; Torres Borda *et al*., 2024).

Social behaviours in horses can also vary between sexes. In adult Icelandic horses, it was observed that male horses had a higher rate in both agonistic and submissive interactions compared to mares (Sigurjónsdóttir & Haraldsson 2019). Adult males also engaged in more affiliative behaviours than mares (Sigurjónsdóttir & Haraldsson 2019). A study by Hausberger *et al*. 2012 showed that geldings played significantly more than mares when out in paddocks. Another study found that mares were more socially dependent than geldings, and when isolated they showed a reduced food motivation and increased alert standing, indicating that mares may be more sensitive to social isolation than geldings (Górecka Bruzda *et al*., 2024).

1.2 Behavioural needs

In feral populations or in the Przewalski horse, up to 18 hours of the day is spent on grazing and/or foraging for food and in free-ranging horses with ad libitum feeding this time-budget matches that (McGreevy 2012c). Continuous access to roughage not only promotes this crucial behavioural need but also maintains good physical health as it has been shown that horses fed an unnatural diet consisting of grain or pellets high in sugar and starch-content, and lack of roughage can increase the risk for gastric ulcers and colic (Böhm *et al*., 2018; Hesta & Costa, 2021; Moore-Colyer 2024).

The horses' need for locomotion is tightly linked with foraging behaviour as they constantly slowly move forward when grazing to always find fresh food

(McGreevy 2012c). In stables or in paddocks horses are usually fed in one place which greatly reduces how much they move (McGreevy 2012c). Horses kept in stables without access to pasture-time, are at an elevated risk of developing locomotor-stereotypies such as weaving or box walking, severely affecting their welfare (Seabra *et al*., 2023).

It is not unusual to provide horses with large meals two or three times a day resulting in quite long fasting periods, especially during the night, that can impact their welfare negatively (Seabra *et al*., 2023). Time spent on foraging severely drops when fed unnaturally, which can result in stereotypies and health concerns (Seabra *et al*., 2023) and therefore horses should be given a sufficient amount of food in the evening to last for the whole night (McGreevy 2012c). Research has shown that the use of various kinds of slow-feeding systems or hay-nets could increase time spent on eating and decrease fasting periods and inactivity which is positive for the horses' welfare (Ellis *et al*., 2015a; Ellis *et al*., 2015b; Burla *et al*., 2016; Correa *et al*., 2020). However, while hay-nets provide an extended eating period, the horse is stationary while eating and therefore does not allow for locomotion, which is an essential part of the grazing behaviour and depending on hay-net placement, may also result in an unnatural eating posture (McGreevy 2012c). Horses are also sensitive to changes in feeding routines, shown in the study by Zupan *et al*., 2019, where frustration levels were higher in horses when feed was not provided on the usual time, indicating that a routine is preferable.

Resting is also an essential need, and while horses can sleep while standing up, they also need to lie down to achieve REM-sleep (McGreevy 2012d; Greening & McBride 2022). Available space and environment, bedding, and rank of the horse has been shown to influence how much time a horse spends lying down (McGreevy 2012d; Kjellberg *et al*., 2021; Kjellberg *et al*., 2022; Greening & McBride 2022). Lack of sleeping opportunities may result in sleep deprivation which increases stress levels and lowers the welfare of the horse (McGreevy 2012d; Greening & McBride 2022).

The behaviour frequency also changes between day and night, with more foraging and locomotion observed during daytime and more resting and lying down during nighttime (McGreevy 2012d; Maisonpierre *et al*., 2019; Auer *et al*., 2021; Kjellberg *et al*., 2021; Kelemen *et al*., 2021). The diurnal rhythm and time budget can also be affected by housing and management, for example a review from Auer *et al*. 2021 showed a large variation in resting behaviour (from 8.1 % to 66%) and foraging behaviour (from 10% to 66.6%).

1.3 Housing systems and their impact on horses' welfare

The choice of housing management for horses is influenced by economy, geography, the discipline the horse is being used for and personal beliefs (McGreevy 2012a). Keeping horses in stables can improve the control of the horse in terms of feeding, movement, and shelter from weather conditions but it may impact other aspects of their welfare negatively (McGreevy 2012a). Keeping horses in group-housing outdoors may make it harder to control how much and what they are eating and if they have access to shelter or not, but it may increase overall welfare as horses gain more freedom to perform natural behaviours (McGreevy 2012a, Yngvesson *et al*., 2019).

Horses housed in conventional stables often experience limitations in expressing natural behaviours such as grazing, roaming, and social interactions with conspecifics (McGreevy 2012a; Seabra *et al*., 2023). Restricted feeding is associated with the development of oral stereotypies, including crib-biting, wood-chewing, and excessive licking, while restricted locomotion can lead to locomotor stereotypies such as weaving or pacing (Seabra *et al*., 2023). Additionally, individually housed horses in box stalls are at a higher risk of health issues, including colic and respiratory disorders, compared to horses kept in group housing in paddocks (Yngvesson *et al*., 2019).

Horses kept in small paddockss are sedentary under prolonged periods of time, to increase locomotion and encourage movement different types of track systems where resources are placed away from each other can be used (McGreevy 2012c; Mitson & Greening 2019; Kirton *et al*., 2024; Cameron *et al*., 2025). Increased movement can also lower the risk of obesity (Cameron *et al*., 2025).

In summary, providing horses with access to large paddockss together with conspecifics promotes the expression of natural behaviours, including social interactions, foraging, and locomotion, while also reducing aggression toward humans and the occurrence of stereotypies (McGreevy 2012a; McGreevy 2012b; Hauschildt & Gerken 2015; Yngvesson *et al*., 2019; Ruet *et al*., 2020).

1.4 Welfare

"The Five Freedoms" and "the Five Domains" are commonly used frameworks for assessing animal welfare (Green & Mellor, 2011; Webster, 2016; Keeling & Jensen, 2017; Fletcher *et al*., 2021). The former implies that an animal experiences good welfare when it is free from negative states. However, the Five Freedoms do not account for positive experiences or the emotional well-being of

an animal (Keeling & Jensen, 2017; Fletcher *et al*., 2021). In contrast, “the Five Domains” includes 'mental state' as the fifth domain, recognizing emotional well-being as equally important as physical health (Green & Mellor, 2011; Fletcher *et al*., 2021). To achieve high animal welfare standards and “a life worth living”, it is essential not only to minimise negative states but also to provide opportunities for positive experiences and the expression of positive affective states, such as happiness (Green & Mellor, 2011; Mellor, 2016; Fletcher *et al*., 2021).

A solid indicator of positive welfare for horses is close social proximity as this represents a strong social bond with a friend (Zeitler-Feicht *et al*., 2024). Other behaviours such as play, or allo-grooming could also indicate positive states but can be harder to assess because they occur more seldom and could also be combined with stressful events (Zeitler-Feicht *et al*., 2024).

Fletcher *et al*. (2021) found that horse owners may struggle to accurately assess their horse’s welfare and often fail to recognise the importance of fulfilling their horse’s needs for positive affective states. The study also emphasises the need for an objective assessment tool for equine emotional well-being, suggesting that such a method could enhance understanding of the interaction between physiological and psychological health, which is crucial for ensuring good animal welfare. A study by Hall *et al*. (2018) also highlights the need for correctly assessing the mental state of a horse to ensure their welfare and that studying the horses behaviour can give some hints on how the horse feels in different scenarios.

2. Aim and research questions

2.1 Aim of this study

This study aims to investigate how horses spend their free time in paddocks across different behavioural categories, with a focus on potential differences between riding school horses and Icelandic riding school horses and what aspects that impacts the expression of these behaviours. In addition, the study looks at if behaviour varies during the night vs during the day and whether sex influences social behaviours. By addressing these questions, the study provides new insights into the behavioural needs of domestic horses and highlights management practices on riding schools that may better support their welfare. This study will only focus on the behavioural aspect of welfare and therefore the physical health of the horses or the stable/work environment will only be slightly touched upon.

2.2 Research questions

To reach the aim set for this study the following research questions were formulated;

1. To what extent is behavioural synchrony present within the horse flocks, and does this differ by horse type or sex?
2. How does behaviour differ night vs day and are certain behaviours (e.g., foraging, resting, play) concentrated at specific times of the day?
3. Are there differences in the frequency and type of social interactions (affiliative vs. agonistic) between the two horse types and/or between sex?

3. Material and methods

3.1 Material

Axevalla Horse Center is a high school located in Skara, Sweden, specialising in three horse sport disciplines: riding, Icelandic riding, and trotting. During the spring of 2024, the facility housed 17 riding horses, 10 Icelandic horses, and 10 trotting horses. The three groups of horses were kept and managed according to their respective activities. This study is a retrospective observational case study of existing horse groups and includes the riding horses and Icelandic horses.

3.1.1 Horses and management

The riding horses

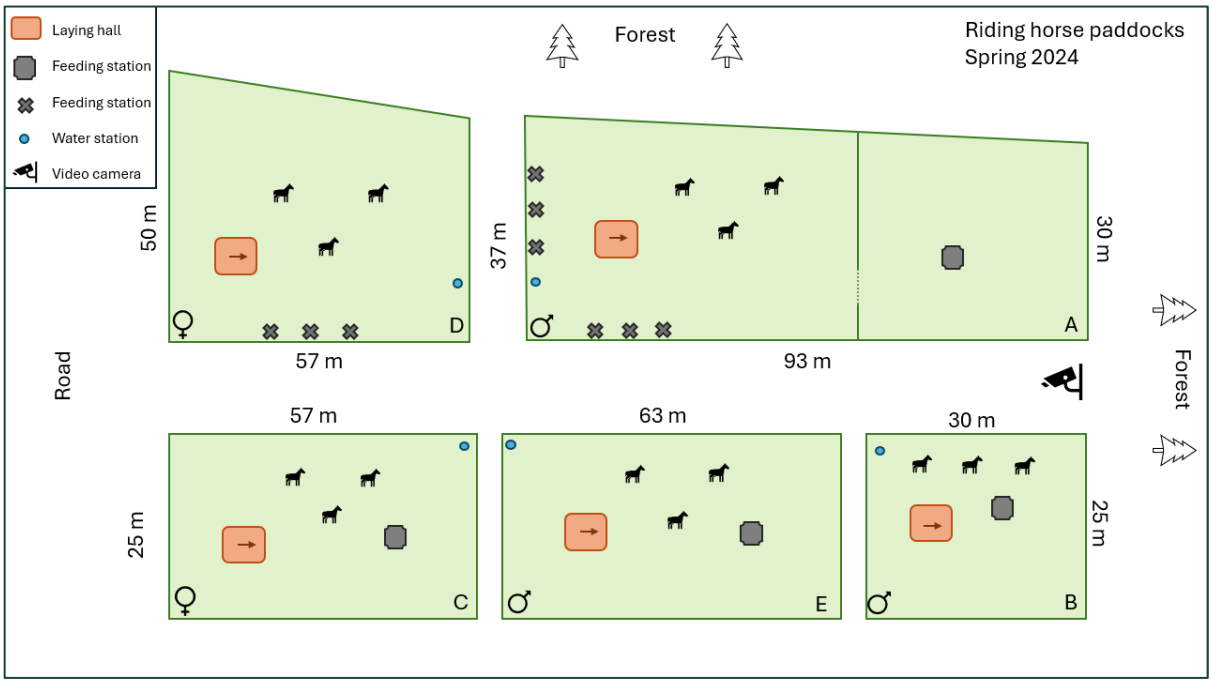

Figure 1. The riding horse paddocks spring 2024.

The riding horses were housed in groups of three in separate paddocks (See fig.1) with lying halls (5m x 6m x 2.7m, providing ~10 m^2 per horse). The paddocks varied in size, offering approximately; ~1250 m^2 (A), ~250 m^2 (B), ~475 m^2 (C), ~1000 m^2 (D), ~525 m^2 (E) per horse. There were two groups of mares and three groups of geldings. Group B, C and E were fed roughage *ad-libitum* while group A and D were fed four times daily. Group C also had a large bale of straw inside their lying hall. In paddock A, the horses had a section of the paddock closed off until nighttime (see dotted line in paddock A), which opened by a timer to let the horses in to eat from the feeding station. Each paddock had *ad-libitum* access to

water and either a large feeding station (2m x 2m with 12 feeding slots) or smaller feeding stations. All of the horses were blanketed. The riding horses were ridden five to six times per week on average.

The Icelandic horses

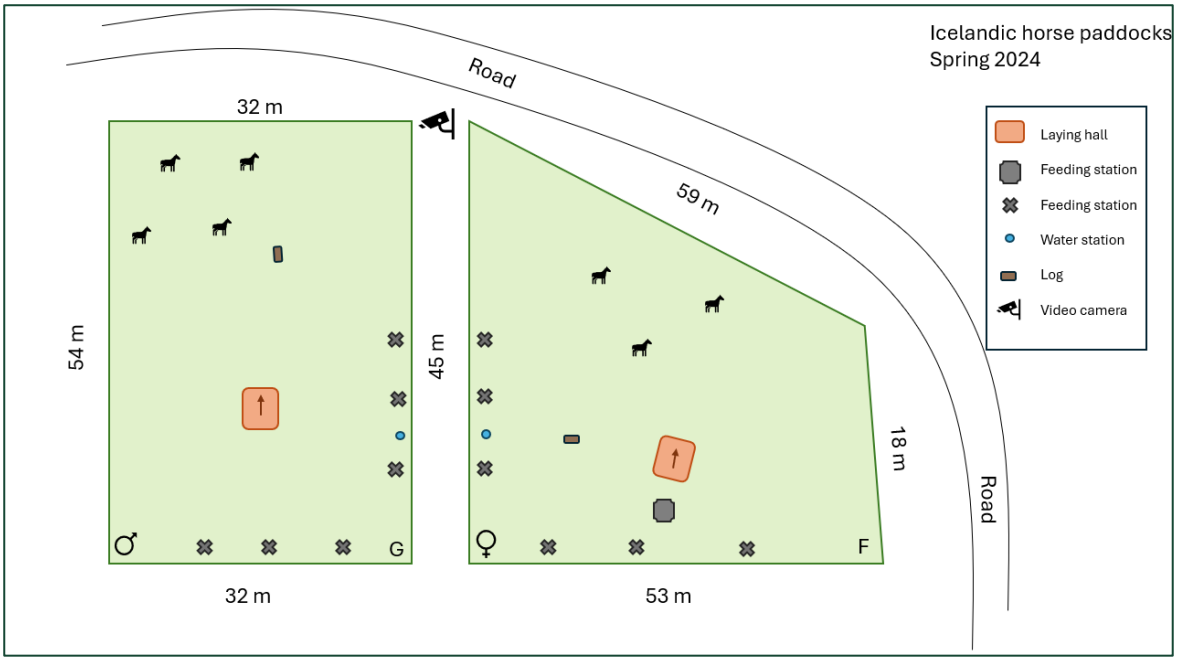

Figure 2. The Icelandic horse paddocks spring 2024.

The Icelandic horses were housed in one group of three (mares) and one group of four (geldings) in separate paddocks (See fig.2) with lying halls (5m x 6m x 2.7m. providing 8-10 m^2 per horse). The paddocks varied in size, offering approximately; ~850 m^2 (F) and ~610 m^2 (G) per horse. Both groups of Icelandic horses were fed four times daily. Each paddock had ad-libitum access to water as well as small automatic feeding stations, paddock F also had a large feeding station (2m x 2m with 12 feeding slots). Both paddocks had a log as enrichment. Only one of the Icelandic horses were blanketed. The Icelandic horses were ridden four times per week on average.

3.2 Method

3.2.1 Video recordings and video analysis

Video recordings were carried out in March of 2024. Each recording was 24 hours long and multiple days were recorded with night-vision cameras used after dark. Daytime was set to 07:00–19:00 and nighttime was set to 19:00–07:00.

Groups A-E (riding horses) were recorded over three consecutive days and groups F and G (Icelandic horses) were recorded on non-consecutive days (see Table 1).

Table 1. Recording dates and horse group composition for all study groups included in the video analysis.

Group	Horse type	Recording date(s)	Weather conditions
A	Riding horse	10-12 March 2024	Windy and mostly cloudy with a few sunny hours, snow/rain during the night
B	Riding horse	10-12 March 2024	See above
C	Riding horse	10-12 March 2024	See above
D	Riding horse	10-12 March 2024	See above
E	Riding horse	10-12 March 2024	See above
F	Icelandic horse	19 and 23 March 2024	Mostly cloudy, sun here and there, rain during evening/night
G	Icelandic horse	19 and 20 March 2024	Mostly cloudy and rainy

The video recordings were analysed using the programme “Behavioral Observation Research Interactive Software” (BORIS). For each video, 10 minutes per hour was selected for analysis. It was chosen by quickly skimming through an hour to find a ten-minute section where all horses in the paddock (or as many as possible) were simultaneously visible within the camera’s range.

Within each selected 10-minute segment, each horse was analysed separately using continuous sampling. All horses within a group were analysed using the same time-window per hour. One focal horse was observed for the full 10 minutes, after which the video was rewound to the start of the same segment and the next horse was analysed. This procedure was repeated until all horses in the group had been observed for that hour resulting in 240 minutes of observations per horse per video.

The behavioural categories ‘resting’ (lying down and standing resting), ‘locomotion’ (standing alert, walking and running) and 'foraging’ (grazing/eating) were logged with the modifiers ‘social’ or ‘solitary’ in BORIS. The modifier ‘solitary’ was used if a behaviour were carried out at least two horse-lengths away from another horse and the modifier ‘social’ was used when horses were within two horse-lengths from each other.

3.2.2 Data collection and analysis

Behavioural events were logged individually for each horse and exported from BORIS into Excel spreadsheets. Both detailed datasets of all recorded behaviours as well as time budgets were exported into Excel.

3.2.3 Ethogram

The ethogram for this study was developed by selecting relevant behaviours from already existing ethograms from behavioural studies on horses (Hausschildt & Gerken, 2015; Marliani *et al*., 2021; Kjellberg *et al*., 2021; Bradshaw-Wiley & Randle, 2023; Seabra *et al*., 2023; Torres Borda *et al*., 2024). The ethogram was put into BORIS, for logging and sorting of the behaviours. The ethogram was evaluated in a small pilot study on one randomly selected video from the 2024 recordings using BORIS and thereafter altered into the current version seen in table 2.

Table 2. Ethogram developed for this study with selected behaviours from 6 different equine behavioural studies, Hausschildt & Gerken, (2015); Marliani et al. (2021); Kjellberg et al. (2021); Bradshaw-Wiley & Randle, (2023); Seabra et al. (2023); Torres Borda et al. (2024).

Behaviour	Definition
	Social behaviours
Avoidance/retreat	One horse moves away from another horse to maintain distance and to avoid conflict or a threat (Torres Borda *et al.,* 2024).
Allogrooming	Two horses stand in close proximity and grooms one another by using their lips, teeth, or tongue (Torres Borda *et al.,* 2024).
Nose-nose interaction	Two horses closely approach each other and touch or almost touch nose to nose. Can be followed by both affiliative and/or agonistic beh. (Torres Borda *et al.,* 2024).
Play	Non-aggressive interactions such as, running, bucking, and nipping at each other without the presence of ears back or other threatful signals (Torres Borda *et al.,* 2024).
Backing threat	One horse backs up towards another horse with its ears back (Torres Borda *et al.,* 2024).
Head threat	One horse extends their neck with ears back toward another horse (Torres Borda *et al.,* 2024).
Bite/bite threat	One horse bite another horse or threats to do so, often combined with tail-swishing and ears back (Torres Borda *et al.,* 2024).
Chase	One horse chases another horse with ears back and threatening body posture for at least a couple of strides (Torres Borda *et al.,* 2024).
Kick/kick threat	One horse kicking another horse or threatening to kick, by lifting the hindleg, with either one or both hindlegs. Often combined with tail-swishing and ears back (Torres Borda *et al.,* 2024).
	Foraging behaviour
Grazing/Eating (social/solitary)	With muzzle low to the ground, the horse is nipping, chewing, and swallowing hay from station or ground alone, standing still or slowly moving forward with head down (Bradshaw-Wiley & Randle, 2023).
Drinking	With muzzle in water trough/bucket, sucking and swallowing water (Bradshaw-Wiley & Randle, 2023).
	Locomotion and resting behaviours

Walking (social/solitary)	Slow movement forward (Marliani *et al*., 2021).
Running (social/solitary)	Trotting (two-beat gait) or galloping (four-beat gait) forward (Marliani *et al*., 2021).
Standing alert (social/solitary)	Standing with head upright with open eyes and alert ears (Kjellberg *et al.,* 2021).
Standing rest (social/solitary)	Standing with head lowered with closed eyes and relaxed ears, one rear foot can be slightly elevated (Kjellberg *et al.,* 2021).
Lying down (social/solitary)	Lying down on breast with head up or nose on bedding, legs under or next to the body or lying down on side with body and head on bedding, legs stretched out (Kjellberg *et al.,* 2021).
	Stereotypical behaviours
Crib-biting	The horse grasps a surface (usually horizontal) with their teeth with apparent engulfing of air while bending the neck (Seabra *et al.,* 2023).
Oral stereotypies	Licking, lip-smacking, repetitive motions with mouth, lips, or tongue without food in the mouth (Seabra *et al.,* 2023).
Wood chewing	The horse chews and eats wood, can be on the box/hall interior or on fences/logs in the pasture (Seabra *et al.,* 2023).
Weaving	The horse moves its head from side to side in a rhythmic movement that can involve neck, forelimbs, and hind limbs (Seabra *et al.,* 2023).
	Other behaviours
Exploratory beh.	The horse sniffs objects in its surrounding/ground/faeces (Torres Borda *et al.* 2024).
Rolling	The horse lies down from standing or are already lying down and rotates their body from chest to side to back one or multiple times and then stands up (Marliani *et al*., 2021).
Grooming	The horse scratches some part of its body either on another object or with its mouth or hind leg (Marliani *et al*., 2021).
Out of view	Horses are not observable on camera
Other	Behaviours not listed above

3.2.4 Statistical analysis

All statistical analyses were carried out using Minitab and Microsoft Excel. Descriptive statistics (means, standard deviations, and percentages) were calculated to summarise the time budgets of different behaviours across groups, sex and horse type. Descriptive statistics were also used for analysing the differences in affiliative and agonistic behaviours.

Differences between social vs. solitary behaviours within the behavioural categories “foraging”, “resting” and “locomotion” were tested using Wilcoxon signed-rank test. Differences between sex and horse type in social vs. solitary behaviour were tested using Mann–Whitney U tests.

In addition, day/night differences for the selected behaviours “Eating”, “Lying down”, “Standing rest” and “Play” were analysed using Wilcoxon signed-rank tests comparing counts of events per horse.

Statistical significance was set to $p < 0.05$ for all tests.

4. Results

A total of 16, 24-hour long, videos were analysed resulting in 720 minutes (240 minutes times 3 days) per group of riding horses and 480 minutes (240 minutes times 2 days) per group of Icelandic horses. This resulted in a total of 7 396 registered behaviours in BORIS. Due to camera placement resulting in poor visibility, all horses from paddock B were excluded from the study resulting in a total of 19 participating horses (10 geldings and 9 mares, 12 riding horses and 7 Icelandic horses).

4.1 Behavioural patterns and synchronisation

The behavioural categories ‘resting’ included the behaviours ‘lying down’ and ‘standing resting’, ‘locomotion’ included the behaviours ‘standing alert’, ‘walking’ and ‘running’ and 'foraging’ included the behaviour ‘grazing/eating’. These behaviours were logged with the modifiers ‘social’ or ‘solitary’ in BORIS.

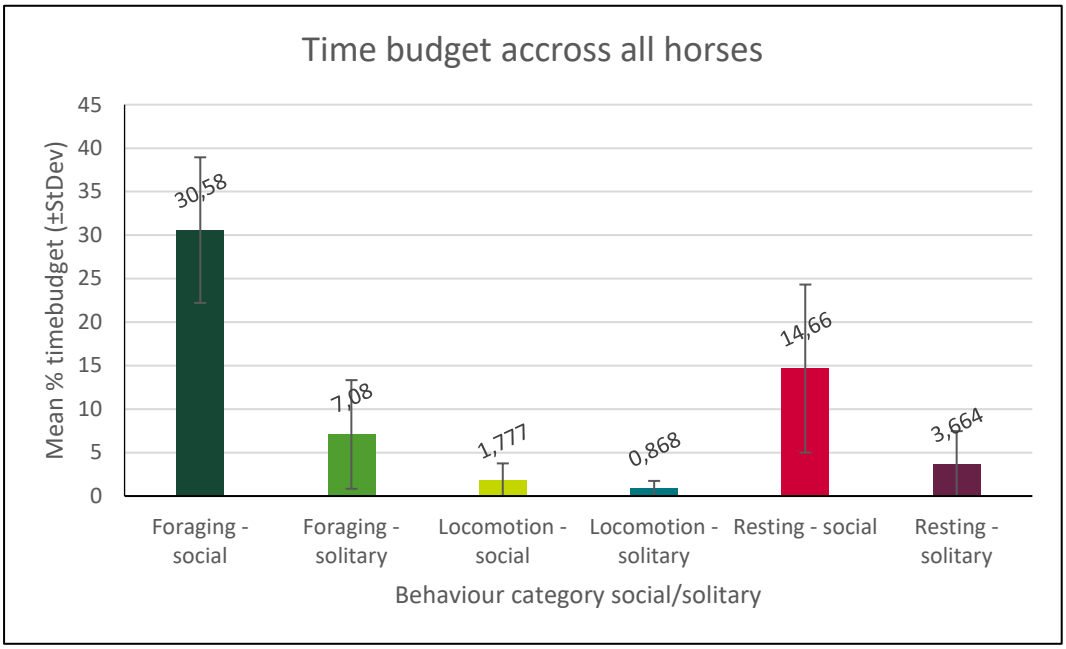

Figure 3. Column chart showing the proportion of time horses spent performing foraging, resting, and locomotion either socially or solitarily. Social behaviours dominated in all categories, with foraging being the most frequent activity, followed by resting and locomotion.

Across all horses, social behaviours were more frequent than solitary ones in every behavioural category (*See figure 3*). Foraging behaviour occupied the largest proportion of the time budget overall, followed by resting and locomotion. Resting was most observed in social contexts, particularly standing rest, while solitary resting was relatively uncommon. Locomotion occurred infrequently compared to other behaviours but was still performed more often in social

contexts. Wilcoxon signed-rank tests showed significant differences between social and solitary behaviour across all categories. Foraging (median=23.9, $p < 0.000$), resting (median = 11.1, $p < 0.000$), and locomotion (median = 0.61, $p < 0.000$) were all performed more socially than solitarily.

4.1.1 Effects of sex

A total of 10 geldings and 9 mares were included in the analysis. Both sexes showed similar behavioural patterns, mares and geldings both spent more time engaging socially than solitarily in all behavioural categories (*See figure 4*).

The difference between social and solitary behaviours were calculated. No significant differences for sex were found with the Mann-Whitney test when comparing if mares or gelding differ in social vs solitary behaviour (foraging: $p = 0.206$; resting: $p = 0.942$; locomotion: $p = 0.457$; all behaviours: $p = 0.966$). However, when analysed separately with Wilcoxon signed rank test, both mares and geldings showed an overall preference for social behaviour in all categories (all $p < 0.01$).

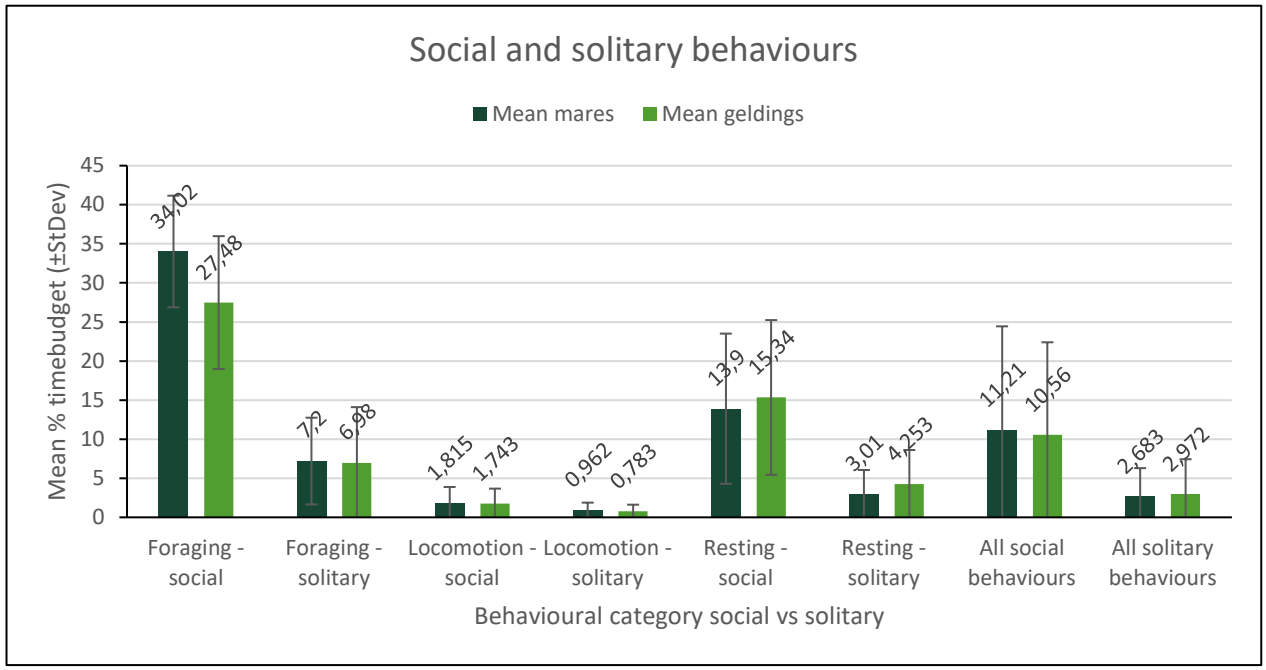

Figure 4. Column chart comparing mean proportions of social and solitary foraging, resting, and locomotion between mares and geldings. Both sexes showed a strong preference for social behaviours in all categories.

4.1.2 Effects of horse type

A total of 12 riding horses and 7 Icelandic horses were included in the study. Both horse types spent most of their time engaged in social foraging, followed by social resting (*See figure 5*). Riding horses tended to show higher levels of social

foraging and locomotion, while Icelandic horses displayed slightly more social resting. Statistical comparisons with the Mann-Whitney test were carried out between the two horse types and revealed that riding horses engaged in significantly more social locomotion than Icelandic horses (median difference = 0.69 vs. 0.07, p = 0.007). There was also a tendency for riding horses to spend more time on social foraging (median = 28.3) compared to Icelandic horses (median = 18.9; p = 0.057), and for Icelandic horses to spend more time on social resting (median = 14.9) compared to riding horses (median = 8.9; p = 0.051).

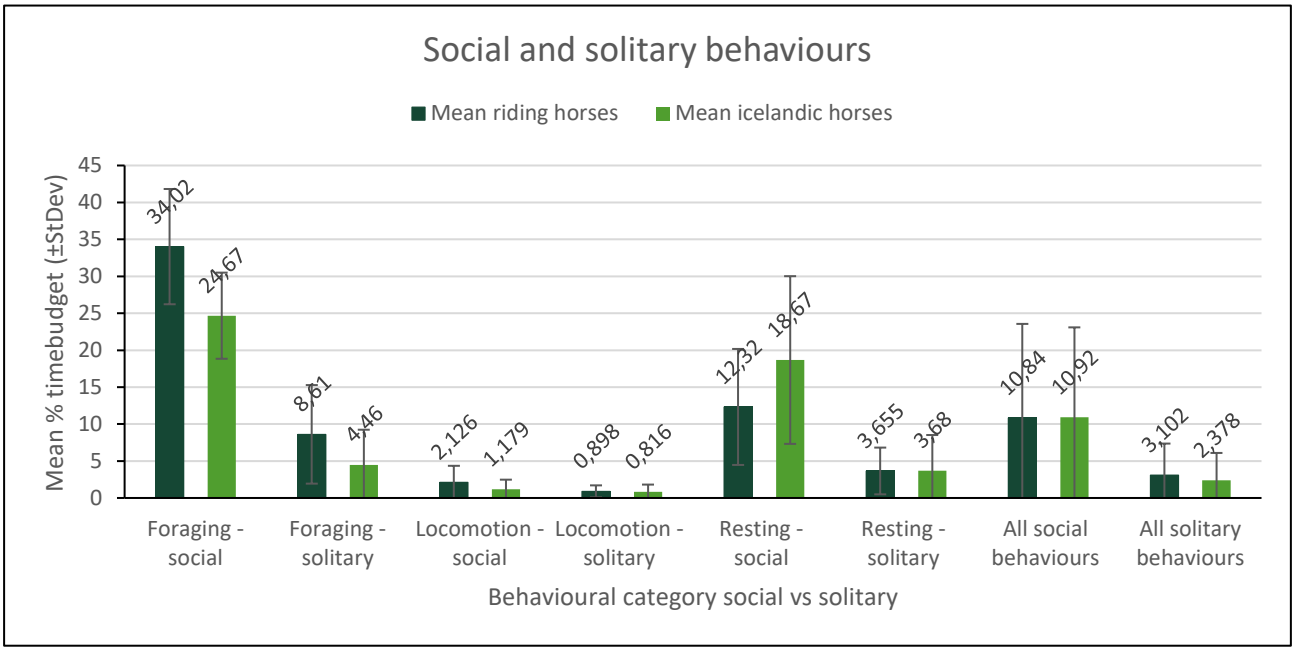

Figure 5. Column chart showing mean proportions of social and solitary foraging, resting, and locomotion between riding and Icelandic horses. Riding horses exhibited significantly more social locomotion, while Icelandic horses tended to show more social resting and slightly less social foraging.

4.2 Behavioural patterns during day and night

From all recorded behaviours, four behaviours (Eating, Lying down, Standing rest, and Play) were selected for analysis of day/night differences.
All horses were observed lying down at least one time and up to 16 times, except for one Icelandic mare. The four selected behaviours resulted in a total of 2 305 events (see *table 2*). Of these, “Eating” was the most frequently observed behaviour (1 327 events), followed by “standing rest” (613 events), “play” (202 events), and “lying down” (163 events).

Table 3. Distribution of observed frequencies for four selected behaviours during daytime and nighttime. Values represent total counts of behavioural events observed across all horses.

Behaviour	Day	Night	Total
Eating	876	451	1327
Lying down	17	146	163
Standing rest	286	327	613
Play	119	83	202

The day/night pattern of these behaviours varied (*See figure 6*). "Eating" occurred more often during the day (876 events, 66%) than at night (451 events, 34%) and was significantly more frequent during daytime (median = 22, $p < 0.000$) "Lying down" showed the opposite, with most events occurring at night (146 events, 90%; 17 events, 10% during the day) and was significantly more frequent at night (median= –7, $p < 0.000$). "Play" was slightly more common during the day (119 events, 59%; 83 events, 41% at night) but showed no significant difference (median= 0, $p = 0.724$). "Standing rest" was evenly distributed between day and night (286 events, 47%; 327 events, 53%) and did not differ significantly (median difference = –1.75, $p = 0.508$). When combining the two resting behaviours ("lying down" and "standing rest"), they occurred significantly more often at night (median difference = –4.5, $p = 0.002$).

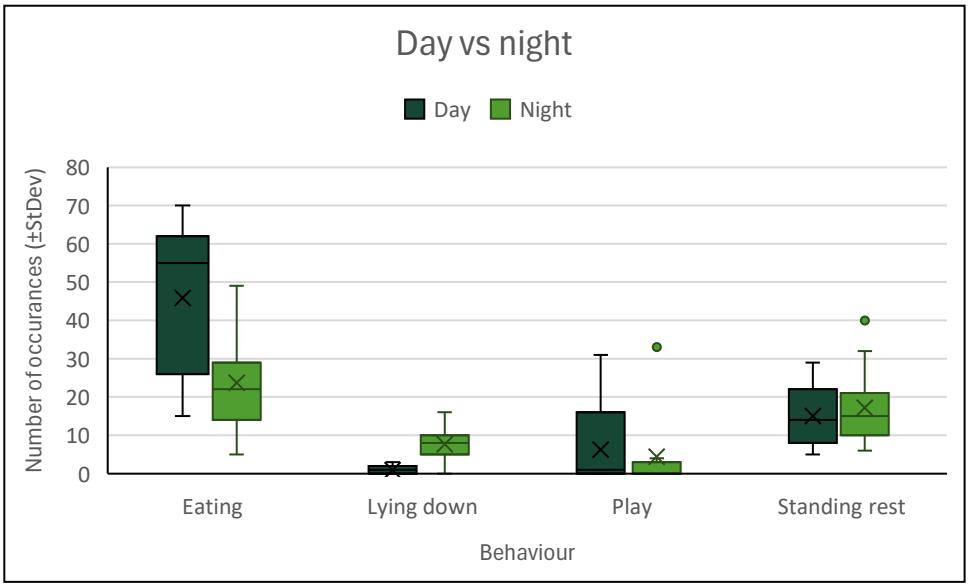

Figure 6. Box plot showing the number of occurrences of different behaviours during day and night. Horses were observed eating significantly more during the day and resting more at night.

4.3 Social interactions: affiliative and agonistic behaviours

Affiliative and agonistic behaviours varied in both frequency and expression across groups, sexes, and horse types (*see figures 7–8*). Affiliative interactions were much more frequent than agonistic ones. The highest total affiliative activity was observed in group A, followed by groups E and C, while agonistic interactions were most common in groups C and E. The difference in individual horses was quite large, with some horses rarely engaging in social behaviours and other horses showing frequent affiliative or agonistic interactions.

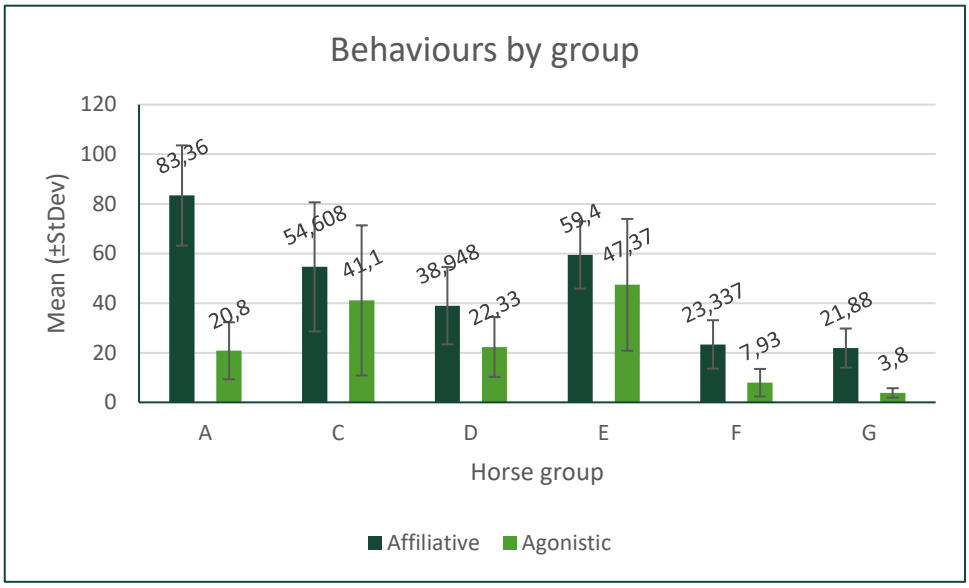

Figure 7. Mean number of affiliative (e.g., allogrooming, play) and agonistic behaviours (e.g., threats, avoidance) per horse group. Affiliative interactions dominated across all groups.

When summarised by breed and sex, riding horses showed higher mean values for both affiliative and agonistic behaviours compared with Icelandic horses. Geldings were generally observed doing more affiliative behaviours than mares, while mares showed slightly higher levels of agonistic behaviour.

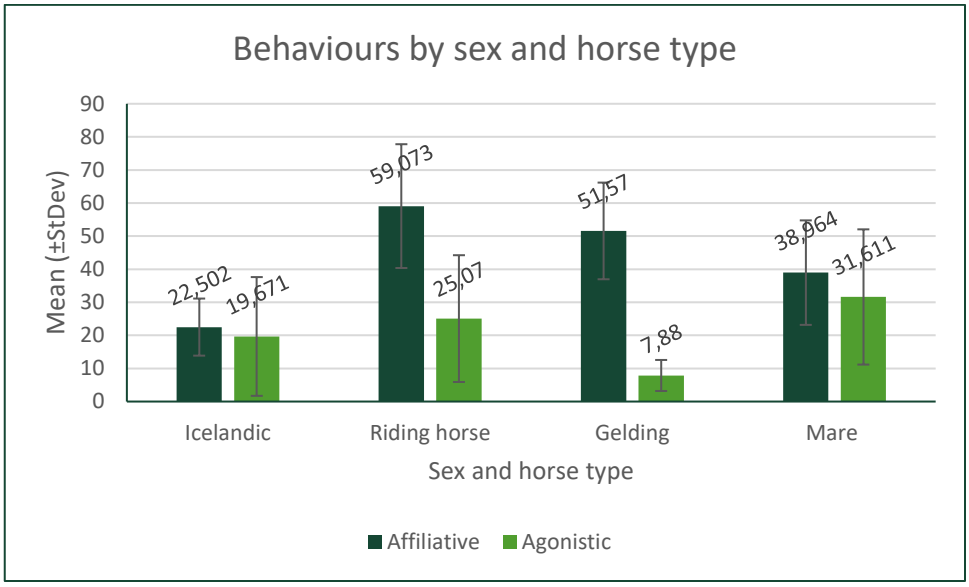

Figure 8. Mean number of affiliative (e.g., allogrooming, play) and agonistic behaviours (e.g., threats, avoidance) by sex and horse type. Riding horses and geldings showed slightly higher affiliative activity, while mares displayed slightly more agonistic interactions.

4.3.1 Affiliative behaviours

Active affiliative behaviours "play", "allogrooming", and "nose–nose interactions" were generally rare compared to the overall time budget. Play occurred only occasionally, with a median of zero bouts for most horses, although a few individuals, particularly riding horses and geldings, showed high frequencies with up to 54 bouts and 1831 seconds of play (*see figure 9*). Allogrooming was also quite uncommon, but when present, durations were longer in riding horses than Icelandic horses and more common among geldings than mares.

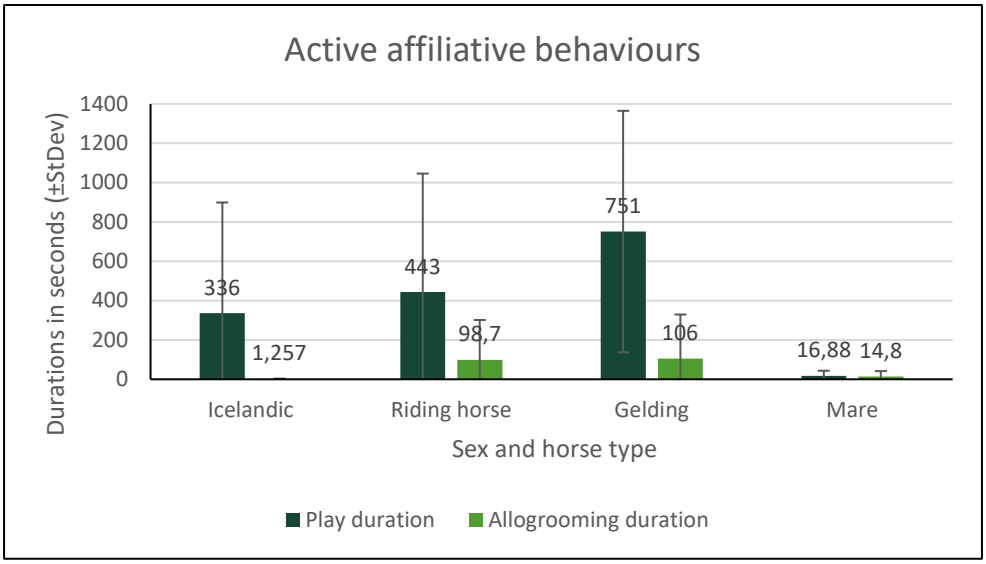

Figure 9. Durations of the affiliative behaviours play and allogrooming. Play had longer durations than allogrooming for all categories.

Passive affiliative behaviours (socially "standing alert", "standing resting", "lying down") accounted for the majority of affiliative events. Horses spent long periods in close proximity to each other, with mares tending to show slightly higher durations than geldings (*see figure 10*).

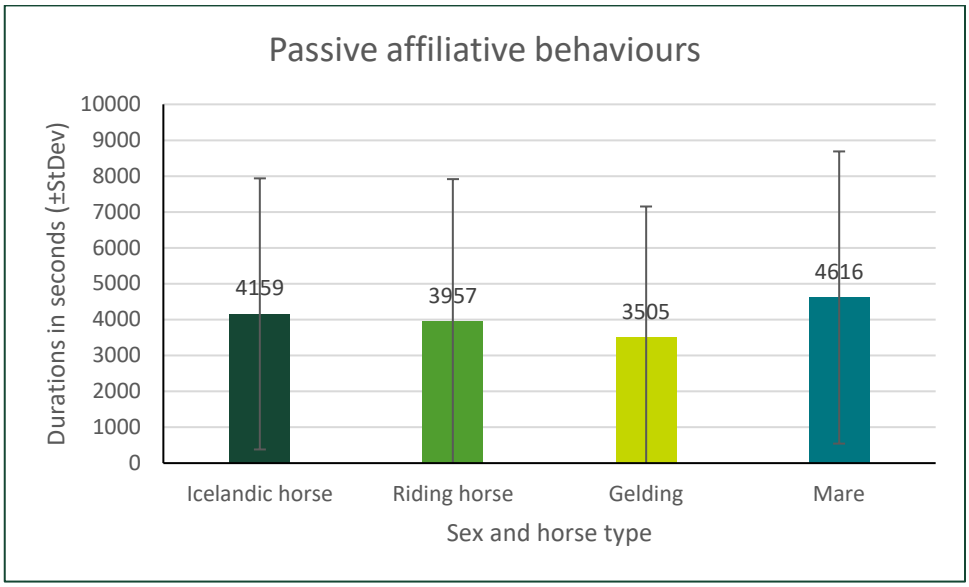

Figure 10. Durations of the passive affiliative behaviours "standing rest" "standing alert" and "lying down". All groups showed relatively long durations for passive affiliative behaviours.

4.3.2 Agonistic behaviours

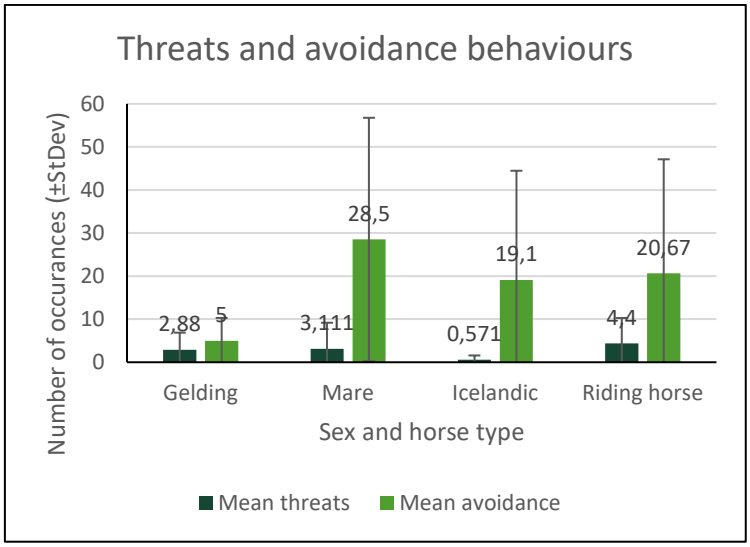

Figure 11. Column chart showing the mean of avoidance and threat behaviours by sex and horse type. Riding horses and mares displayed slightly higher levels of threat behaviour compared with Icelandic horses and geldings.

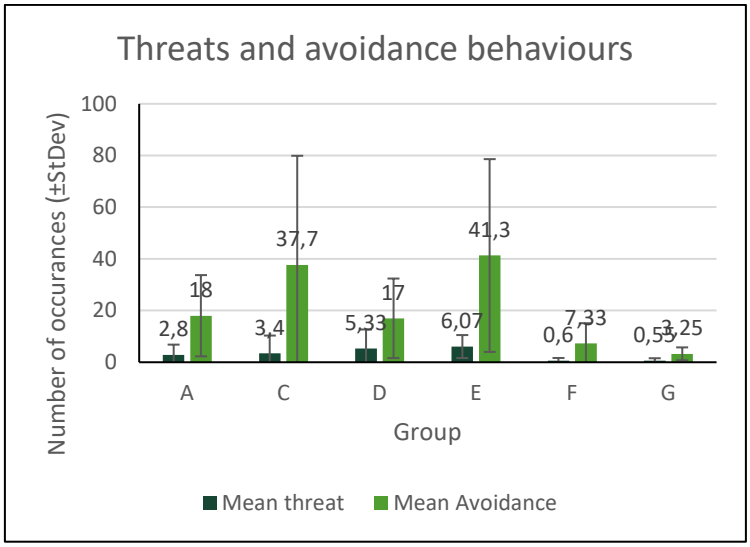

Figure 12. Column chart showing the mean of avoidance and threat behaviours per horse group. Avoidance was the most common agonistic response in all groups.

Agonistic behaviours were less frequent than affiliative behaviours and showed large variation across groups, sex, and horse type (*see figures 11–12*). Avoidance and retreat behaviours were the most common forms of agonistic behaviours, occurring more often in riding horses, while direct threats such as “bite”, “kick”, “head threat”, “chase”, and “backing threat” appeared at low to moderate levels overall.

The variation between groups were high, with some individuals showing more than 80 agonistic behaviours while others displayed none. Riding horses exhibited higher mean values of both threats and avoidance compared with Icelandic horses. Overall, avoidance/retreat behaviours were observed 377 times, outnumbering threatening behaviours, with head threat being the most frequent type of threat (141 occurrences) followed by bite/bite threat (57), backing threat (32), kick/kick threat (29), and chase (25) (*see figures 13-14).*

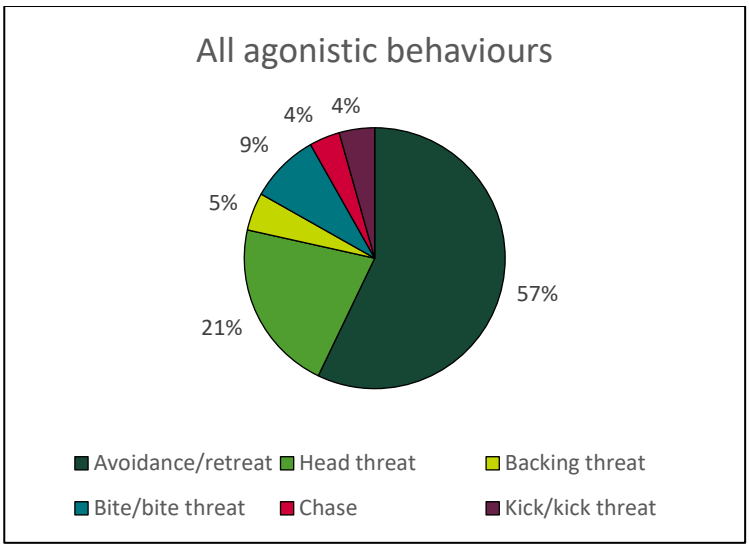

Figure 13. Pie chart of all agonistic behaviours. Avoidance/retreat occurred 377 times and were more common than the threatening behaviours combined.

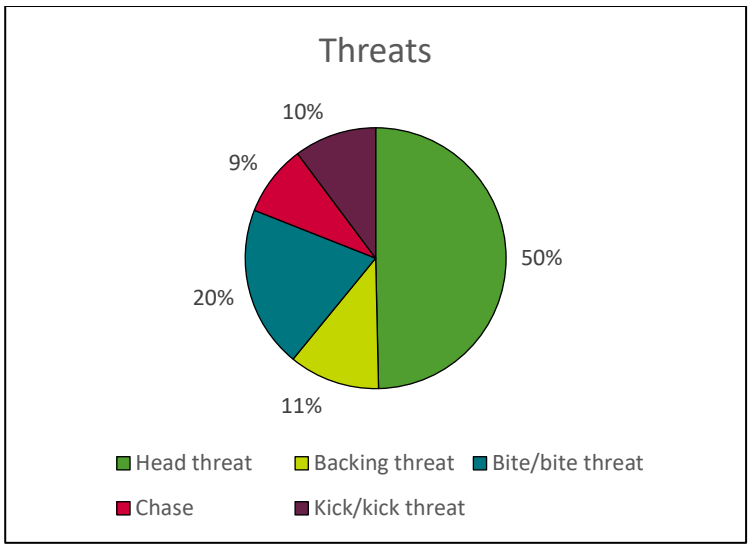

Figure 14. Pie chart of threats. Head threat was most common and occurred 141 times followed by bite/bite threat 57 times, backing threat 32 times, kick/kick threat 29 times and chase 25 times.

5. Discussion

5.1 Discussion of main findings

Overall, the results show that the horses in this study spent a large proportion of their time performing behaviours in close proximity to conspecifics, and that behavioural patterns varied between daytime and nighttime. Some differences between horse type and sex were also observed in affiliative and agonistic interactions. This discussion will analyse these findings with current knowledge on equine behaviour, welfare and housing.

5.1.1 Behavioural patterns and synchronisation

Horses showed a preference for performing natural behaviours such as foraging, resting, and locomotion socially rather than solitarily, and this pattern was consistent across sex and horse type. Geldings and riding horses showed slightly higher levels of social behaviours than mares and Icelandic horses, but these differences were not statistically significant. This indicates that the motivation to perform behaviours socially is a natural part of domestic horse behaviour and does not depend on sex or horse type.

Previous research has shown similar patterns of synchronisation in horses. Marliani *et al*. (2021) reported that horses housed in an 'ethological stable' spent most of their time foraging and resting in groups, which suggests that environments allowing free social contact promotes social behaviours. Another study by Hauschildt and Gerken (2015), found that Shetland pony mares kept on pasture maintained a stable social structure and showed a high level of behavioural synchronisation over time, which supports the findings of the present study. Hauschildt and Gerken (2015) used <3 meters for social proximity which is similar to this study which used approximately two horse lengths to distinguish between social vs solitary. A difference worth noting between the study by Hauschildt and Gerken (2015) and the present study is that this study observed horses kept in small groups (3-4), while theirs used a group of 10 horses. They could therefore notice naturally chosen and formed sub-groups and dyads in the bigger group, which was not possible in this study due to the small groups which limited the range of social relationships the horses could naturally form.

The overall proportion of social behaviours compared to solitary behaviours was high across all groups, however, some variation was observed. In two of the paddocks, E and F, there was a newly introduced horse, and both of these two horses showed a high rate of avoidance and retreat behaviours. Burla *et al*. (2016) observed that changes in herd composition could increase agonistic and

displacement behaviours temporarily. This increased frequency is a short adjustment period and should therefore not reflect poor welfare unless it continues over a longer time period.

This study found a high level of synchronisation and horses were mostly observed eating and resting together. All horses except for one Icelandic mare (group F) and one riding horse gelding (group E, the same newly introduced horse) were observed lying down socially, this indicates that the majority of horses felt safe enough in the group to rest and enter REM-sleep. It is fully possible that the Icelandic mare did lie down, however because of the angle of the camera, the inside of the lying hall was not visible and "out of view" was logged when the horses entered it. The gelding was observed lying down alone one time while the other two were eating, he was however woken up after only 8 minutes by one of the other horses. He was, as mentioned earlier, new to the group and the first two days of recording he was taken into the stable during the night, which may have allowed him to rest indoors instead.

As stated in the introduction, resting is a crucial behavioural need, and lying down is needed for REM-sleep (Kjellberg *et al*., 2021; Kjellberg *et al*., 2022). Many factors affect the prevalence of sleep in horses, composition, environment and available resting space to mention a few (Kjellberg *et al*., 2021; Kjellberg *et al*., 2022). The lying halls in this study were ~30 m^2, which is quite small, although adequate according to Swedish legislation which requires 80% of 8-10 m^2 per horse, assuming the horses are between 1.49 m to 1.80 m (L101). Kjellberg *et al*. 2021 found that when increasing the available space for each horse from 8 m^2 to 18 m^2 the time spent in the lying halls and the time spent lying down increased. They also concluded that the Swedish legislations' minimum requirements might be too small and may need to be increased to safeguard horse welfare (Kjellberg *et al*., 2021).

Social contact and synchronisation are strong motivational factors for horses, and its absence can cause stress and be an indicator for poor welfare (Hauschildt & Gerken 2015; Keeling and Jensen 2017; Zeitler-Feicht *et al*., 2024; Górecka Bruzda *et al*., 2024). Overall, the results suggests that the horses in this study had high levels of social synchronisation for crucial behavioural needs such as foraging and resting and this indicates that they have their social needs met, social stability and an overall good welfare.

5.1.2 Behavioural patterns during day and night

The horses in this study showed a clear difference in behaviours during daytime versus nighttime. Foraging occurred significantly more during the day (66%,

p<0.000) while lying down occurred significantly more during the night (90 %, p<0.000). Standing rest and play were quite evenly distributed across both daytime and nighttime. The result is consistent with previous studies on this topic which show that foraging is more common during daytime and the majority of sleep happens during the night (Bott *et al*., 2013; Marliani *et al*., 2021; Kelemen *et al*., 2021. Kjellberg *et al*., 2021, 2022).

Although not analysed in this study, the groups had different feeding routines, with groups C and E having ad libitum access to forage while groups A, D, F and G were fed four times daily (some by automatic dispensers late in the evening). Which means that the majority of these groups did not have access to forage during the whole night. Both groups C and E were observed eating more than the other groups which may indicate that the other groups would have eaten for longer period of times, even during the night, if they also had ad libitum access.

Horses assess and choose food with their vision combined with their tactile and olfactory senses, which also can explain why foraging is more prevalent during the daytime as their visual assessment of the feed might be impaired to some degree during darkness (McGreevy 2012c).

In more conventional stables, restricted feeding and long fasting periods have been shown to increase stereotypical behaviours (Seabra *et al*., 2023), which was only seen by three different horses in this study, two instances of wood chewing and one instance of oral stereotypies (repetitive motion with tongue without food in the mouth). This suggests that a paddocks-based housing with non-restricted access to food for horses enhances their welfare and let them behave more naturally.

The strong preference for resting during the night in this study is also supported in the literature. Kjellberg *et al*. (2021, 2022), observed that horses rested mainly at night and also that access to sufficient space has an effect on sleeping time. The horses in this study were only observed sleeping inside of the lying halls, or just outside of the entrance, indicating that the horses found this space sufficiently comfortable. However, they were seldom observed lying down at the same time, when one horse began to lie down, another that was already resting was disturbed and usually got up or shifted their position. If their lying halls were bigger this may not have been the case.

Interestingly, play behaviour were slightly more common during the day (59%) but still occurred at night (41%), which in a way contradicts the otherwise inactivity observed during the night. This could indicate that play behaviour in

horses may not be dependent on time of day, but more research is needed on this subject to make any clear assumptions.

Overall, these results show that the horses in this study maintained a natural circadian rhythm consistent with previous studies (Bott *et al*., 2013; Marliani *et al*., 2021; Kelemen *et al*., 2021. Kjellberg *et al*., 2021, 2022). This suggests that horses kept continuously on pasture and in a relatively stable group can behave naturally and are therefore provided with conditions that promotes good horse welfare (Green & Mellor, 2011; Keeling & Jensen, 2017).

5.1.3 Social interactions: affiliative and agonistic behaviours

The results in this study show that affiliative behaviours were more frequent than agonistic ones, and that most affiliative interactions occurred in more passive forms such as standing socially or resting in proximity to other horses. Active affiliative behaviours (play and allogrooming) and agonistic behaviours (avoidance/retreat, bite, kick, head threat, chase, and backing threat) were quite rare but varied between individuals and groups. Riding horses and geldings showed higher levels of overall social encounters, while Icelandic horses and mares were observed more seldom engaging socially, indicating that some differences in social behaviours between horse types and sexes may exist in this study.

Individual variation is common and is influenced by many factors, which is also seen in this study where many horses never showed play behaviour while others spent up to 54 bouts and 1831 seconds playing. Horse type and sex differences were observed, especially for play behaviour. Hausberger *et al*. (2012) and Sigurjónsdóttir & Haraldsson (2019) found that male horses tend to play and engage in more active social interactions than mares. Górecka-Bruzda *et al*. (2022) also found that mares are often more socially dependent and sensitive to group dynamics than geldings, which may explain the found sex differences in this study.

The result for this research question is consistent with many earlier studies that show that high frequencies of affiliative behaviours combined with low frequencies of agonistic behaviours may indicate that horses have stable friendships and are kept in compatible groups. Interestingly, group E, with the newly introduced horse, showed the highest frequencies for agonistic behaviours but also the longest durations for play behaviour (1831 s) and both most bouts and duration (530 s) for allogrooming. As mentioned in the introduction, both play and allogrooming can help form social bonds and reduce tension in the group (McGreevy 2012b; McGreevy 2012d), which could be the case in this group.

Another study found that play may also help reduce stress in the horse (Howard and Pillay 2025). A study by Hausberger *et al*. (2012) discovered that high frequencies of play behaviour were also correlated to high levels of stress and concluded that play may not always be an indicator for good welfare. These combined findings of these studies (McGreevy 2012b; McGreevy 2012d; Hausberger *et al*. 2012; Howard and Pillay 2025) may explain why both play, allogrooming and avoidance and threat behaviour were high in his particular group.

In more restricted housing or managements, agonistic behaviours are higher than affiliative behaviours which was seen in a study by Kirton *et al*. (2024), which observed higher frequencies of behaviours related to frustration in ponies that had restricted grazing access. Another study by Ruet *et al*. (2020) found that fully stabled horses showed significantly more negative social behaviours than positive when allowed to interact with conspecifics on pasture, indicating that stabled horses may even have altered social skills. In contrast to those, the horses in this study had continuous paddock access and relatively stable social structures, which likely reduced frustration and aggression.

Zeitler-Feicht *et al*. (2024) reported that passive affiliative behaviours such as standing in close proximity to another horse is a good welfare indicator and signals emotional wellbeing as well as close relationships. Hauschildt and Gerken (2015) report similar results and discuss the importance of stability and friendships in horses, which further supports the findings in this study. Overall, these results showed high affiliative behaviours combined with low agonistic behaviours, indicating that stable social groups on turnout help maintain a good welfare for horses.

5.2 Social aspects, ethics and sustainability

As well as behavioural outcomes, the results of this study also raise social, ethical, and sustainability considerations related to horse welfare and management. Allowing horses to live in stable social groups and to express natural behaviours such as foraging, resting, and affiliative interactions reflects not only good welfare but also ethical accountability when having the responsibility of care of domesticated animals. According to Swedish animal welfare legislation (SJVFS 2019:17), horses must be given the opportunity for daily outdoor movement and social contact, and the findings in this study support that this aligns with the horses' behavioural needs.

From a social perspective, riding schools can play an important role in educating the public on horse welfare. By providing environments that allow for natural

social interaction and rest, they can serve as role models for sustainable and ethical horse housing. Transparent, natural horse management and maintaining good welfare help strengthen the public acceptance and trust – “a social licence to operate” (Equine Ethics and Wellbeing Commission, 2023).

Ethically, providing horses with stable social groups and opportunities to express species-typical behaviours such as foraging, social resting, and affiliative interactions aligns with welfare frameworks emphasising both physical and mental well-being (Green & Mellor, 2011; Mellor, 2016; Fletcher *et al*., 2021; Kjellberg *et al*., 2021; Waran & Evans, 2024). The results of this study, showing that horses on paddock spent a considerable time socially foraging and resting, support the ethical argument for management systems that allow such expression of natural behaviour (Green & Mellor, 2011; Mellor, 2016; Fletcher *et al*., 2021; Kjellberg *et al*., 2021; Waran & Evans, 2024). This study used non-invasive observational methods with video recording, which can minimise interruptions of behaviour and also reduce stress compared to direct observations (Torres Borda *et al*. (2024).

From a sustainability perspective, horses kept in groups on pasture can lower feed cost and work labour needed, compared with intensive stabling (Bott *et al*., 2013). However, if the pastures have a high stocking density or poor grazing rotation, it can lead to soil compaction, nutrient build-up, and declining forage quality, negatively affecting both environmental and animal health (Bott *et al*., 2013; Rzekęć *et al*., 2020; Furtado *et al*., 2022). Therefore, careful management of pasture area, stocking rate, and grazing rotation is important to achieve environmental sustainability (Bott *et al*., 2013; Rzekęć *et al*., 2020; Furtado *et al*., 2022). In the present study, the riding and Icelandic horses were kept on paddocks with limited or no grass and received roughage at feeding stations. This management likely reduces labor for feeding but may limit natural foraging-related movement.

Group housing can contribute to both welfare and long-term sustainability by improving horse health. Riding school horses kept in groups have been shown to maintain a better body condition and experience fewer health issues than those housed in boxes or tie-stalls (Yngvesson *et al*., 2019). Longer turnout time can also lower the risk of soft-tissue injuries (Reilly & Bryk-Lucy, 2021), which in turn can decrease veterinary costs and rehabilitation time. Risk of injury may be further reduced when group-housed horses remain together continuously, as separating individuals at night could affect social learning and acceptance, as observed for the newly introduced gelding in this study.

5.3 Strengths, limitations and potential sources of error

The method used in this study combined continuous video observation with a detailed ethogram which provided a thorough background for observing and recording horse behaviour. Using a single observer is both a strength and limitation as it ensures consistency in data collection but may also risk biased results. Video recording allowed for a non-intrusive observation, ensuring horses behaved naturally without human interruptions. The video recordings covered multiple days for each group of horses which captured natural variations in behaviour and daily rhythms and therefore strengthens the validity of the results compared to only observing for one day. Including both mares and geldings, as well as two different horse types, increases the ability to generalise the results to the wider horse population, although including additional horse types and stallions would have further strengthened the method.

However, some limitations and potential sources of error could have affected he results. Some visibility was restricted in the lying halls, particularly for group F, where the angle of the camera made it so that you could not see inside, resulting in the registration of "out of view" and potentially fewer observed events for for example resting. During daytime, the inside of most lying halls were very dark due to the suns' exposure, which also increased the logging of "out of view". To mitigate this problem, an additional behaviour in the ethogram could be "inside lying hall", this would at least record that the horses was using the lying hall (although not a detailed behaviour) instead of just "out of view". Another solution to this problem could be to use accelerometers to record what the horse does when not in the range of the camera (Maisonpierre *et al*., 2019). The camera was also affected by the weather, and rain/snow on the lens, sun glare or the wind shaking the camera could also have led to wrongly interpreting some behaviours where fine details are needed like for example ear position or facial expression (Torres Borda *et al*., 2024). The weather may also have affected the horses behaviour and influenced how much they used the lying hall.

5.3.1 Research gap, practical implications and future research

The effects of housing, feeding, and group composition on horse behaviour are well documented (Hauschildt & Gerken, 2015; Burla *et al*., 2016; Yngvesson *et al*., 2019; Marliani *et al*., 2021; Kelemen *et al*., 2021; Bradshaw-Wiley & Randle 2023). However, continuous 24-hour monitoring of horses in group housing outdoors, including comparisons day vs night and across horse types and sexes, is quite limited. Many studies focus on daytime observations or stabled horses, and therefore potentially miss nighttime behaviours or behaviours on pasture which is

important for welfare assessment (Ellis *et al*., 2015b; Ruet *et al*., 2020; Marliani *et al*., 2021; Kirton *et al*., 2024; Bradshaw-Wiley & Randle 2023).

The majority of horses today are stabled, either fully or with some turnout during the day, and many studies highlight the negative impact of such management (McGreevy, 2012a; Yngvesson *et al*., 2019; Ruet *et al*., 2020; Bradshaw-Wiley & Randle 2023; Seabra *et al.,* 2023). If more studies highlight the positive effects of pasture-based or more natural housing it could potentially lead to more people wanting their horses in that kind of management. Shifting the focus from negative implications (provoking negative feelings) to positive benefits (inciting positive feelings) could increase horse owners' motivation to change to management practices that better meet the behavioural needs of horses (Equine Ethics and Wellbeing Commission, 2023; Fletcher *et al*., 2023; Robertson *et al*., 2024).

This study addresses some of these research gaps by combining 24-hour long, continuous video observation with a detailed ethogram, resulting in an extensive evaluation of time budgets, social synchronisation, agonistic and affiliative behaviours, and daytime vs nighttime comparisons. This study can motivate horse owners and stable managers to think more about the importance of natural behaviours and positive affective states. However, improvements and additions can always be made, and some examples of future research could be:

- Including more horse types, stallions, and ages to 24-hour monitoring and comparing privately owned horses to riding school horses would improve generalisation to the whole horse population. Further observing how sex, age, horse type and social rank etc. influence horses' time budgets and affiliative behaviours to ensure a good welfare and management.
- Including health parameters, veterinary checks and physiological measurements to examine how it effects behaviour over time.
- Combining accelerometers and/or GPS trackers together with video observation may reduce data loss and capture behaviours in blind spots such as inside lying halls (Maisonpierre *et al*., 2019).
- Examine environmental and seasonal effects on nighttime activity, rest, and social interactions, especially interesting during the cold wintertime in Sweden and during summertime when lying halls in pasture are not legally required (L101).
- Look into how to ensure that all horses in a group have access to a safe resting place and feeding spot, taking social synchronisation and horse personality into consideration.

- Examine how time of day influence social behaviours such as play and allogrooming, and if they vary in frequency or duration between day and night, to better understand horses' social patterns and welfare.

5.4 Conclusion

In summary, this study shows that group-housed horses display clear patterns in their behaviour and social interactions, and the findings are consistent with previous studies on equine behaviour. Horses preferred to be social rather than solitary and socially foraging and resting were the most common behaviours displayed. Riding horses engaged in more social locomotion, while Icelandic horses tended to spend slightly more time resting socially. Mares and geldings behaved similarly overall, both showing a preference for social activity.

Clear differences in behaviour between daytime and nighttime were observed. Foraging occurred mainly during the day, while lying down was most common at night. Standing rest was evenly distributed across day and night, and play occurred relatively evenly throughout day and night but was quite rare. Affiliative behaviours, such as standing or lying in close proximity to another horse, were far more common than agonistic interactions, which mainly consisted of avoidance and retreat. Play and allogrooming were observed, but variation between individuals was considerable.

Some limitations may have affected the results, including the small sample size, exclusion of one paddock due to limited visibility, as well as lighting and weather conditions affecting the video quality. Further research with larger and more diverse sample sizes as well as refining the method and reducing technical difficulties would improve the overall results.

The findings from this study highlights natural behaviour, social dynamics, and diurnal rhythms in group-housed horses and can contribute to better management practices where equine welfare is prioritised.

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Popular science summary

English

Horses are social animals that naturally live in groups. They communicate, eat, rest and move together, and this social life is important for their well-being. However, many horses are kept in stables or environments that limit their ability to interact with other horses. To better understand what horses do during their free time, this study looked at how they behave when spending time together on paddock, both during the day and at night.

Nineteen horses were observed for several days using 24-hours video-recordings. The study included both riding horses and Icelandic horses. The videos were analysed to observe different behaviours, such as eating, resting, walking, and social interactions like playing, grooming or standing close together.

The results showed that horses spend much of their time being social. They ate and rested together rather than being alone. Riding horses tended to move more together, while Icelandic horses rested together for longer periods. Horses mostly ate during the day and lay down to sleep at night. Friendly social behaviours were more common than conflicts, and the conflicts were usually avoidance and retreat behaviours rather than aggression.

By using continuous video recording, the study could capture detailed information about what horses actually do during their free time. The results highlight how important social contact and freedom of movement are for horses' welfare. Understanding their natural behaviour can help us design better management systems that meet horses' and ensures good welfare.

Swedish

Hästar är sociala djur som lever i grupp naturligt. De kommunicerar, äter, sover och rör sig tillsammns och det sociala livet är viktigt för deras mående. Hästar hålls däremot ofta i stall eller miljöer där dom inte får samma möjlighet till detta. För att bättre förstå vad hästar gör på sin lediga tid, undersökte den här studien vad hästar utför för beteenden när dom går tillsammans i en hage, både under dagen och natten.

Nitton hästar blev observerade under flera dagar med hjälp av 24 timmar långa videofilmer. Studien inkluderade både ridhästar och islandshästar. Videoinspelningarna analyserades för att hitta olika beteenden som exempelvis,

äter, vilar, går och sociala interaktioner som leker, putsning eller står nära tillsammans.

Resultatet visade att hästar spenderar mycket av deras tid till att vara sociala. De åt och vilade tillsammans hellre än att vara ensamma. Ridhästarna rörde sig mer tillsammanns medan islandshästarna spenderade mer tid med att vila bredvid varandra. Hästarna i studien åt mest under dagen och vilade mest under natten. Vänliga sociala beteenden var vanligare än konflikter, och när konflikter sågs var det vanligare att dom undvek varandra än att faktiskt bråka med varandra.

Genom att använda videoinspelningarna kunde studien fånga många detaljer kring vad hästar faktiskt gör under deras lediga tid. Resultaten belyser hur viktig social kontakt och rörelsefrihet är för hästars välbefinnande. Genom att förstå hästars naturliga beteenden kan vi utveckla bättre stallmiljöer och system som tillgodoser hästars behov och säkerställer deras välfärd.

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