



# Injury incidence, reactivity and ease of handling of horses kept in groups: A matched case control study in four Nordic countries



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## ABSTRACT

There is increasing interest in keeping horses in groups, but progress is hampered by a lack of knowledge about which horses can and should be kept together. Therefore, our objective was to investigate the effect of group composition on the occurrence of injuries among horses, the ease of removing horses from groups and horses' reactivity to a fearful stimulus. Using a matched case control design, 61 groups of horses were studied in Denmark, Norway, Finland and Sweden. They were allocated into groups of similar or different age and sex or where membership changed regularly or remained stable. Injuries were recorded before mixing the horses into treatment groups, the day after mixing and four weeks later. Reactivity of horses to a moving novel object and the behaviour of a horse being removed from its group and the reactions of other group members towards this horse and the handler were evaluated. It was hypothesized that a more socially variable group composition has beneficial effects on behaviour, ease of handling and reducing reactivity whereas frequent changes in group composition has negative consequences, resulting in more injuries. We found that differences in treatment effects were mainly related to breed, rather than group composition. Icelandic horses reacted less to the movement of the novel object ( $P=0.007$ ) and approached it more afterwards ( $P=0.04$ ). They also had fewer new injuries than warmbloods following mixing ( $P<0.001$ ) and fewer than all other groups 4 weeks later ( $P<0.01$ ). Most new injuries after mixing were minor and recorded on the horse's head, chest, hind legs and rump. In conclusion, variations in sex and age composition of the group had little effect on injury level, reactivity and ease of handling compared to the general effect of breed. Concerns about the risk of severe injuries associated with keeping horses in groups are probably overestimated. Thus, we propose that horses can be successfully kept in groups of different sex and age composition.

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## 1. Introduction

Despite the fact that group housing is common in most farm animals, many horses are still kept singly during a large part of the

day, although there is much evidence showing the benefits of keeping horses in groups (Hartmann et al., 2012a). A problem seems to be a lack of knowledge about which horses can and should be kept together and a concern about the risk of severe injuries associated with keeping horses in groups (Hartmann et al., 2015). Some stallions and horses used for competition purposes are never kept with conspecifics and other horses are only part time members of a group, being kept alone at night and in groups during the day-time (Knubben et al., 2008b; Wylie et al., 2013; Hartmann et al., 2015). The main reason for not keeping horses in groups seems to be owners' concerns related to the risk of injuries in horses (Hartmann et al., 2015). There are studies supporting that injuries

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can be severe, for example, as a result from being kicked by another horse (Fürst et al., 2006; Knubben et al., 2008a), but how much this is due to the lack of space and competition over resources and how much to the social environment, i.e. the group composition, is not clear (Flauger and Krueger, 2013). Another concern is that injuries are more likely to occur to a person when a horse is being removed from a group (Hartmann et al., 2012b). However, there is to our knowledge no large scale study that systematically addresses whether these concerns are justified, even if it is well documented that features of the social and physical environment of an animal as well as details of the management affect behaviour (Fureix et al., 2012). One reason for the lack of research in this area may be the difficulty of establishing large numbers of horse groups where these aspects are systematically varied.

This study was a collaborative effort among researchers in Sweden, Norway, Denmark and Finland using different breeds of horses to investigate keeping horses in groups under a diverse range of social and physical conditions. The treatments that were used in this study were the age and sex composition of the group and the stability of the group (i.e. whether new horses were added regularly and others removed). These aspects are most variable in practice and may be expected to affect the behaviour of horses (Bourjade et al., 2008). The hypothesis was that more varied groups (mixed age or sex) would be easier to manage, in terms of separating a horse from its group, and would result in horses reacting less to novel objects in their environment. The latter was predicted based on results from Christensen et al. (2008) showing that a calm companion horse reduces fear reactions in naïve test horses. As older horses tend to be calmer (Bourjade et al., 2008), a group with a mixture of older and younger horses could be expected to be less reactive. Further, we predicted fewer injuries with a stable composition of group members and in groups with horses of different ages and sexes, related to the presumed less time needed to establish and maintain dominance relationships. Parts of these data have been presented previously (Christensen et al., 2011; Jørgensen et al., 2009), but this is the first time all data has been combined in a single analysis.

## 2. Methods

The research conducted in this study adhered with local ethical guidelines in each participating country.

### 2.1. Treatment groups

Using a matched case control design balanced within country, farm and breed of horse, new groups of horses were formed to investigate each of the different grouping strategies. In total, 61 groups (233 horses) were involved in the study which was carried out between September 2007 and November 2008 (Table 1). There were 24 groups used to investigate the treatment comparison 'similar age' (young horses between 1 and 3 years old kept together) versus 'mixed age' (horses from 1 to 19 years old kept together), 22 groups to investigate the treatment comparison 'mixed sex' (mares and geldings kept together) versus 'single sex' (mares and geldings/colts kept separately), and 15 groups to investigate the treatment comparing 'stable' (group membership unchanged) versus 'dynamic' (one horse was removed from the group once per week during 6 weeks and replaced with a new horse from another dynamic group).

The majority of horses were privately owned and mostly used for leisure purposes or they were young, untrained horses. All horses were accustomed to being kept in groups. For the purpose of our experimental design, horses were mixed into new groups (different group members than prior to each study) where they

remained for at least 4 weeks. They were kept in groups on pasture for the entire 24 h period and some had either free or restricted access to additional roughage.

Three different types of data were collected for each horse. These were the number of injuries (including lameness) before and after grouping, a reactivity score for the reaction to a novel object and a score for the ease of removing a horse from the group after mixing horses into treatment groups. The reactivity and the separation test were not carried out on the stable/dynamic treatment groups as those horses were also part of another study.

### 2.2. Injury scoring

Each horse was inspected three times; at day 0, before the horses were placed into the treatment groups (baseline recording to know which injuries were present before mixing), the day after mixing and again at least 4 weeks after mixing. Injuries were recorded on the same spreadsheet for each horse during all three occasions which allowed us to only record new injuries at the second and third inspection after grouping. On the protocol, the position of the injury on the horse's body (see Fig. 1) and the severity of any injury or lameness were recorded. A complete description for each of the lesion scores and how the injury scoring system was validated is presented in Mejdell et al. (2010). Skin lesions obviously related to itching, ringworm and forms of pastern dermatitis were not recorded. Lameness, if observed, was scored on a 5-point scale (1 = slightly lame, up to 5 = very lame; adapted from American Association of Equine Practitioners (AAEP), 2015). All inspections were carried out by observers well trained in the scoring system and experienced with horses. During inspections, horses were haltered to allow a thorough examination.

### 2.3. Group reactivity test

Before the start of the reactivity test, small portions of hay and some concentrate feed (same number of portions as horses in the group) were placed 1.5 m apart in a row on the ground. The test person then entered the paddock with the novel object (4 conventional 0.5 l plastic bottles filled with stones bound to a 15 m rope) hidden behind her back. The person placed the object 10 m away from the fence, approximately 5 m in front of the feeding horses, and walked the same way back to the fence, keeping hold of the other end of the rope. When the person was out of the paddock, and 2 min had passed since the object had been placed on the ground, the rope was forcefully pulled towards the fence so that the bottles moved and made a sound.

The reactions of each horse in the group were recorded during the 2 min when the bottles had been placed in the paddock ('before'), when the bottles were suddenly moved ('during') and during the 2 min subsequently ('after'). Four different categories of response were recorded; 'no reaction' (horse remains stationary and continues feeding, may raise head from feed while chewing continues) and 'flight' (horse jumps or runs away from feed with elevated head, may snort forcefully) were recorded both before and during the bottles were moved, whereas the categories 'investigate' (horse approaches object, lowers its head to sniff or may move the object with its nose or front legs), and 'resume feeding' (horse returns to the feed portions) were only recorded after the bottles were moved. From this information, the proportion of horses reacting in each group was determined. No other treatment groups were in visual range of the group being tested. Thus, no horses had observed the novel object prior to being tested themselves.

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