HABITUATION EFFECTS TO FREQUENT ROAD TRANSPORT IN SPORT HORSES

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Can animals habituate to frequent travelling?

A case study on sport horses

Relevance of the topic

- Multiple evidence that transport can be stressful for horses
  - Elevated heart rates, respiratory rates, cortisol levels,…
  - Studies tested mainly transport naïve horses
    (e.g. Godoi et al., 2014; Schmidt et al., 2010b)

- Limited evidence on horses that travel regularly and are accustomed to transportation
  - Diseases associated with frequent transportation
  - Small sample sizes (e.g. Schmidt et al., 2010a; Tateo et al., 2012)
  - Transport over extremly long distances (e.g. Jones, 2003; Schmidt et al., 2010a)

AIM

To investigate whether frequent transport acts as a major stressor for travel experienced sport horses or if the stress becomes minimal due to habituation effects

Methods

- Data collection at six dressage and seven show jumping events at two equestrian centres in the UK
- 120 sport horses, 5-24 years and of 41 different breeds
- Behavioural assessment
  - student and professional in animal behaviour (ICC=0.93)
  - using 1-10 scale adapted from previously published **scale of behavioural indicators of stress for use with domestic horses** (Young et al., 2012)
  - owners were questioned about current veterinary problems and special transport related experiences of the horse in the past

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A novel scale of behavioural indicators of stress for use with domestic horses

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Methods

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- Behavioural assessment
  - student and professional in animal behaviour (ICC=0.93)
  - using 1-10 scale adapted from previously published **scale of behavioural indicators of stress for use with domestic horses** (Young et al., 2012)
- Physiological assessment
  - salivary cortisol concentrations (→ only unloading)
  - assessed in 29 horses
- Total stress score
  - cortisol values used to validate or modify behavioural assessment
  - average of unloading and loading score
- Statistics: Mann-Whitney U-test and Spearman's rank test

Results

- Transport experience was positively correlated with the total stress scores of the horses (r_s=0.273, p=0.003)

Influence of transport experience

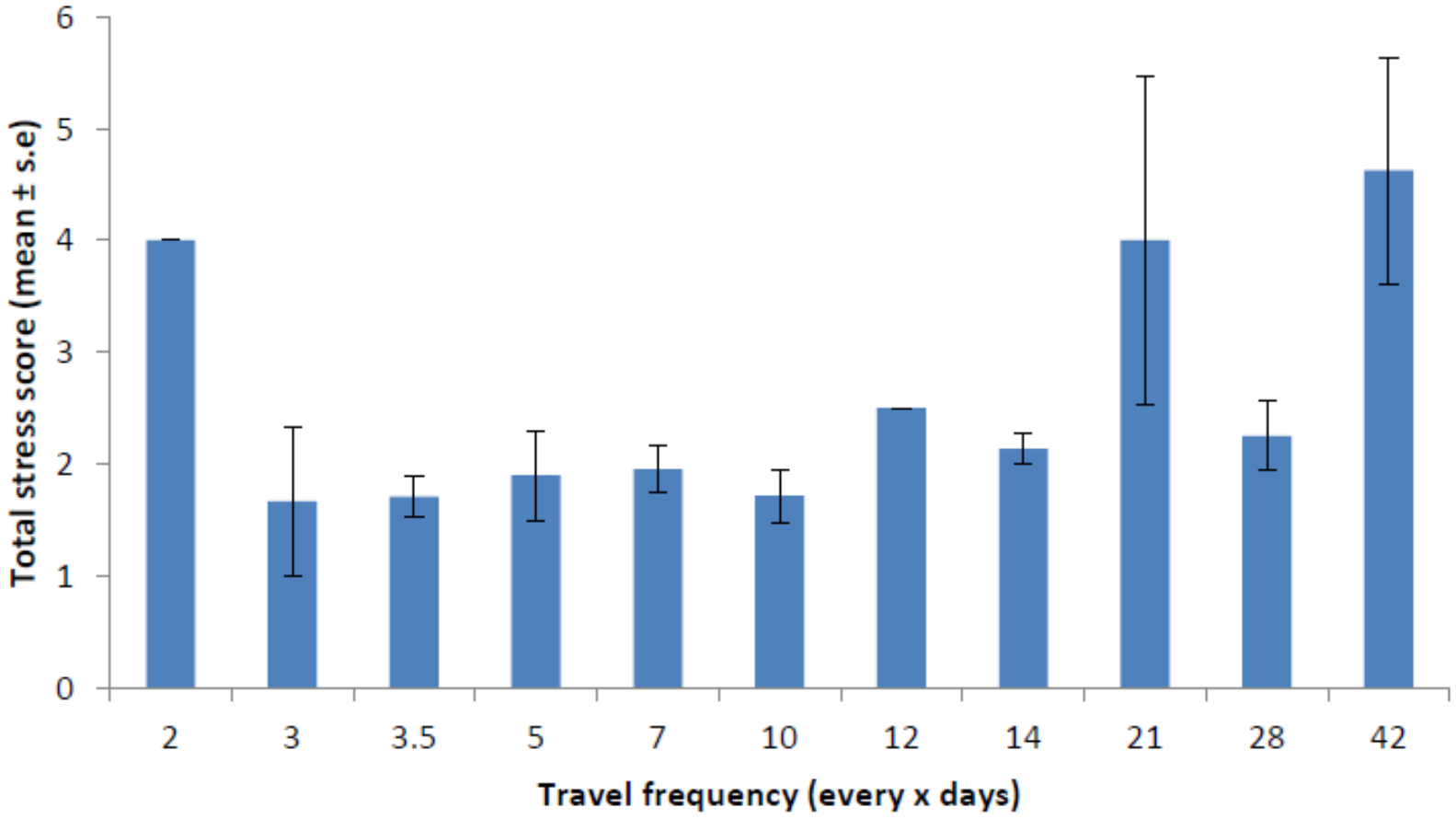

Figure 3.3. Mean total stress scores (± standard error) of horses transported with different frequencies. N=120 horses.

Results

- Transport experience was positively correlated with the total stress scores of the horses (r_s=0.273, p=0.003)
- Horses travelling with a companion had significantly lower stress levels than horses that travelled without a companion (p=0.0063)

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Influence of a companion

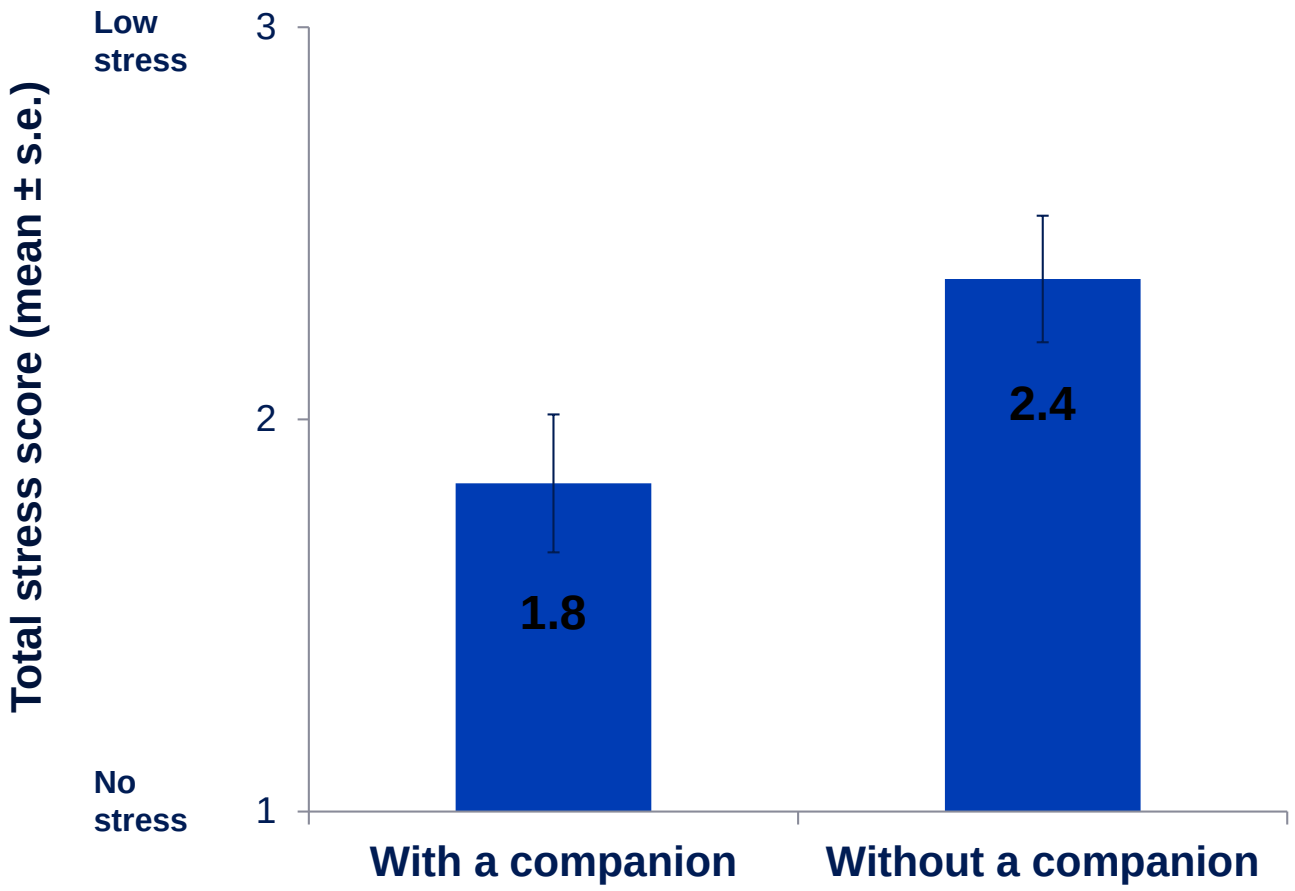

Fig. 2) Comparison of the mean total stress score (± standard error) of horses that were transported with a companion (n=46) and without a companion (n=74). **, W=2287.0, p=0.0063 (adjusted for ties), d=0.4.

Presence of a companion had no significant effect on stress levels of very frequent travellers (every ≤10days, p=0.066).

Results

- Transport experience was positively correlated with the total stress scores of the horses (r_s=0.273, p=0.003)
- Horses travelling with a companion had significantly lower stress levels than horses that travelled by themselves (p=0.0063)
  - but no significant effect for very frequent travellers (p=0.066)
- Transport experience was positively correlated with the stress score for loading (r_s=0.301, p=0.004)

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- Horses travelling with a companion had significantly lower stress levels than horses that travelled by themselves (p=0.0063)
  - but no significant effect for very frequent travellers (p=0.066)
- Transport experience was positively correlated with the stress score for loading (r_s=0.301, p=0.004)
- Transport duration had no significant impact on the total stress scores of the horses (r_s=-0.139, p=0.129)

Influence of transport duration

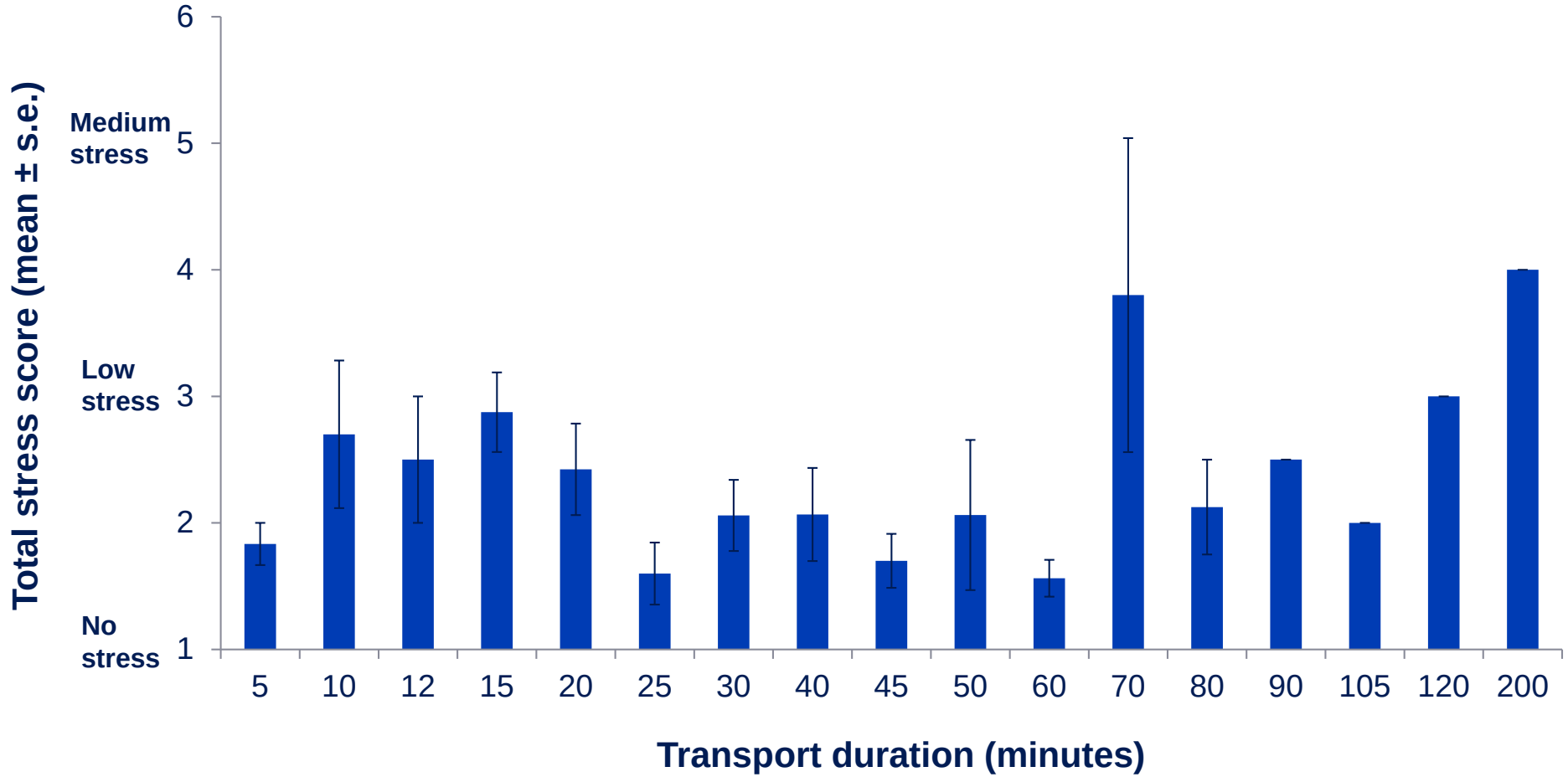

Fig. 3) Mean total stress scores (± standard error) of horses transported for different journey durations (in minutes, n=119 horses).

Main limitations of the study

- No control for individual horses
  - No replications
  - No knowledge of baseline cortisol values
- Cortisol concentrations assessed in only 29 horses
  - possibility of passively coping individuals
- Influence of temperament

Conclusion

- Stress levels of horses travelling with high frequency were indicative of no or solely a low stress response to transportation

- **A high level of transport experience can significantly reduce transport stress in sport horses**
  - especially during the loading procedure
  - positive influence of a companion for infrequent travellers

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THANK YOU!

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Original score (Young et al., 2012)

Table 4
A scale of behavioural indicators of stress in domestic stabled horses, as revealed by principal component analysis (PCA) and behavioural assessment completed by a professional panel.

Stress level	Behaviour score	Behavioural indicators
No stress	1	Standing at the front of the stable, looking around or head below wither height, eating. Ears pricked, back or slowly scanning, tail still or gently swishing. Some repetitive oral behaviour. *Horse described as*: Horse calm, unconcerned, relaxed, quiet, listening, accepting.
	2	*Behaviour exhibited for previous BS plus*: Walking. *Horse also described as*: Horse alert and watching.
Low stress	3	*Behaviour exhibited for previous stress level plus*: Occasional weaving behaviour, box walking and repetitive head movements. Ears occasionally flattened. Defecation. *Horse described as*: Listening, interested, alert.
	4	*Behaviour exhibited for previous BS plus*: Pacing. Approaching potential stressors e.g. noise from outside the stable. Repeated tail swishing. *Horse also described as*: Curious, unsettled, barging.
Medium stress	5	*Behaviour exhibited for previous stress level plus*: Scratching against stable walls or fittings, pawing at ground with front legs. Nostrils flared. Repeatedly looking around. Tail raised. *Horse described as*: Restless, showing tension in the body, fidgeting when still.
	6	*Behaviour exhibited for previous BS plus*: Approaching and retreating away from potential stressors. Stopping eating to focus on potential stressor. *Horse also described as*: Jumpy, easily startled.
	7	*Behaviour exhibited for previous BS plus*: Keeping away from potential stressors and remaining still to focus on them. *Horse described as for previous BS.*
High stress	8	*Behaviour exhibited for previous stress level plus*: Repeated performance of stereotypic behaviour e.g. weaving, box walking repetitive head movements. Stamping of hind feet. Snorting. *Horse described as*: Very unsettled and alert.
	9–10	*Behaviour as exhibited for previous BS.* *Horse also described as*: Agitated, fidgety, anxious, active, aggressive, uncomfortable (McDonnell et al., 1999; Strand et al., 2002).

Table 5) Adapted version of the scale of behavioural indicators of stress in domestic horses for use during unloading

Stress level	Behaviour score	Behavioural indicators
No stress	1	Strides of an average length coming off the trailer then standing, looking around or head below wither height, ears pointing forward/ pricked or slowly scanning, tail still or gently swishing. Some repetitive oral behaviour. Neck relaxed, loose/floppy lower lip, lip line curled down at corners, round nostrils, maybe eating when off trailer, will not jump or be startled at sudden noise or movement *Horse described as:* Horse relaxed, calm, unconcerned, quiet, listening, accepting.
	2	*Behaviour exhibited for previous BS plus*: Strides of an average length coming off the trailer then walking (with average strides when off trailer), neck slightly elevated *Horse also described as:* Horse alert and watching, mildly excited
Low stress	3	*Behaviour exhibited for previous stress level plus:* Occasional weaving behavior and repetitive head movements. Ears occasionally flattened. Defecation. Neck elevated *Horse described as:* Listening, interested, alert. Mildly excited
	4	*Behaviour exhibited for previous BS plus:* Repeated tail swishing. Pacing. Approaching potential stressors e.g. noises. Responds to sudden noises or movement by slight movement, but calms quickly. *Horse also described as:* Curious, unsettled, barging.
Medium stress	5	*Behaviour exhibited for previous stress level plus:* Scratching against trailer walls or fittings, pawing at ground with front legs. Nostrils flared. Repeatedly looking around. Tail raised. *Horse described as:* Restless, showing tension in the body, fidgeting when still. Moderately excited
	6	*Behaviour exhibited for previous BS plus:* Strides shortened when coming off the trailer. Approaching and retreating away from potential stressors. (Stopping eating to focus on potential stressor.) *Horse also described as:* Jumpy, easily startled. Moderately excited.
	7	*Behaviour exhibited for previous BS plus:* Keeping away from potential stressors and remaining still to focus on them. Ears pointing backwards, horse shies away from potential stressors *Horse described as for previous BS:* Jumpy, easily startled. Horse is excited.
High stress	8	*Behaviour exhibited for previous stress level plus:* Strides considerably shortened when coming off the trailer. Repeated performance of stereotypic behaviour e.g. weaving, repetitive head movements. Stamping of hind feet. Snorting. Sudden/violent movements. Lip line straight and tight, nostrils tight/long/thin, head up, neck stretched *Horse described as:* Very unsettled and alert.
	9	*Behaviour as exhibited for previous BS.* Repeated performance of stereotypic behaviour e.g. weaving, repetitive head movements. Stamping of hind feet. Snorting. Ears laid backwards, horse shows muscle tension/is shivering and/or sweating, horse 'rushes down the ramp', tries to escape/flee from potential stressors or goes backwards once unloaded *Horse also described as:* Anxious, agitated, fidgety, active, aggressive, uncomfortable
	10	*Behaviour as exhibited for previous BS.* horses flees from potential stressors in trot or canter once unloaded (minimum five strides) *Horse also described as:* Very anxious, agitated, fidgety, aggressive, uncomfortable

(Adapted from Young et al. 2012; Munsters et al. 2012)

Number of horses (frequency)

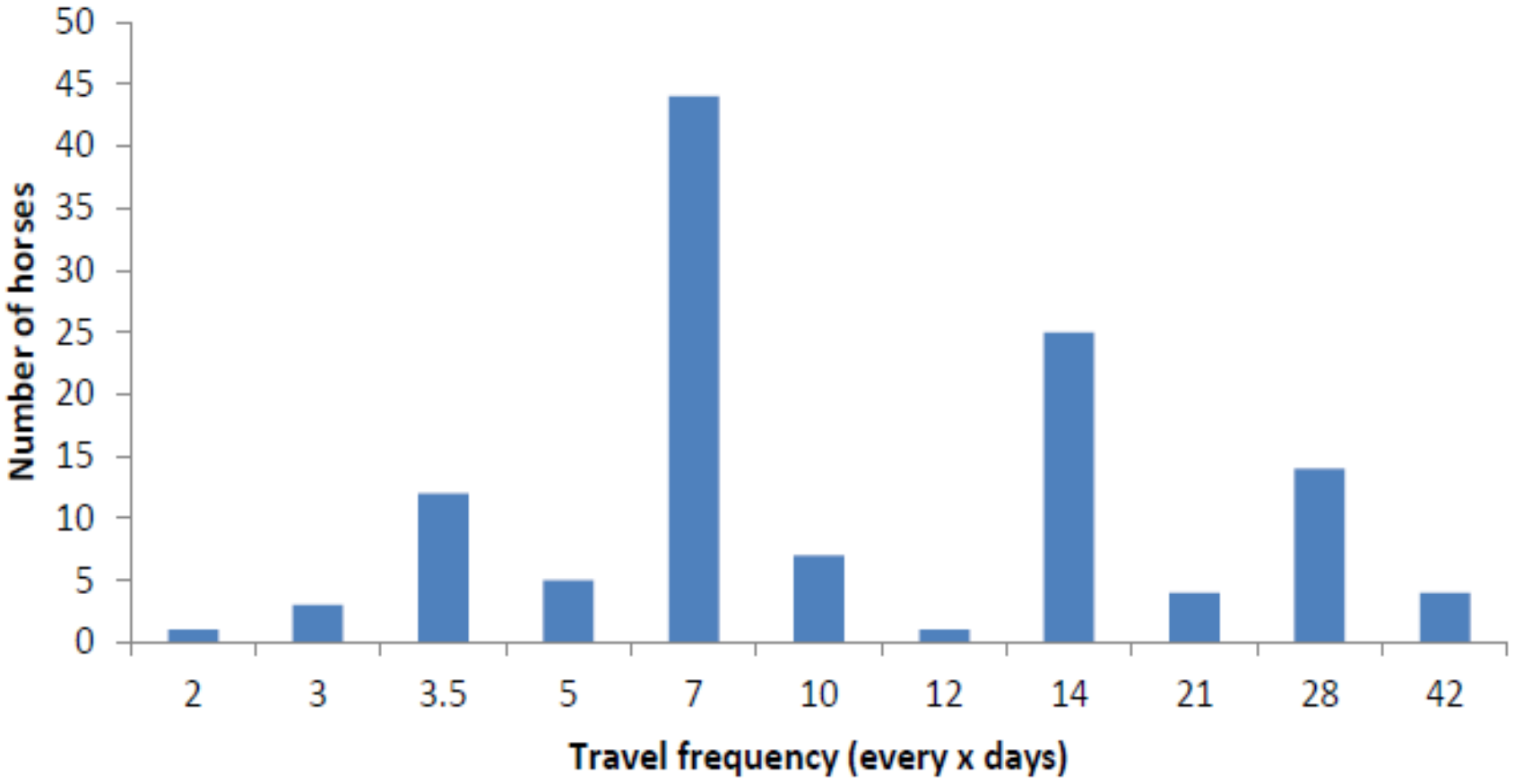

Figure 3.1. Outline of the travel frequencies of the studied horses (n=120).

Number of horses (duration)

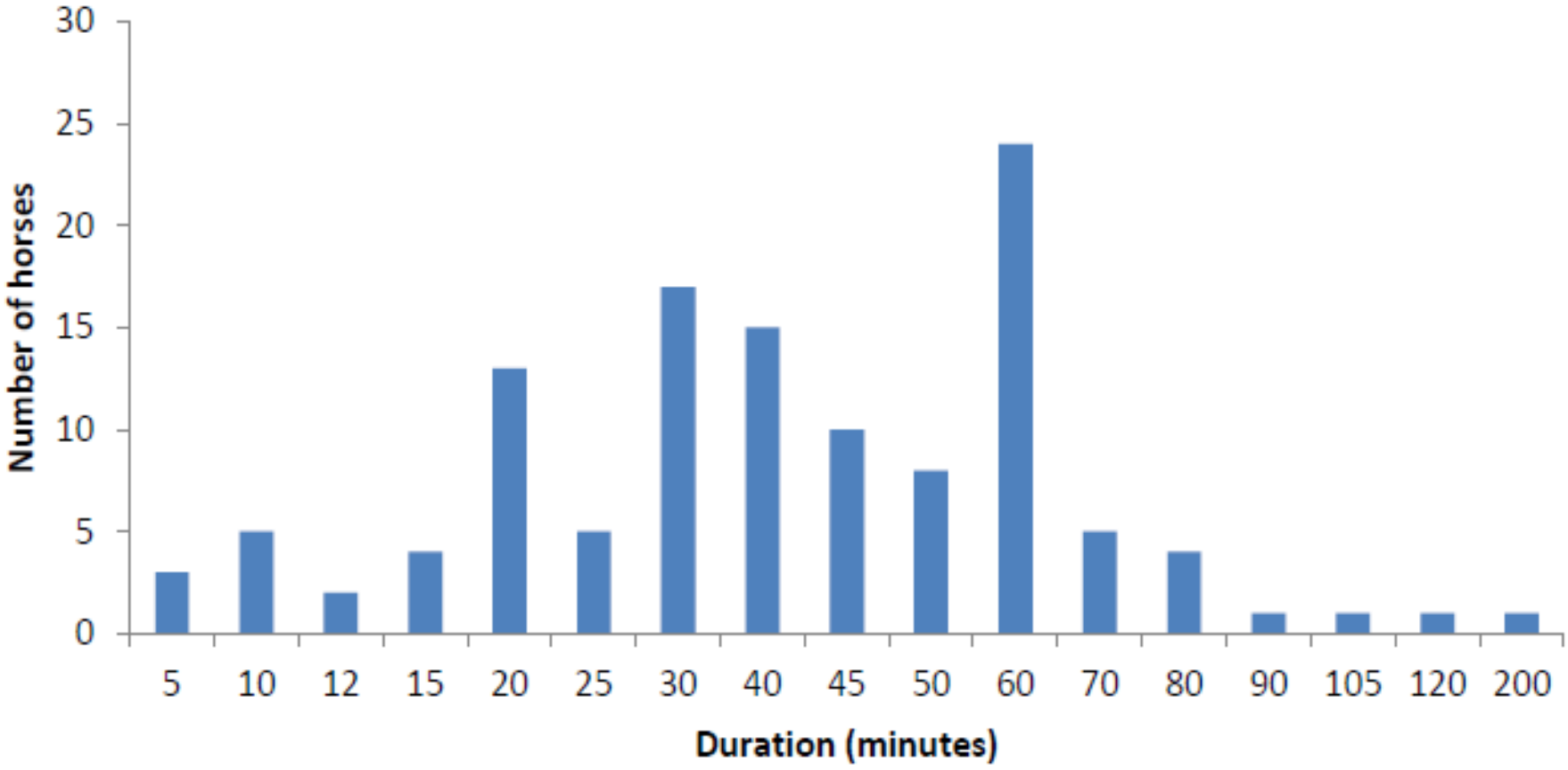

Figure 3.7. Outline of the transport durations of the studied horses (n=119).

Influence of travel experience

(Results of beh. & physiol. sampled horses, n=29)

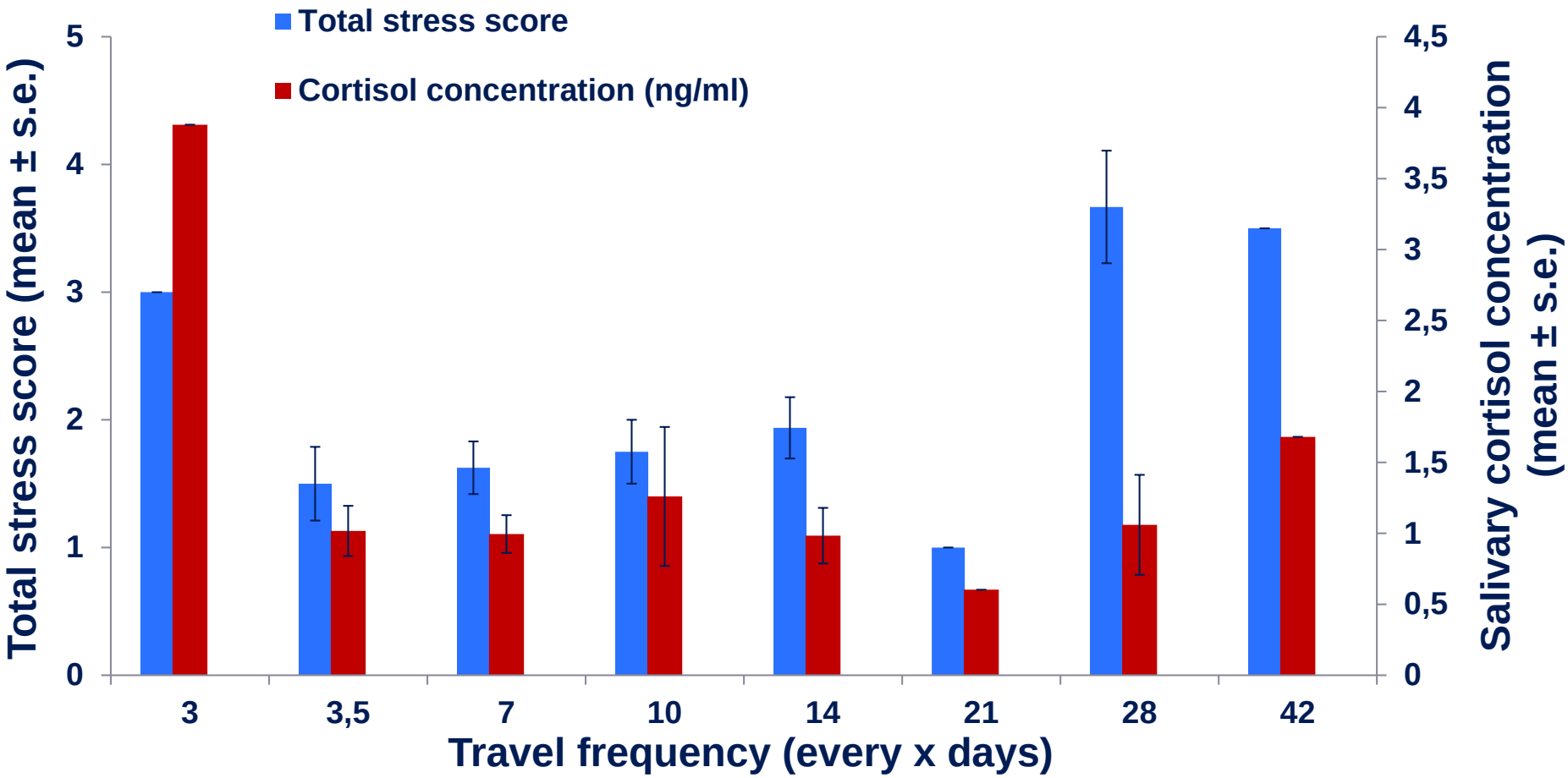

Figure 3.12. Mean total stress scores (± standard error, blue bars) and mean salivary cortisol concentrations (± standard error, measured in ng/ml, red bars) of horses transported with different frequencies. Excluding outliers. N=29 horses.

Correlation of travel frequency with the total stress score

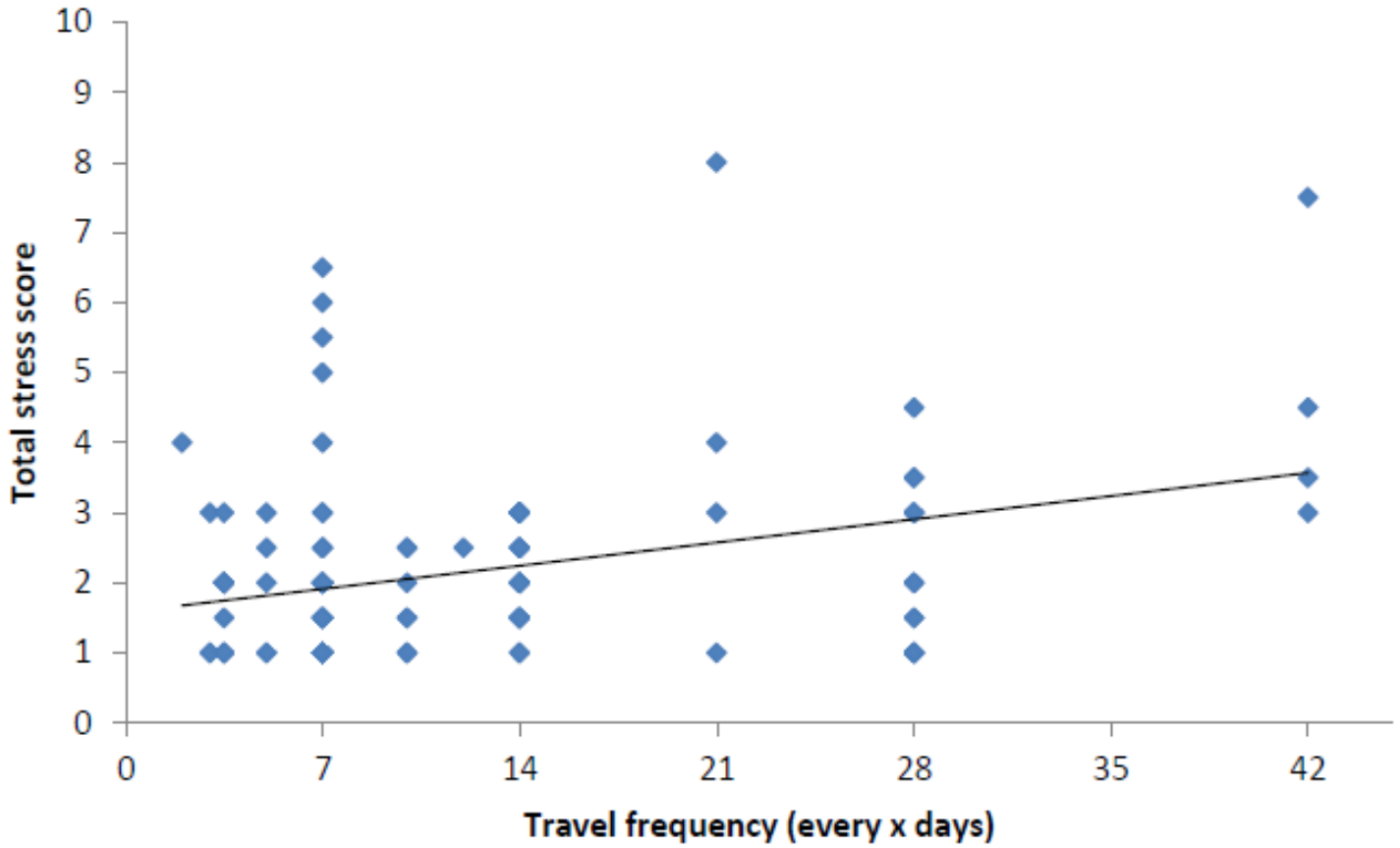

Figure 3.2. Correlation of the total stress score of the horses with the frequency of transport. **, r_s=0.273, p=0.003. N=120 horses.
Regression equation: total stress score=1.581+0.04739*(travel frequency)

Correlation of travel frequency with the loading stress score

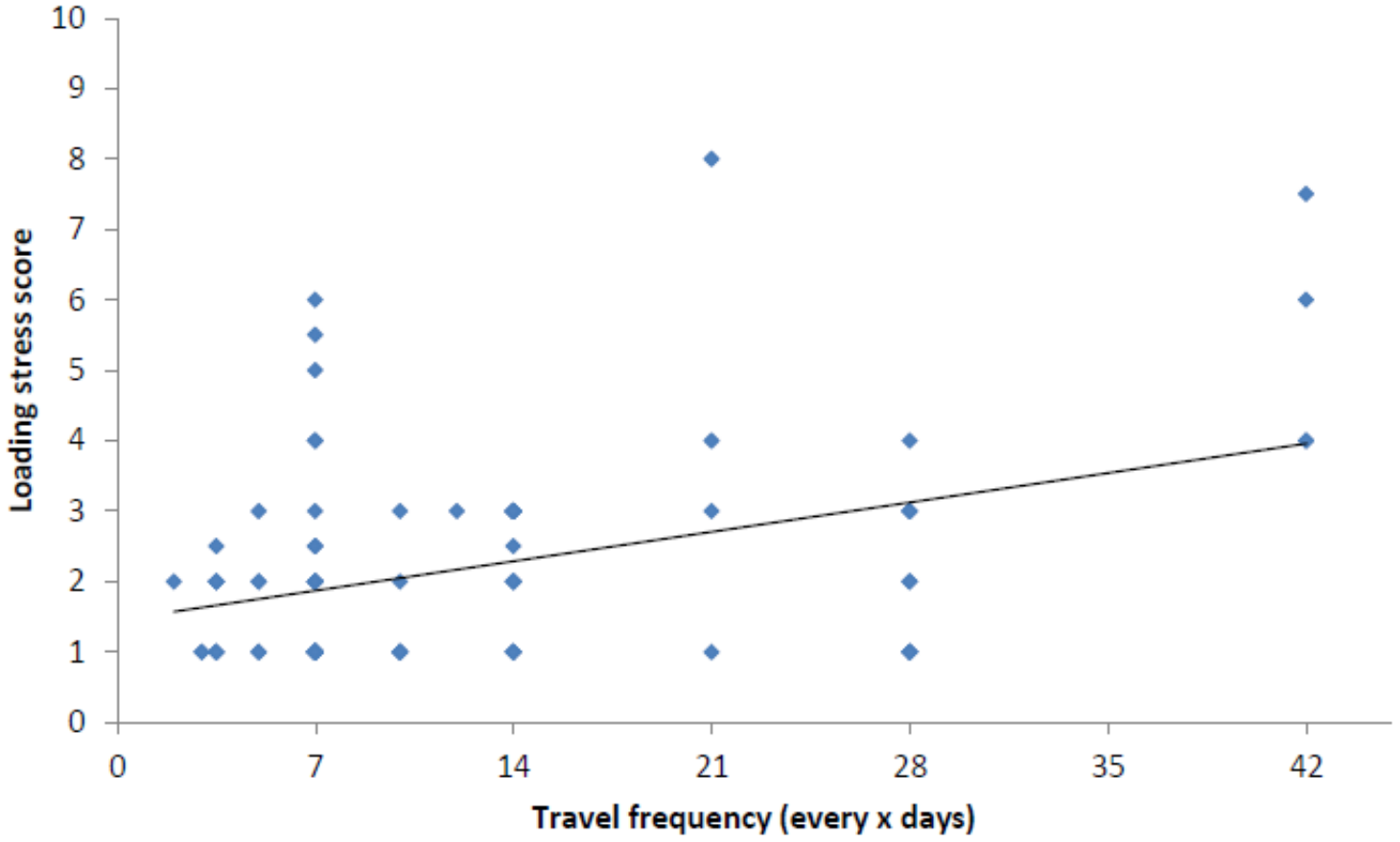

Figure 3.5. Correlation of the loading stress score with the travel experience. **, r_s= 0.301, p=0.004. N=91 horses.
Regression equation: Loading stress score= 1.453+ 0.05968*(travel frequency in days)

Stress Level	Beh. Score	Salivary CORTISOL (ng/ml)	Reference
No Stress	1	**<0.35-0.65**	Range baseline values in diurnal rhythm: 0.35-0.65ng/ml (Bohák *et al.*, 2013) Basal values before transport: 0.38±0.05ng/ml (Schmidt *et al.*, 2010a) Baseline values in the morning: 0.6 ng/ml (Erber *et al.*, 2013) Basal cortisol-IR one day before transport:0.4ng/ml (Schmidt *et al.*, 2010c)
	2	**~0.8 (max. 1.0)**	Concentrations before loading: 0.69 ±0.26 ng/ml (Shanahan, 2003) Baseline before transport:1.0 ng/ml (Schmidt *et al.*, 2010b)
Low Stress	3	**1.0-1.7**	Values before competition: 1.0 ± 0.2ng/ml (Becker-Birck *et al.*, 2013) Values 30min before loading: 1.07±0.21ng/ml (Schmidt *et al.*, 2010a) Concentration after loading: 1.23 ± 0.26ng/ml (Shanahan, 2003)
	4	**~2.0**	Horses abruptely moved to individual boxes from a mixed group: 1.8 ± 0.2 ng/ml (Erber *et al.*, 2013)
Medium Stress	5	**2.2-3.5**	Range mid-transport of an excessive journey: 2.37-3.10ng/ml (Schmidt *et al.*, 2010a) End of an excessive transport: 2.83±0.36ng/ml (Schmidt *et al.*, 2010a) Values after competition: 2.2±0.4 ng/ml (Becker-Birck *et al.*, 2013)
	6	**4.0+**	Range highest cortisol during transport in transport naïve horses: 4.1-6.5ng/ml (Schmidt *et al.*, 2010b)
	7	**~5.0- 6.5**	Greatest cortisol for completely transport naïve horses: 5.9 ±0.6 ng/ml (Schmidt *et al.*, 2010c)
High Stress	8	**≥6.5**	