

### Effect of varying dimensions of the littered lying area on the lying behaviour of group-housed horses (*Equus ferus caballus*)

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Although horses can sleep while standing, recumbency is required for REM sleep and since all sleep stages must be completed for an entire sleep cycle, the opportunity for recumbency is essential for animal welfare. Observations on feral horses indicate a minimal lying duration of 30 min, preferably on a deformable and dry ground. In contrast to feral horses, lying behaviour in stabled horses is often affected by the dimensions of the provided lying area and rank.

In Switzerland, minimum requirements (MR) for the littered lying area are established by law to ensure animal welfare (BLV, 2008) (A/N: approximately match German recommendations (BMEL, 2009)). The aim of this study was to assess the adequacy of the dimensions of the minimum requirements for group-housed horses by investigating 38 horses in 8 groups. Further, hard rubber mats were provided supplementary in order to assess their suitability as an alternative to litter. Four treatments were each applied in randomised order:

0x MR: no litter + 1.5x MR with rubber mats

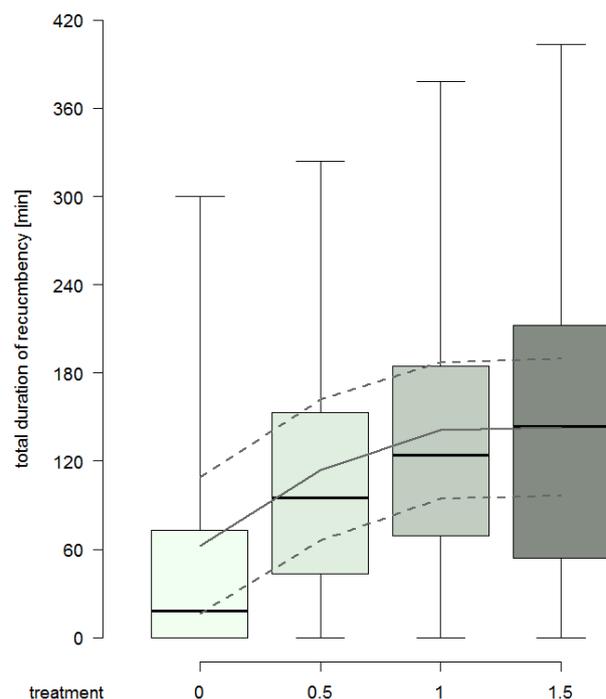
0.5x MR: 0.5x MR with litter + 1x MR with rubber mats

1x MR: 1x MR with litter; 0.5x MR with rubber mats

1.5x MR: 1.5x MR with litter + no rubber mats

For each treatment, after a habituation period of 8 days, lying behaviour was recorded (video, accelerometers) continuously for 72 hrs. Statistical analysis was performed using mixed effects models.

Regardless of the ground chosen, the duration of recumbency per 24 hrs was increasing with increasing dimensions of the littered area ( $F_{1,93} = 12.9$ ,  $p = 0.0005$ ; Fig. 1). Whereas the effect flattened from 1x to 1.5x MR, the duration spent on litter – a deformable ground – was increasing continuously ( $F_{1,62} = 23.1$ ,  $p < 0.0001$ ). Further, the proportion of lateral recumbency



**Figure 1:** Total duration of recumbency [min] per individual per 24 hours (summarising recumbency on litter, rubber mats and other firm ground) in treatment with 0x, 0.5x, 1x and 1.5x minimal requirements of the littered lying area. Boxplots show medians, interquartile and absolute ranges of data. In addition, model predictions with estimated means (solid lines) and 0.95 confidence intervals (dashed lines) are shown.

was increased with increased dimensions of the littered area ( $F_{1,79} = 12.3$ ,  $p = 0.0007$ ). Regarding the number of lying bouts, no differences were apparent between treatments providing litter, but recumbency occurred very seldom if only rubber mats were provided ( $F_{1,93} = 14.7$ ,  $p = 0.0002$ ). Further, low-ranking horses spent more lying bouts on rubber mats than high-ranking horses ( $F_{1,29} = 4.4$ ,  $p = 0.04$ ). Additionally, the larger the dimensions of the littered area the more horses were present in the lying area at the moment

of lying down ( $F_{1,79} = 6.6$ ,  $p = 0.01$ ). Moreover, low-ranking horses showed considerably higher percentages of involuntarily terminated lying bouts than high-ranking horses if 0.5x and 1x MR were littered ( $F_{1,76} = 8.43$ ,  $p = 0.005$ ).

Although the indicated minimal lying duration was averagely performed, large individual differences occurred and at least 8% were lying down less than 30 min per 24 hrs in every treatment. Further, the inclusion of social parameters indicated a beneficial effect of an exceedance of the minimum requirements especially for low-ranking horses. Therefore, the minimum requirements established by Swiss law can be stated as adequate but should be perceived as minimum and not optimum dimensions.

**Key words:** group housing, lying behaviour, littered lying area, rubber mats

#### References:

BMEL Federal Ministry of Food and Agriculture, 2009. Leitlinien zur Beurteilung von Pferdehaltungen unter Tierschutzgesichtspunkten.

BLV Federal Food Safety and Veterinary Office, 2008. Tierschutzverordnung (TSchV 455.1).