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Stress in riding horses



Janne Winther Christensen

Aarhus University, Dept. of Animal Science, Tjele, Denmark

Effect of Head-and-Neck-Position on acute stress responses in dressage horses

(Christensen et al, under review)



Hyperflexed (LDR)



Competition frame (CF)



Loose frame (LF)

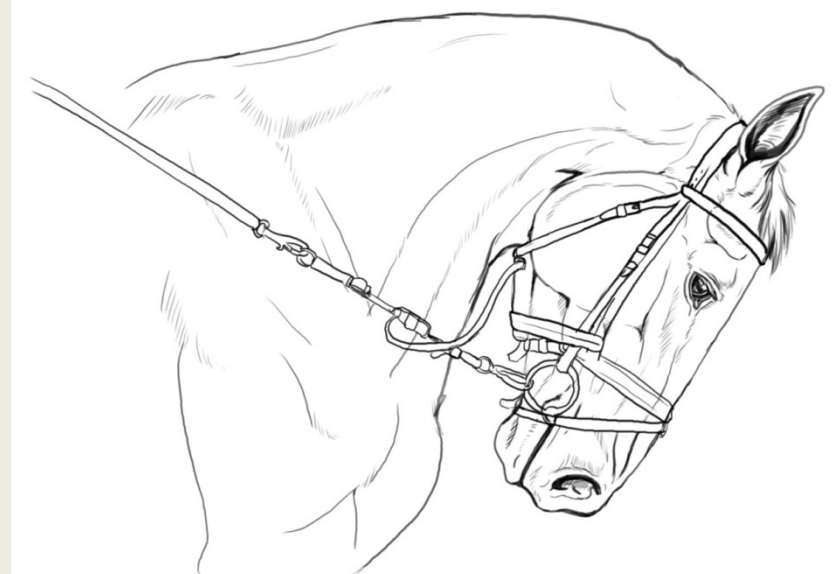
- 15 Danish dressage horses
 - Intermediate to high level
 - Routinely trained in LDR
 - Ridden 3 times by their usual rider
 - Balanced across three test days

HNPs according to [Elgersma et al. 2010](#)

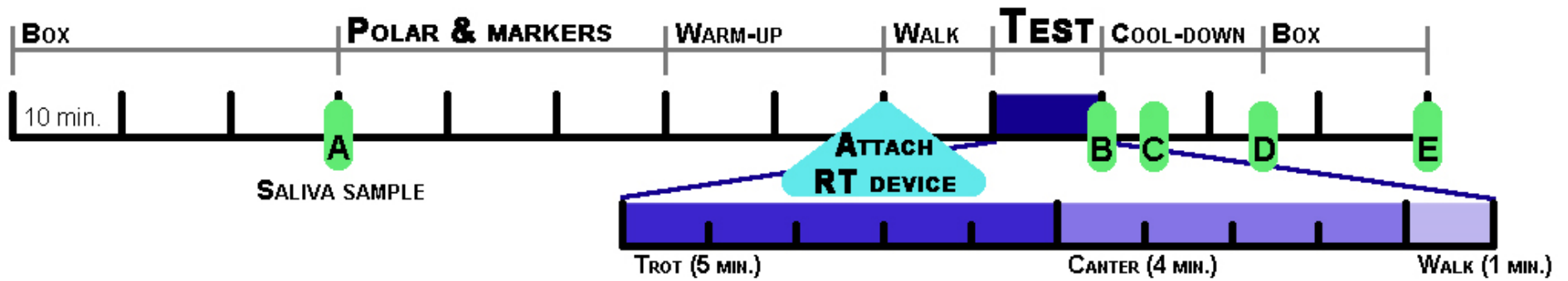
Material & Methods

Parameters

- Cortisol in saliva
 - -60, 0, 5, 15, 30 min
- Heart rate & heart rate variability
 - HR, RMSSD, LF/HF ratio
- Head and Neck angle
 - Anatomical markers
- Behaviour
 - Video recordings
- Rein tension
 - SignalScribe™, sensor limit=5kg



Protocol



Standard riding arena (20x60m)



Results

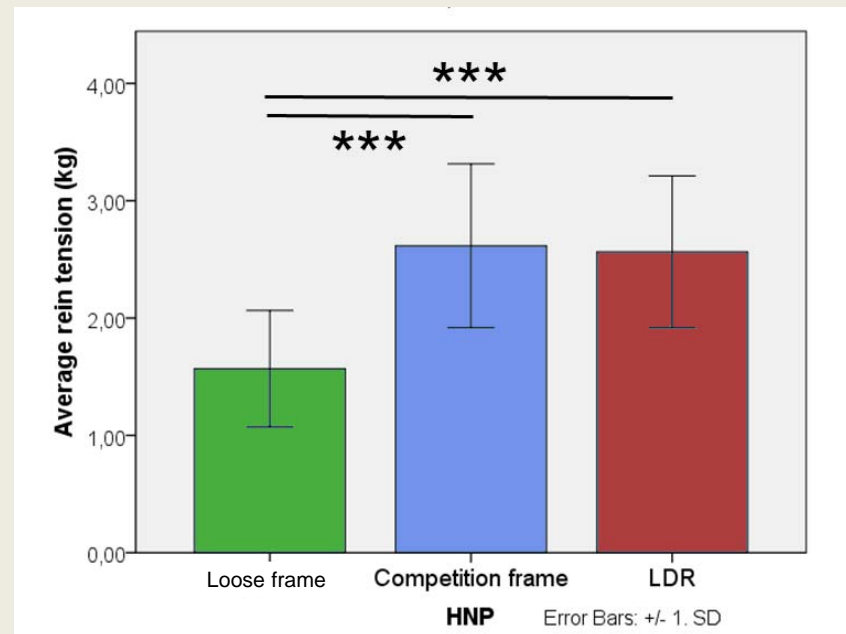


Loose frame

Competition frame

Low, Deep & Round

Rein tension

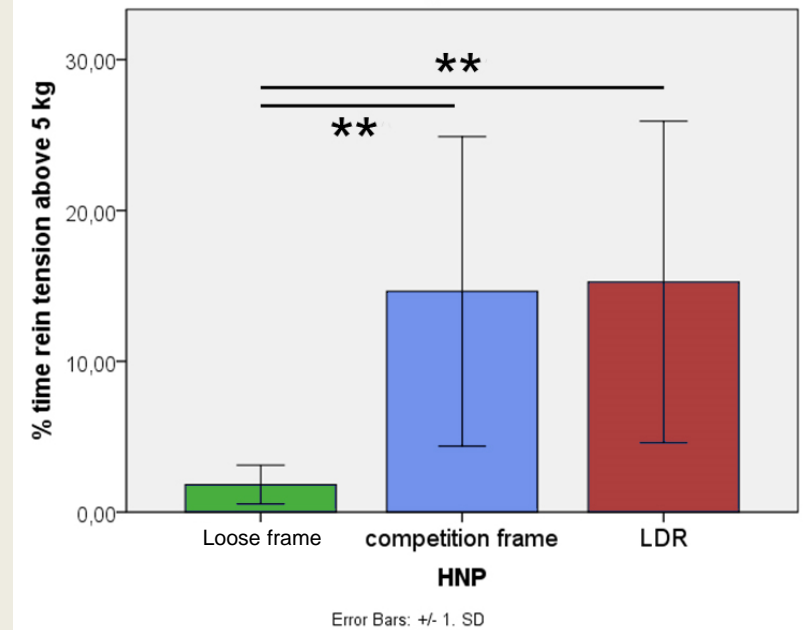
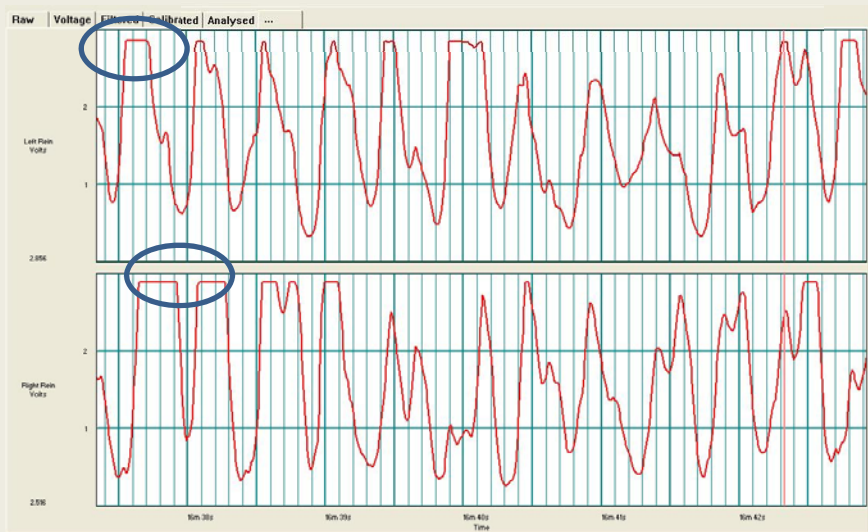


*** p ≤ 0.001

Results - Rein tension



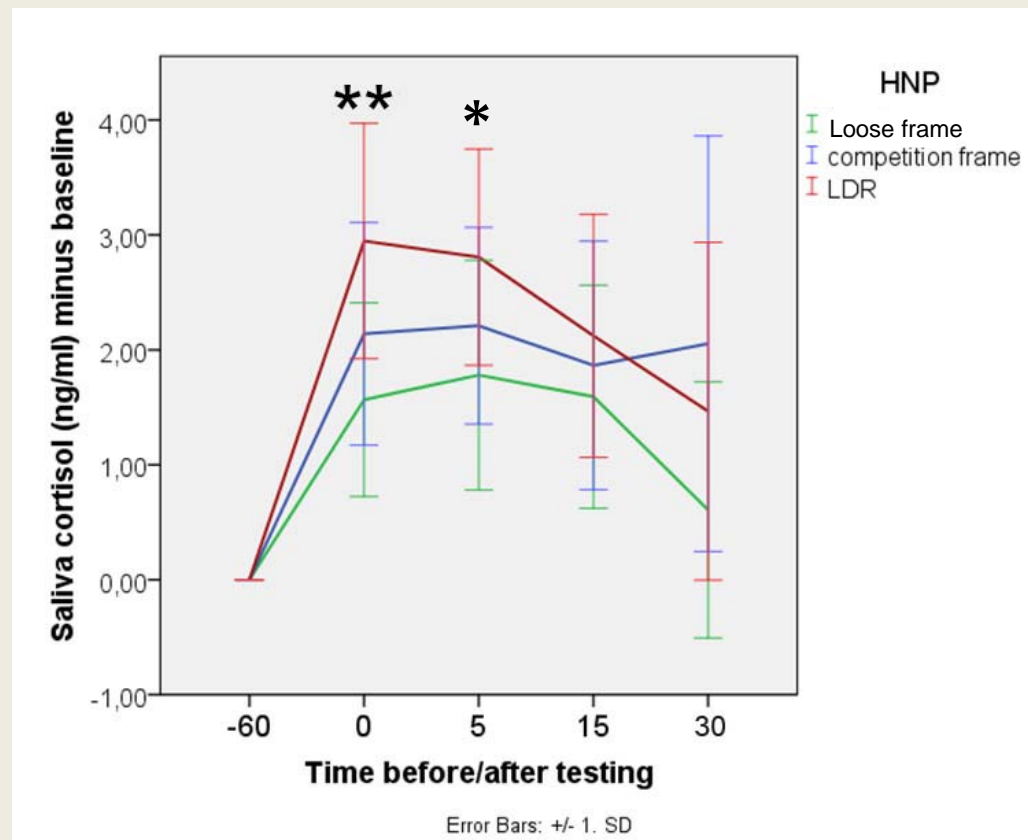
Ceiling effect RT



** $p \leq 0.01$

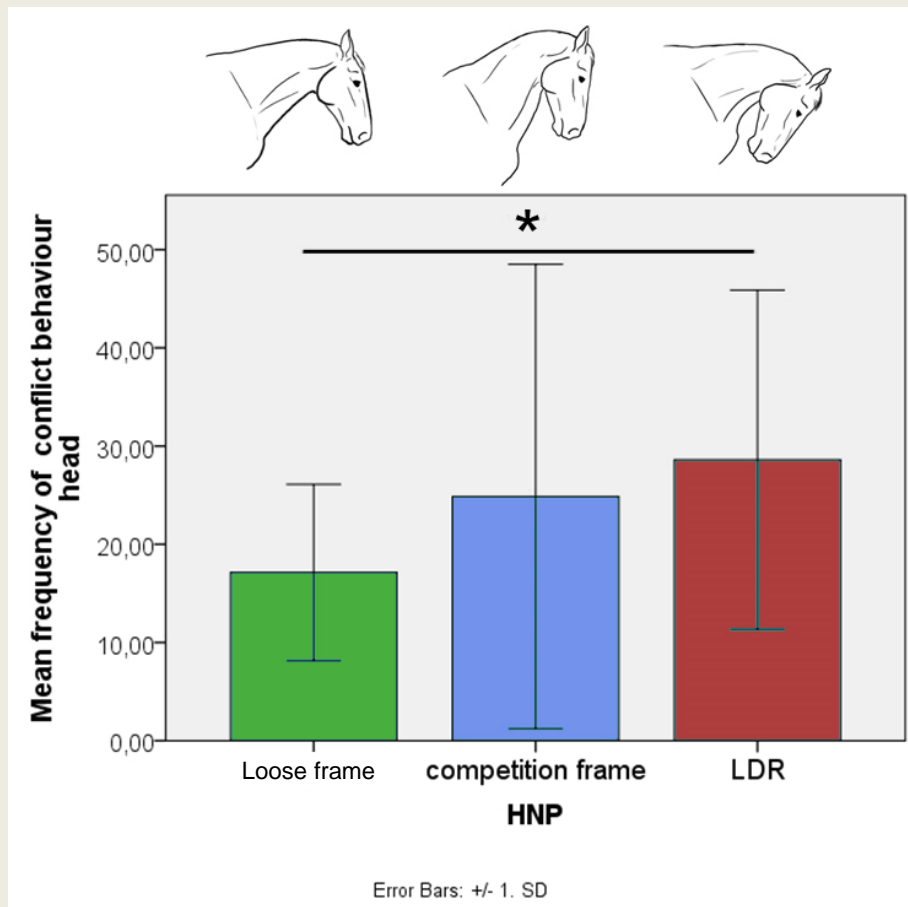
Results - Cortisol

Difference from baseline



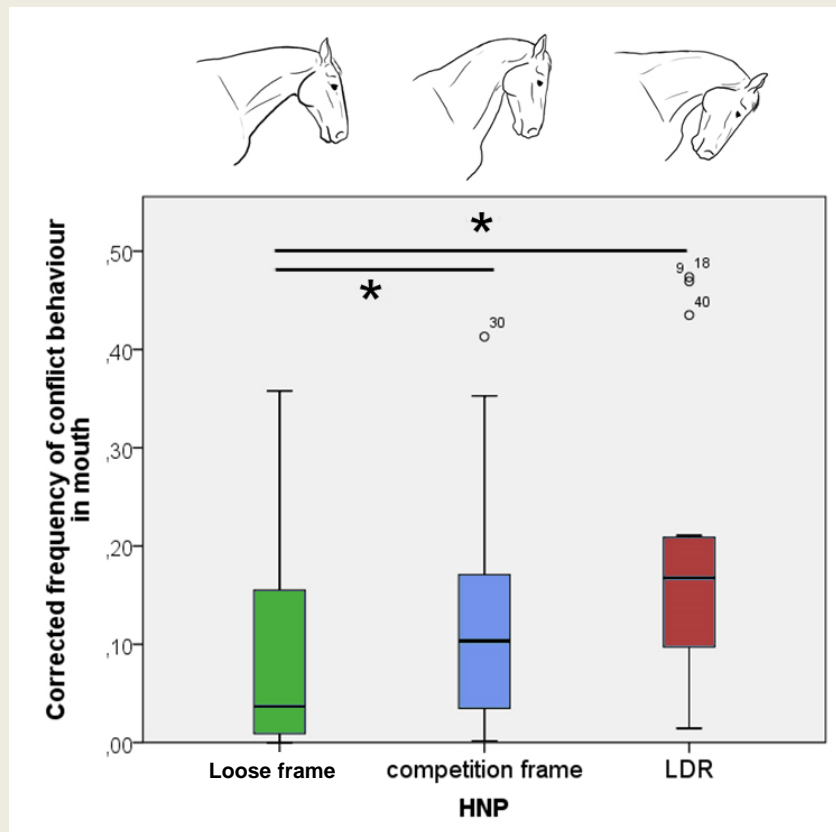
Results - Behaviour

Conflict behaviour – head (freq)

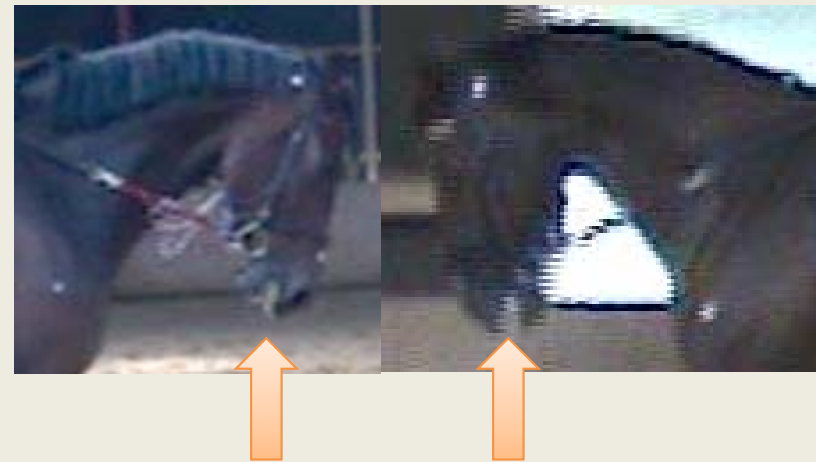


Results - Behaviour

Conflict behaviour – mouth (freq)



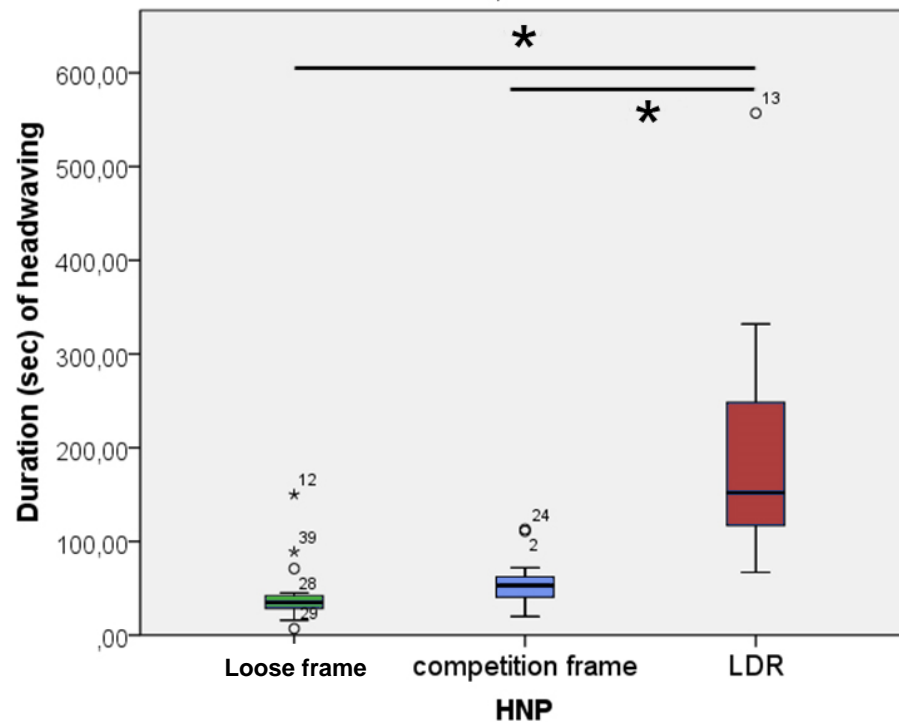
* $p < 0,05$



Corrected for time visible
(#/sec)

Results - Behaviour

Head waving (duration)



Total duration in seconds

Results - Other

No significant difference in:

- Heart rate
- Heart rate variability
- Other behavioural categories
 - Tail lashing
 - Bucking, rearing and breaking gait



Conclusion

- Cortisol & behaviour point in same direction
- No differences in e.g. HR/HRV
 - 9 min trot/canter inappropriate?
 - Control frame unusual
 - Too few horses?
- Combined results indicate that being ridden 10 min in LDR may be perceived as more stressful for horses in this experimental set-up.

Behaviour and stress responses in horses with gastric ulceration

(Malmkvist et al, Appl Anim Behav Sci, 2012)

High prevalence of gastric ulceration

Racehorses (n=345): 86 % (Begg & O'Sullivan 2003)

Endurance horses (n=30) (Tamzali et al. 2011)

- Competition season: 93 %
- Outside this season: 48 %

Riding horses (n=201): 53 % (Luthersson et al. 2009)



High prevalence of gastric ulceration

- Consequences for the horse?

"In pain"

"Poor body condition"

"Resistance during girth tightening"

"Uncooperative"

"Fatigue"

"Playing with food"

"Abnormal behaviour"

"Loss of appetite"

"Increased sensitivity"

Aim

- Horses with severe gastric ulceration
 - in a poor body condition?
 - more abnormal behaviour?
 - higher baseline of stress hormones?
 - different behaviour during feeding?
 - react differently in fear test?

Study design

- 100 Danish Warmblood dressage/
jumping horses at one stud
- Gastroscopic examination
Equine Gastric Ulceration Syndrome score
= EGUS score (Andrews et al. 1991)

Method: Luthersson et al. 2009

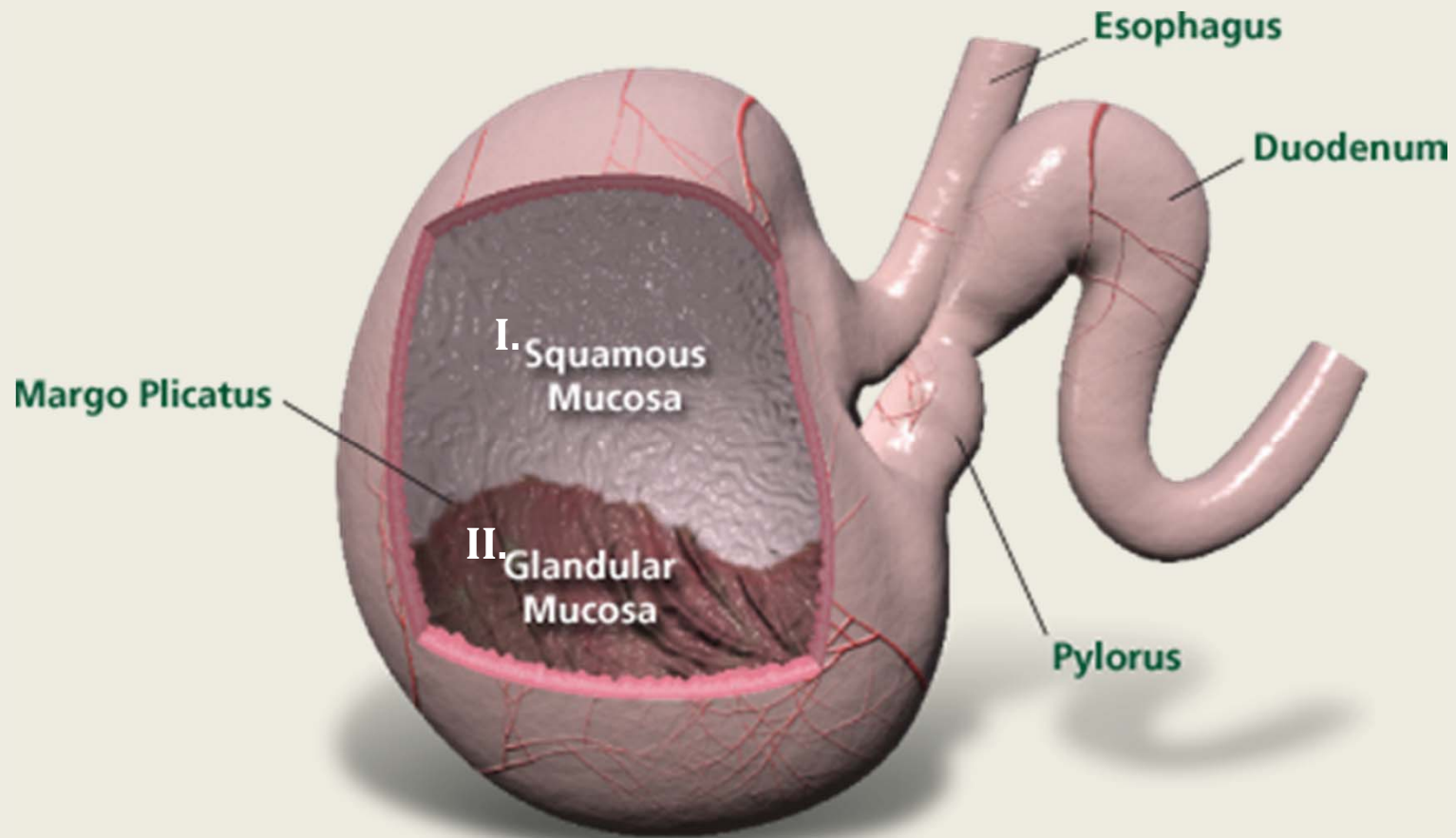
EGUS score

Score 0: Healthy mucosa

Score 4: Extensive lesions with areas of
apparent deep ulceration

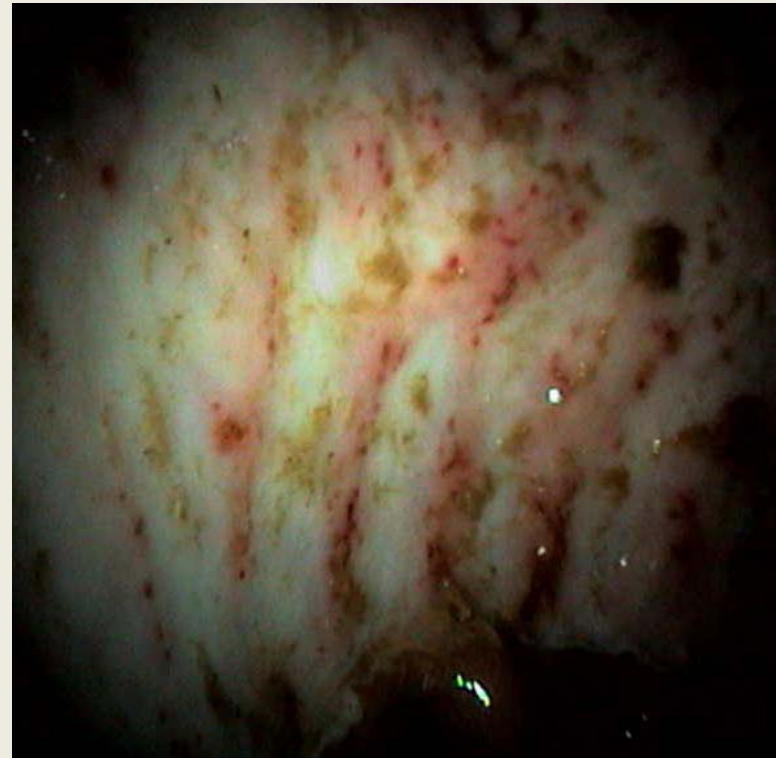
- Two regions of stomach scored
 - I. Upper non-glandular part
 - II. Glandular part

Regions of stomach scored



EGUS score

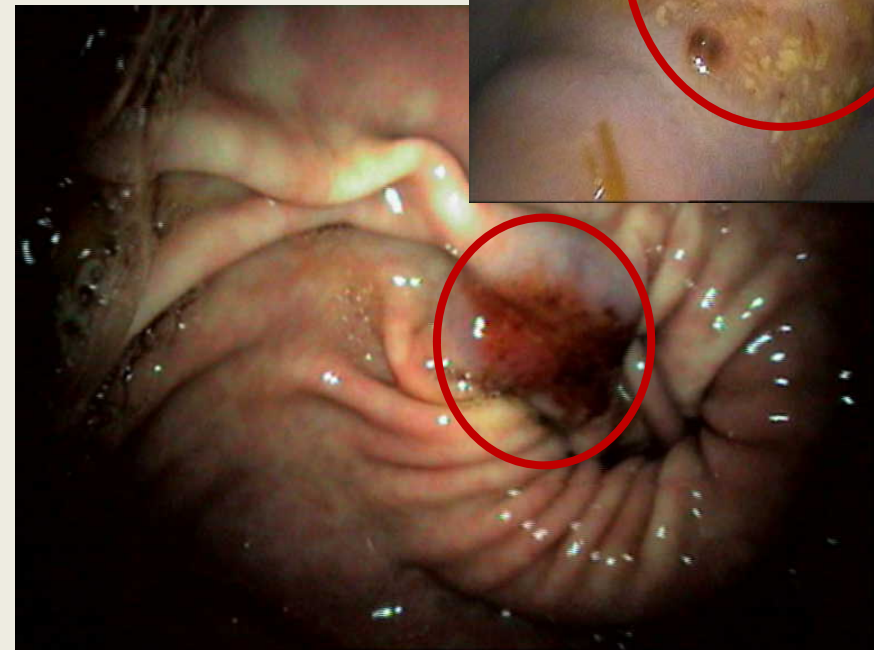
I. Upper non-glandular part of stomach



Score 3

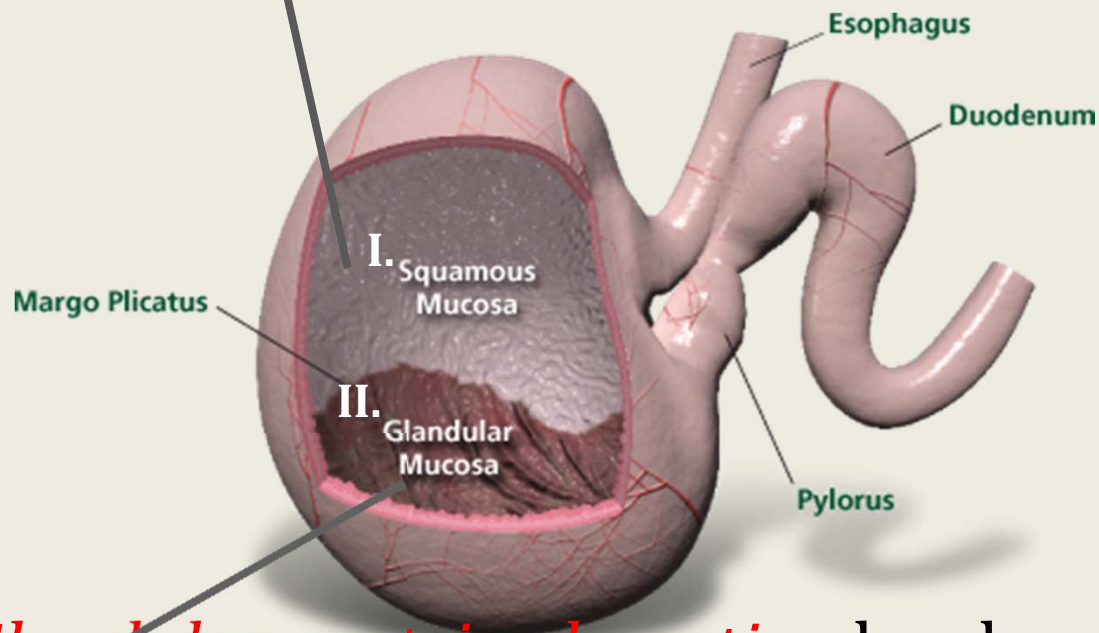
EGUS score

II. Glandular part of stomach



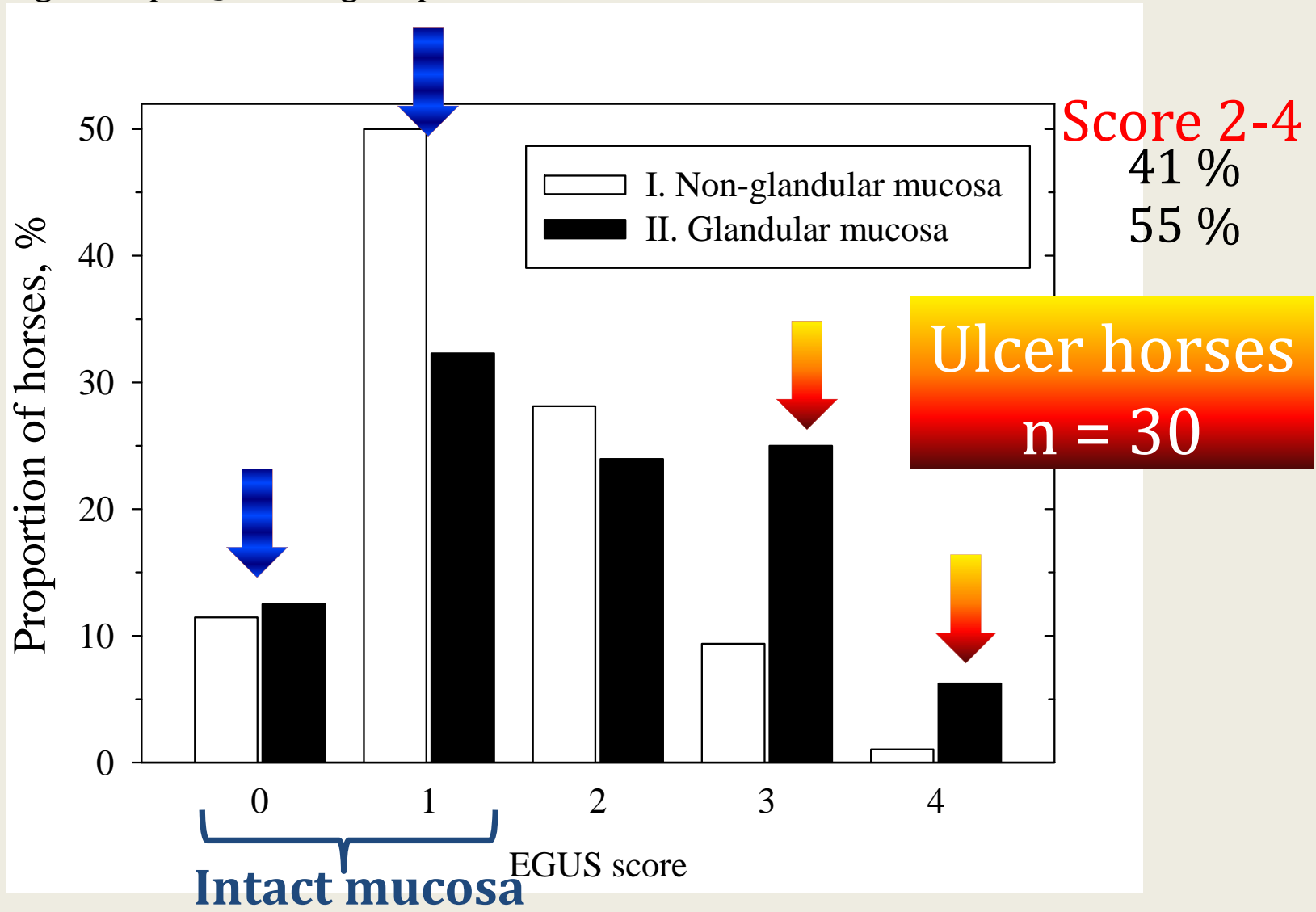
Score 3

Non-glandular gastric ulceration exposure to gastric acids during exercise in horses (e.g. Tamzali et al. 2011)



Glandular gastric ulceration has been related to stress in other species (e.g. Selye, 1936; Weiss 1968)

EGUS stages in the original groups



Controls, n = 30

Study design

	Control	Ulcer
Glandular score	0-1	3-4
Non-gland. score	0-1	0-3
Age, years	7 (0.7)	7 (0.4)
Mare:Gelding:Stallion	6:8:16	5:13:12
In training	67%	77%
Starch, g/kg BW	1.1	1.1
Hay per day, kg	4.2	4.2
Body condition score	5 [4; 5]	5 [5;5]

Behaviour during feeding

- 1h observation. A feed teaser after 30 min.

Behaviour	Control	Ulcer	P-value
Time spent			
-eating teaser	126 (10)s	94 (11)s	0.025 *
-locomotion	4 (1.1) %	2 (1.2) %	0.030 *

- NS. difference in occurrence of abnormal behaviour

Novel object test

- In home box, 10 min test time



Behaviour	Control	Ulcer	P-value
Latency to touch	100 s	102 s	0.98 NS
Time spent			
-away	32 %	49 %	0.081 (*)
-in object contact	27 %	23 %	0.49 NS

Novel object test

- In home box, 10 min test time



Heart rate	Control	Ulcer	P-value	
Maximum	72 (3.4)	69 (3.7)	0.53	NS
Mean	45 (1.3)	43 (1.3)	0.32	NS

Fearfulness did not differ

Stress hormones (FCM)

FCM: Faecal Cortisol Metabolites,
reflecting blood cortisol with a 24 h time-lag (Palme et al. 1996)

FCM, ng/g	Control	Ulcer	P-value
Baseline	5.3 (1.9)	5.7 (2.0)	0.79 NS
Response to NOT	5.8 (0.8)	7.3 (0.8)	0.018 *

Increased stress hormone response in ulcer horses

Conclusion

Horses with severe glandular ulceration:

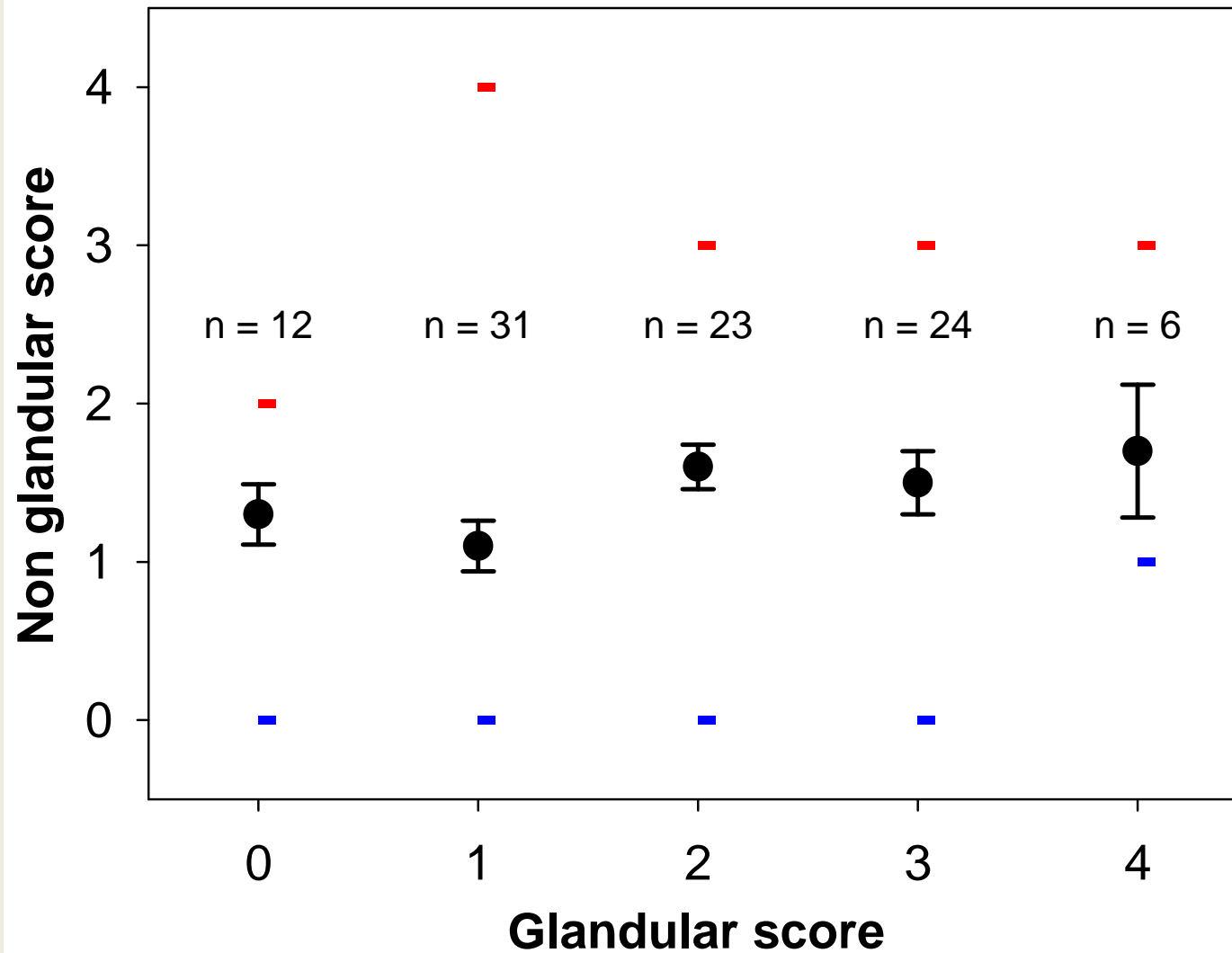
- no clear outer signs
(e.g. body condition, crib biting, fearfulness)
- differ in behaviour around feeding
- same stress hormone baseline as controls
- more stress sensitive, as they responded with a higher FCM concentration after a novelty test

Overall conclusion

- A combination of behavioural and physiological parameters is useful for evaluation of stress in riding horses

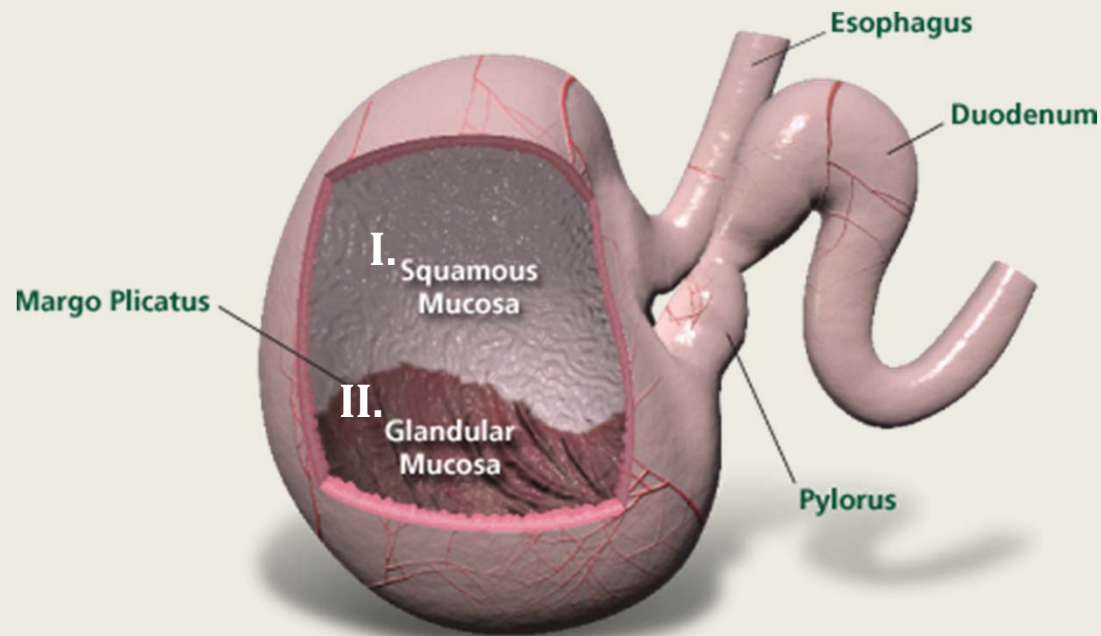






- 27 % lesions (score 2-4) in both non- and glandular part
- 33 % no lesions (score 0 – 1)

Risk factors include feeding management:
amount of starch, availability and type of forage
(e.g. Luthersson et al. 2009)



Humans: link with *Helicobacter pylori*,