

# May work alter horse's welfare?

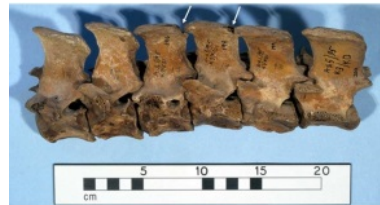
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EthoS - Ethologie animale et humaine*

# Horse-human relationship: a long shared working history



↳ Detected by the consequences on the horse's body (vertebrae and teeth)



Ak-Alakha 5, Kurgan 3, Horse 1, ThV 14 – L1 (16+ years old)  
Overriding or impinging dorsal spinous processes.



Ak-Alakha 5, Kurgan 3, Horse 4, ThV 14 (7-10 years old)

Deposition of spondylitic spurs of new bone on the ventral and lateral surfaces of the vertebral bodies adjacent to the intervertebral space.

*Kurgan horse (riding)  
(16+, 10 yr)*



Exmoor pony 97-7 (27 years old), ThV 11-18  
1) no spondylitic spurs of new bone on the vertebral bodies  
2) no impinging dorsal spinous processes



Exmoor pony 97-7 (27 years old), ThV 14

no spondylitic spurs of new bone on the vertebral bodies  
No fissures through the epiphyses.  
No periarticular osteophytes.

*Free living Exmoor pony  
(27yr)*

Marsha Levine  
(pers comm)

↳ Chronic consequences of work related issues? Could welfare be altered?



*Ak-Alakha 5, Kurgan 3, Horse 1, ThV 14 – L1 (16+ years old)  
Overriding or impinging dorsal spinous processes.*



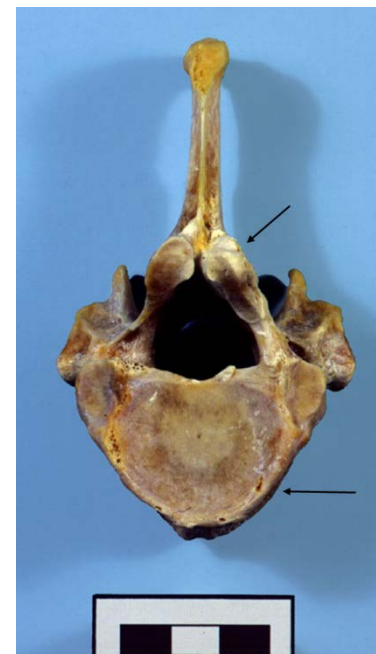
*Deposition of spondylotic spurs of new bone on the ventral and lateral surfaces of the vertebral bodies adjacent to the intervertebral space.*

*Ak-Alakha 5, Kurgan 3, Horse 4, ThV 14 (7-10 years old)*



*Exmoor pony 97-7 (27 years old), ThV 11-18*

- 1) *no spondylotic spurs of new bone on the vertebral bodies*
- 2) *no impinging dorsal spinous processes*



*no spondylotic spurs of new bone on the vertebral bodies*

*No fissures through the epiphyses.*

*No periarticular osteophytes.*

*Exmoor pony 97-7 (27 years old), ThV 14*



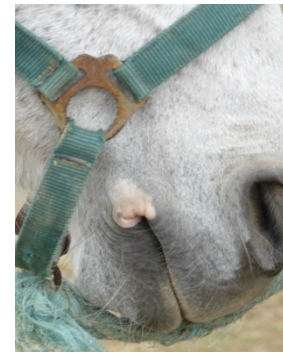
# Work related welfare issues in horses

## Work as a potential source of physical problems ?

What about nowadays?

Some aspects are highly visible

But others are less!



Ex: vertebral problems

*Anatomical data*: : **92% of thoroughbreds** (racing horses) with impingement or overlap of dorsal spinuous processes (especially at T3-T18 (Haussler et al. 1989)

**78% of 443 riding horses** (Jeffcott 1980)

(No relation with age, more in jumping/leisure horses, Gillis 1999)

difficult to detect  
difficult to assess in field conditions



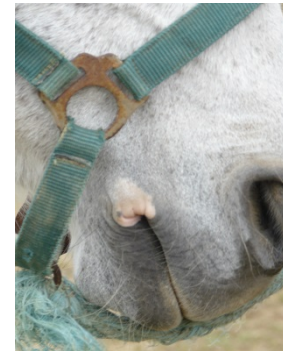
***one of the most common and less treated problems in the horse*** (Jeffcott et al. 1999)

# Work related welfare issues in horses

## Work as a potential source of physical problems ?

### A welfare issue?

Independently of the type of work  
(harness, riding, loads..)



**3% of the horses with body lesions** (Popiescu & Diugan 2013)

**31% of the horses with lip lesions** (Pritchard et al. 2008)

➔ **Express apathy, “depression like behaviours”**

(20 % of riding school horses,  
Fureix et al 2012)



*Lesions may reveal poor equipment fitting with repeated pain,  
but also owner's neglect or mistreatment of the horse  
Repeated stress or pain with no possible escape may lead to  
learned helplessness (Hall et al. 2008, Burn et al 2008, Durier et  
al. 2012)*

# Work related welfare issues in horses

## Work as a potential source of physical problems ?

### A welfare issue?

### Back problems

Mostly expressed through:

- **posture**: stiff "flat backed" gait, shortened stride, flat/hollow neck (Cauvin 1997, Martin & Klide 1999, Landman et al 2004...)

- **behaviour**: difficulties at work, rearing, bucking, aggressiveness (Landman et al 2004, Cauvin 1997)

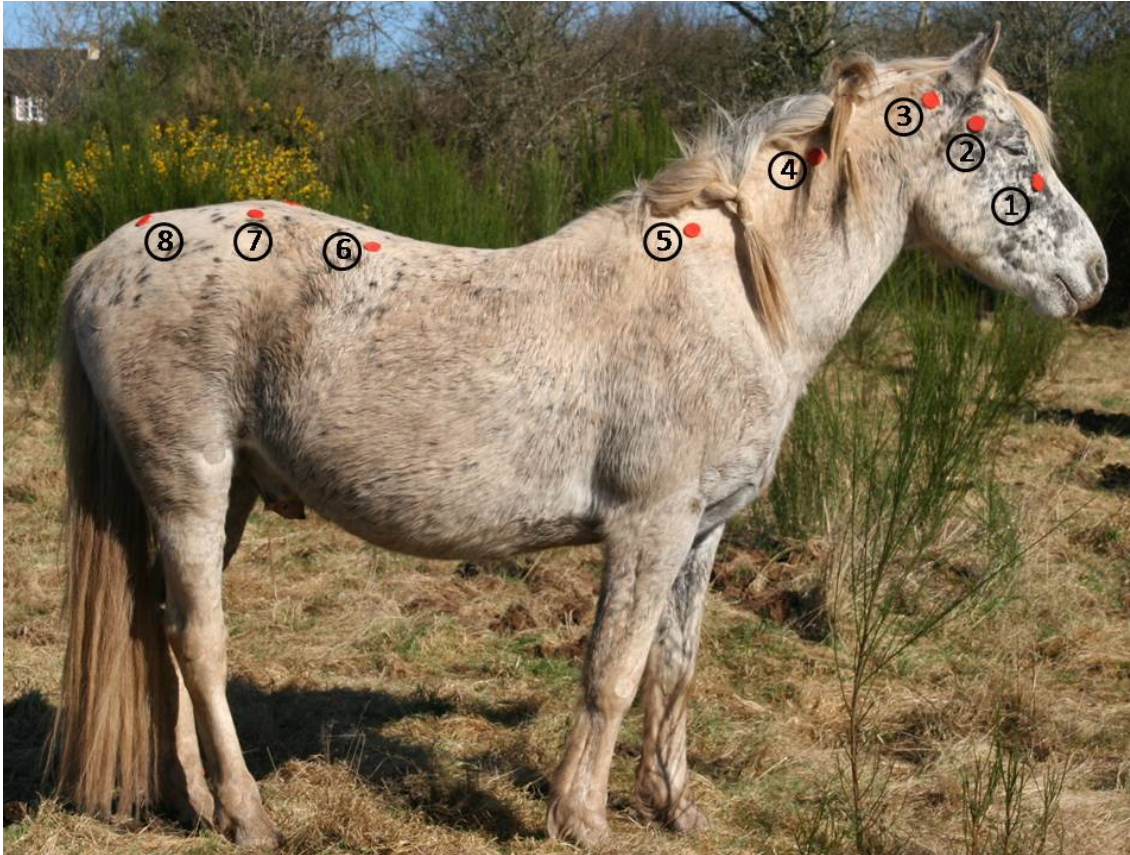
*75% of affected riding school horses threatened an unfamiliar experimenter during tests (Fureix et al 2010)*



# Work related welfare issues in horses

## Work as a potential source of physical problems ?

Evaluating postures: a geometric morphometry approach



*Photographs*

- 20 in movement (walk)
- 10 standing



*Total: 540 photos*

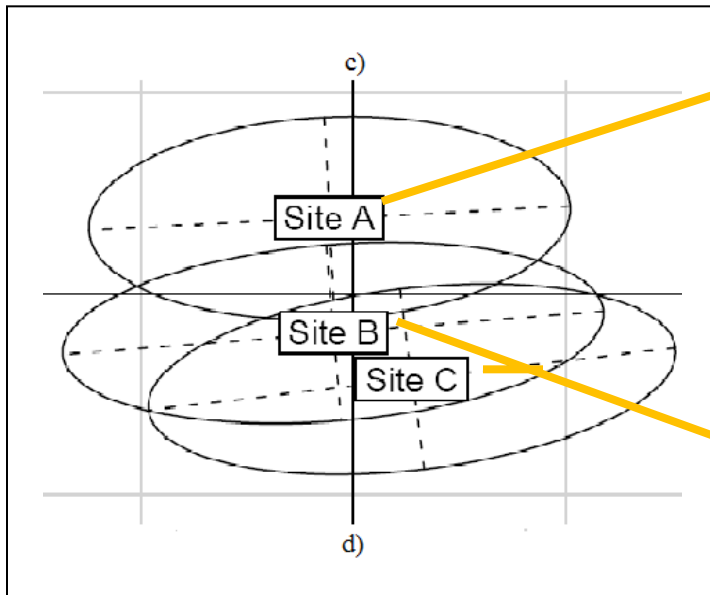


# Work related welfare issues in horses

## Work as a potential source of physical problems ?

### *To work related postures*

*Geometric morphometry reveals chronic differences in the postures of horses led in hand.*



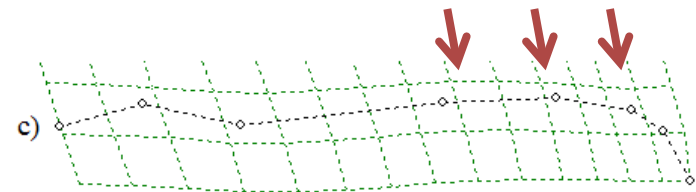
*PCA based on GPA of markers*

X = 1 (59,68%) Y = 2 (19,86%)

*Fureix et al. 2011*

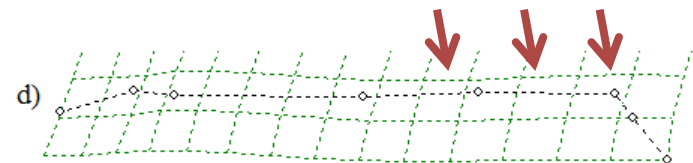
*Some riding school horses were too stiff to obtain neck flexion in De Cartier d'Yves & Odberg's study (2005)*

### *Outdoor living leisure horses*



*A « round » posture*

### *Riding school horses*



*A « flat » posture*



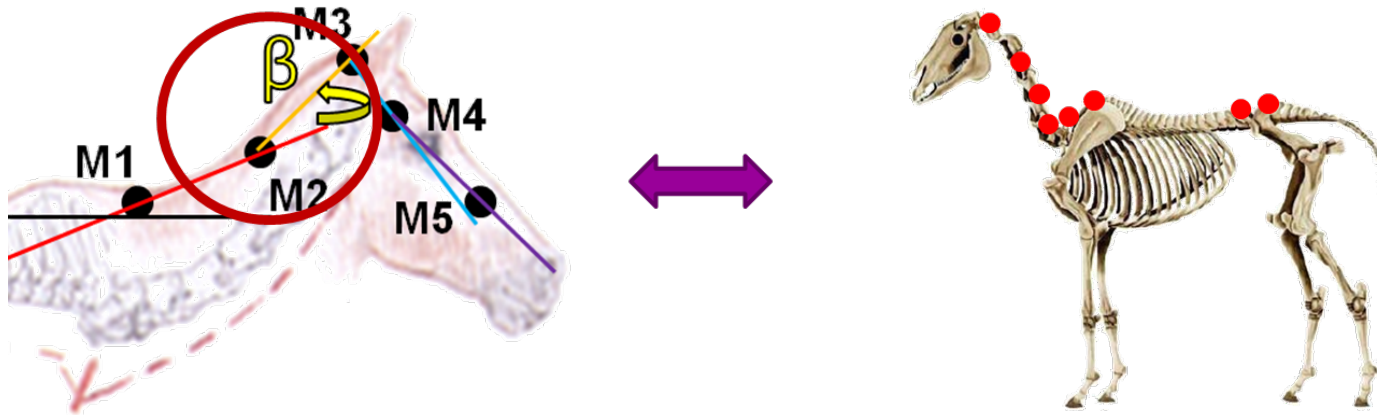
# Work related welfare issues in horses

## Work as a potential source of physical problems

### Are chronic postures indicative of potential back problems?

In humans, low back pain associated with increased muscular tension (s EMG, ...)

In horses, sEMG (Myovision) reveals correlations between neck shape (standing in hand) and muscular tension at rest



Muscular tension (sEMG)

Neck roundness angle beta (here « hollow neck »)	Muscular tension (sEMG)							
	C1	C3	C5	C7	T1	T3	L5	S1
Standing		rs=0.53 p=0.03	rs=0.57 p=0.02		rs=0.57 p=0.02	rs=0.75 p<0.001	rs=0.79 p<0.001	rs=0.54 p=0.03

The more hollow the neck, the more muscular tensions along the spine at rest

# Work related welfare issues in horses

## Work as a potential source of physical problems ?

### Comparison of two populations



Leisure horses



Riding school

Angle  $\beta$   
(negative value  
= round shape)

Standing

sEMG Measures  
(standing)

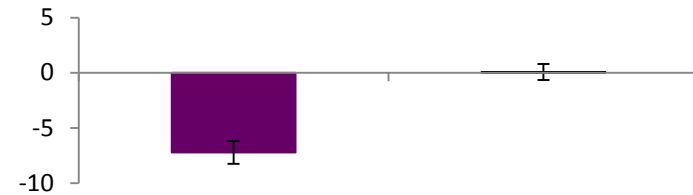
3rd cervical

10th thoracic

5th lumbar

NECK SHAPE

\*\*\*

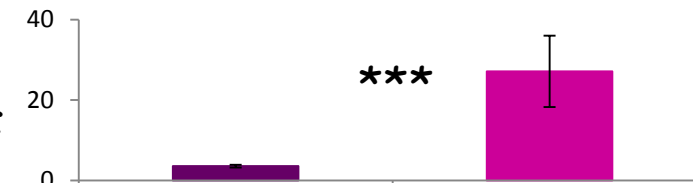


MUSCULAR ACTIVITY

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Leisure Riding school

Lesimple et al, PloS ONE 2012

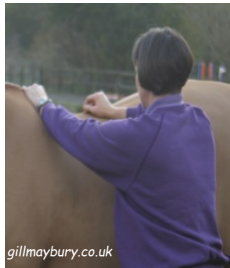
→ Leisure horses have a "rounder" neck shape and lower muscular tension along spine

# Work related welfare issues in horses

## Work as a potential source of physical problems

Are chronic postures indicative of potential back problems?

Neck roundness ( $\beta$  angle) is correlated to evaluations of back disorders  
(practitioners, sEMG: both  $p < 0.01$ )



Lesimple et al PloS ONE 2012



Angle  $\beta < 0$



Angle  $\beta = 0$



Angle  $\beta > 0$

Back problems



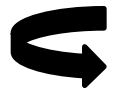
# Work related welfare issues in horses

## Work as a potential source of physical problems

Data show that prevalence of back disorders and chronic postures differ according to work conditions

Pain and psychological stress induce an extension of spine, increased muscular tension at neck or back (e.g. Ridgway & Hartmann 1999)

A survey of owners: N = 791 riding horses



84% show resistance (not slowing)

61% express discomfort

36% have jumping problems (refusals...)

22% show extreme conflict with riders

Multivariate regression shows **impact of saddle type, use of artificial aids (whip, side reins...)** and **time spent by owner outside work** (Hockenhull & Creighton 2012)

**A probable addition of potential inappropriate conformation, poor saddle fitting, and improper riding techniques (Häussler 1997) and repeated stress?**

# Work related welfare issues in horses

## Work as a potential source of physical problems

What about riding techniques: the example of riding schools?



High neck

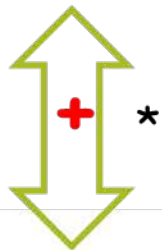


Low neck

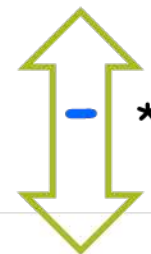
Posture at work  
(beginners' lessons)  
(% of time)

Videorecordings  
(scan sampling / walk)

$R_s = 0.53$



$R_s = -0.50$



No of affected vertebral sites

Spine evaluation  
at rest

(3 practitioners 94 to  
100% agreement)



% of affected  
thoracic vertebrae

Corrélations de Spearman \*  $p < 0,05$ ,

Lesimple et al. PLoS ONE 2010

# Work related welfare issues in horses

## Work as a potential source of physical problems

What about riding techniques? the example of riding schools



*Riding teacher's recommendations*

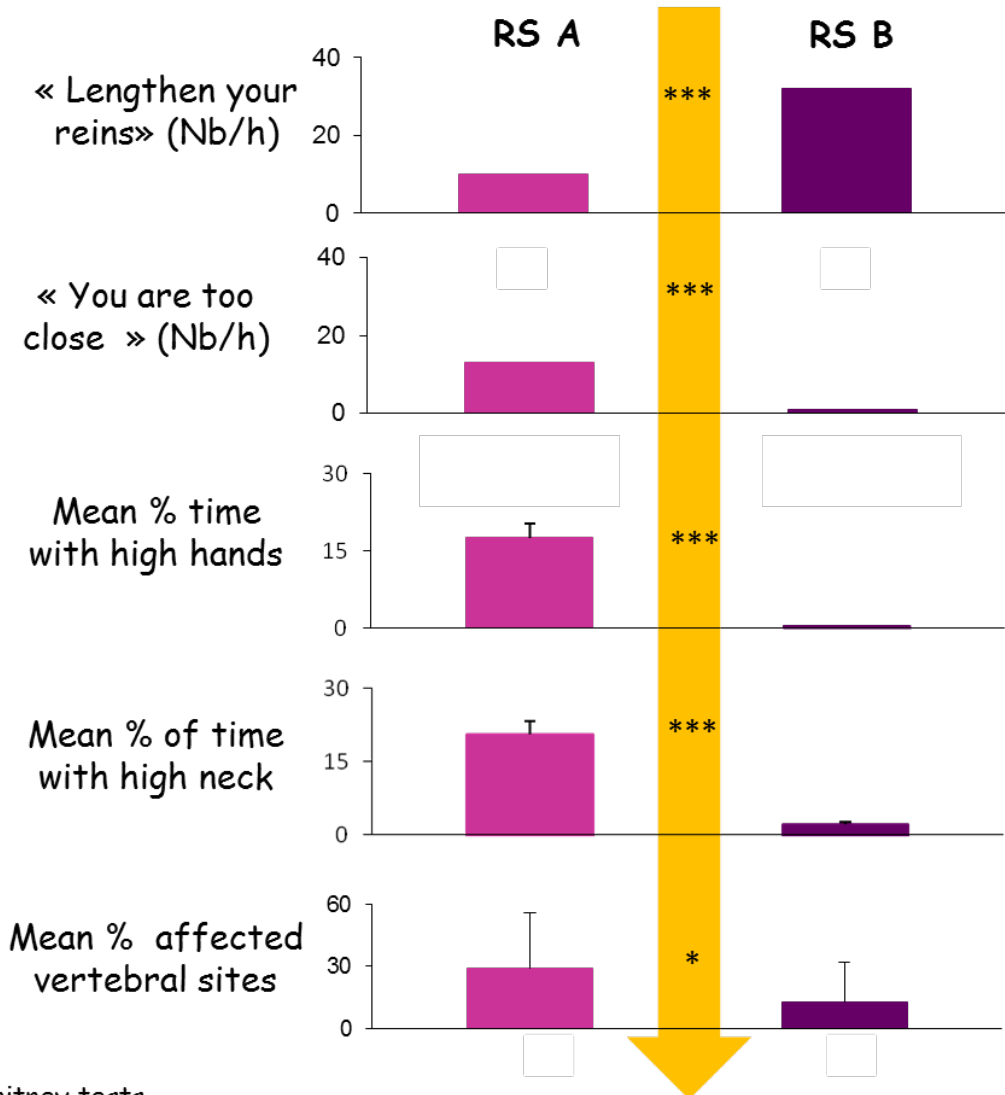
*Beginners' lessons*

*Riders' postures*

*Spearman*  $\updownarrow$   $p < 0.05$

*Horses' postures at work*

*Horses' spine in stall*



Mann Whitney tests  
 $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$

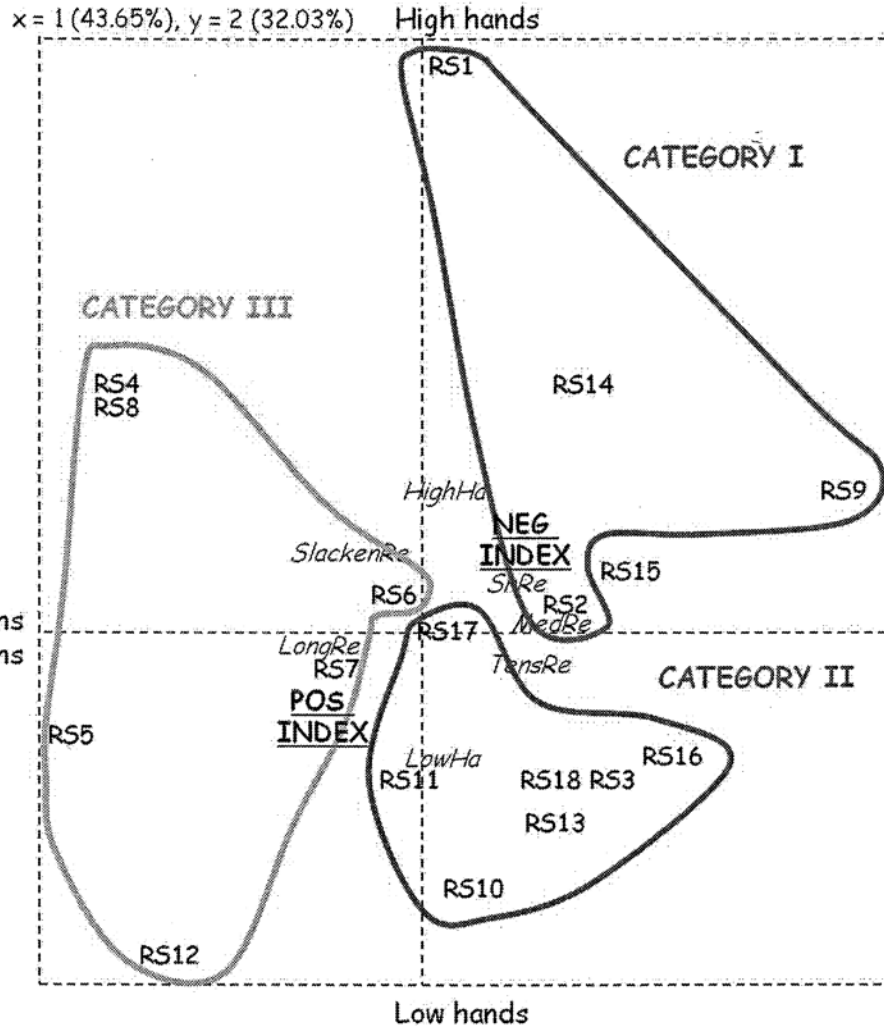


# Work related welfare issues in horses

## Work as a potential source of physical problems

### What about riding techniques? The example of riding schools

N = 139 horse / rider pairs, 18 riding schools, beginners



CATEGORY I



CATEGORY II



CATEGORY III



# Work related welfare issues in horses

## Work as a potential source of physical problems

*Rein tension and hand positions: a universal question?*



*When rein tension induces extreme neck positions, it leads to resistance, and potential chronic pain, hence welfare issues*

*Individual variations in riding style: an intercultural issue*



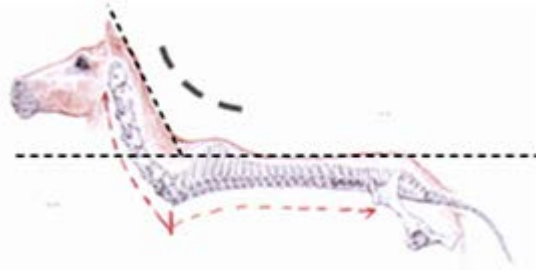
*See also hyperflexion, e.g. Von Borstel 2009*

# Work related welfare issues in horses

## Work as a potential source of "psychological" and hence physical problems

Ex: training task to go backwards with negative versus positive reinforcement:

1) 100% of NR laid their ears back (0% PR), 2) higher heart rate in NR, 3) different neck position when backing

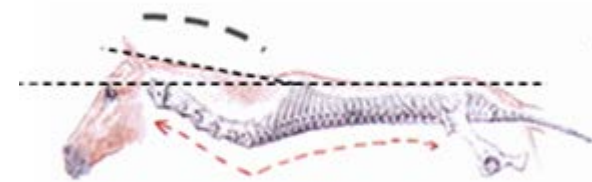


HIGH  
NECK  
( $>45^\circ$ )

PR : 26 %  
NR : 74 %

FLAT/  
HOLLOW  
NECK

PR : 42 %  
NR : 83 %



HORIZ.  
NECK  
( $0 < 45^\circ$ )

PR : 74 %

ROUND  
NECK

PR : 58 %

**Prevalence of negative reinforcement and punishment may create negative emotional states and hence unwished postures: steady headcarriage and roundness reflect calmness and spine welfare** (Warren-Smith & Mc Greevy 2007, Von Borstel et al 2009, Egenwall et al 2012)



# Work related welfare issues in horses

## Behavioural consequences

Does work affect personality (as in humans, Robert et al. 2003) ?

### A multifactorial approach

Experimental tests on 702 horses from 104 sites

2-26 years-old, 3 sexes, 16 breeds

3 genetic factors (sire, breed, sex), -5 environmental factors (type of work, site, number of riders, feeding),

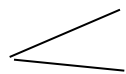
Multivariate analyses



3 major factors: (site, breed, sire:  $p \leq 0.001$ ) but **type of work with a significant impact ( $p=0.0049$ )**

### *Emotionality*

Leisure, harness horses  
Non working (breeding mares, unbroken)



show horses  
(dressage ++)



*Even if same breed and same living conditions*

(Hausberger et al., 2004, 2009)

# Work related welfare issues in horses

## Behavioural consequences

Does work affect personality (as in humans, Robert et al. 2003)  
... and induce behavioural disorders ?

**Higher emotional levels in dressage horses:**

- ↳ conflicting relationships with riders through bit pressure?
- ↳ suppression of the expression of emotion?
- ↳ (further studies) additive effects with selection by trainers?

**And what about behavioural disorders ?**

Stereotypic behaviours:

- more frequent in dressage horses: life conditions or work? (Mc Greevy et al. 1995)
- more frequent in thoroughbreds after first working sessions (Mills et al. 2002)
- increase with working time (Christie et al. 2006)
- more cribbing after round pen work (Whisher et al. 2011)

# Work related welfare issues in horses

## Behavioural consequences

### Abnormal repetitive behaviours: stereotypies



Only in horses living in domestic conditions :  
a variety of stereotypic behaviours have been described (Mills, 2005).

These behaviours have been associated with chronic stress, poor welfare, frustrating situations (Mason et al 2001, Odberg 1976)

Classical examples are :

**Weaving:** obvious lateral movement of head, neck, forequarters and sometimes hindquarters.



**Cribbing and windsucking:** when cribbing, the horse grasps a fixed object with its incisors pulls backwards and draws air into its oesophagus. Windsucking is similar but no object is grasped.



**Box walking:** repetitive tracing of a route within the stable

# Work related welfare issues in horses

## Behavioural consequences

Abnormal behaviours:  
also more discrete abnormal repetitive behaviours (ARB)

⇒ Repetitive licking or grid biting

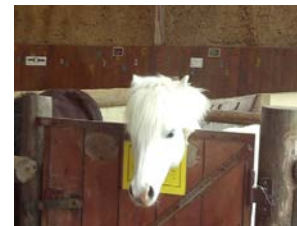


⇒ Lips / tongue repetitive movements



⇒ Complex atypic / functionless behavioural sequences

⇒ Head tossing / nodding



⇒ ... Or even repetitive vacuum chewing





# Work related welfare issues in horses

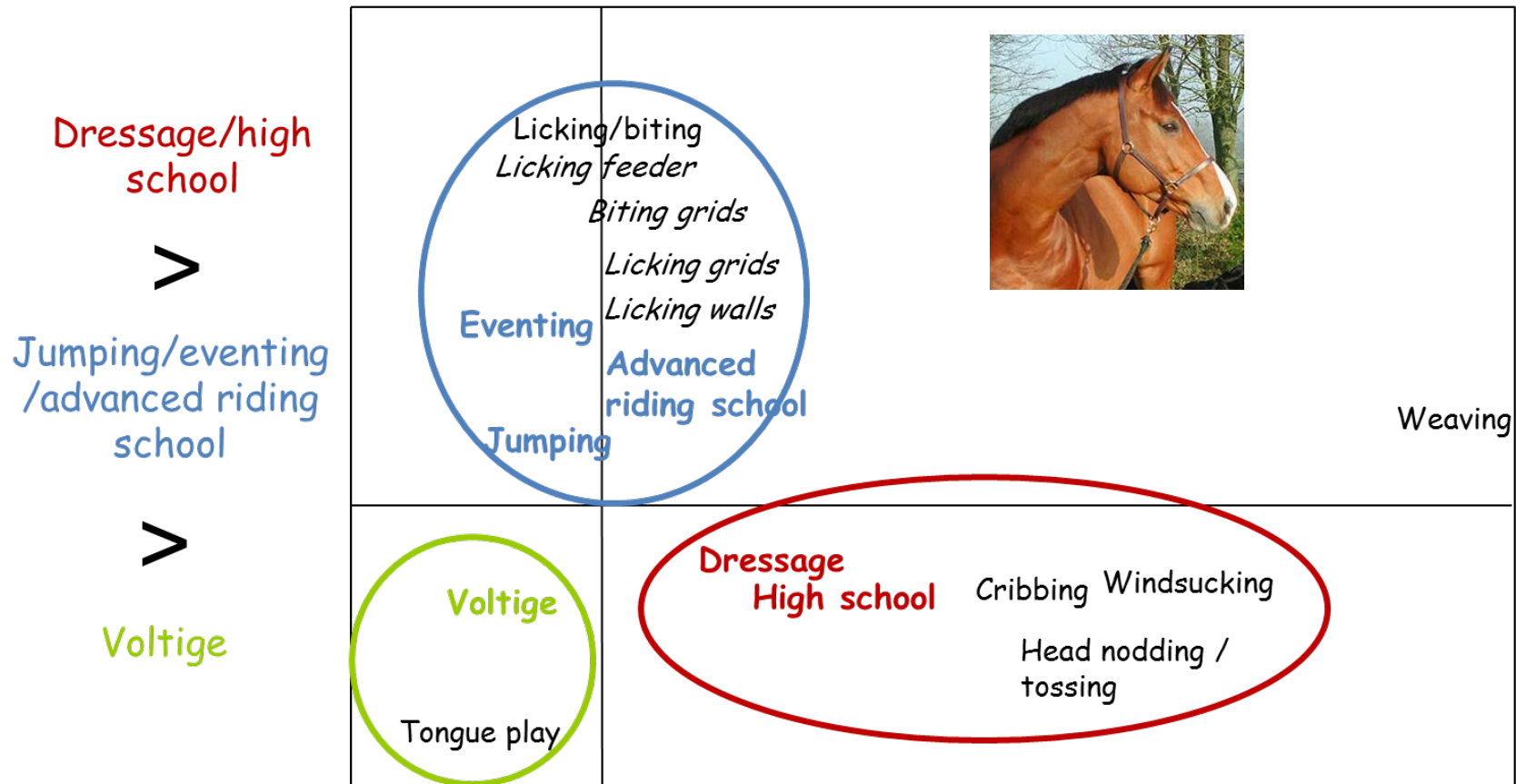
## Behavioural consequences: abnormal behaviours

### Testing the potential impact of the type of work

N = 76 horses, one breed (French saddlebreds), 4 to 15 years-old, one sex (geldings), one hour riding/day (one discipline per horse), one site (= same living conditions)

54' focus/horses, 120 scan samplings, 2 periods : August - November, 14 sessions per horse

X = 1 (31.9%); Y = 2 (26.6%)



# Work related welfare issues in horses

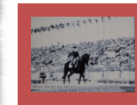
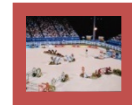
## Behavioural consequences: abnormal behaviours

On the only basis of the prevalence of the different types of stereotypies, three groups emerged, that corresponded to distinct groups of disciplines:

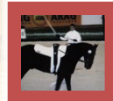
Eventing / advanced riding school  
/ jumping



Dressage / high school



Voltige



# What hypotheses?

## Cribbing, windsucking

ONLY in dressage / high school horses

Traditionally associated with gastric ulceration (e.g. Nicol *et al* 2000, 2002, Bergeron *et al* 2006)

↳ Effect of stress → gastric problems?

Emotional constraints: not allowed to express emotional reactions during work (suppressed emotion = a major problem in humans at work, Hutri & Lindeman, 2002; Mann 2004)

↳ Others ?



# What hypotheses?

Head tossing / nodding  
Tongue play

⇒ More in dressage horses  
More in vaulting horses

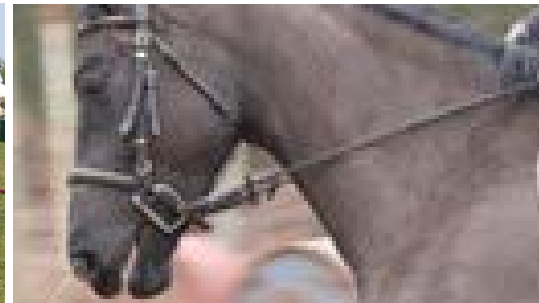
All observed at work, revealing resistance to bit pressure, to riders' actions in general, to reining devices

Obderg (1978): *abnormal behaviours may arise in 3 steps:*

- 1) the individual tries to escape a frustrating/conflicting situation*
- 2) the behaviour becomes automatic during the situation*
- 3) the behaviour emancipates and arises outside the situation, becoming chronic*

↳ Could behavioural reactions at work constraints, that is to acute but repeated situations, become chronic ?

↳ Could tongue play and head movements result from trials to escape chronic pain?





# Work related welfare issues in horses Towards solutions

## Taking the right decisions

*What type of horse (conformation...)?*



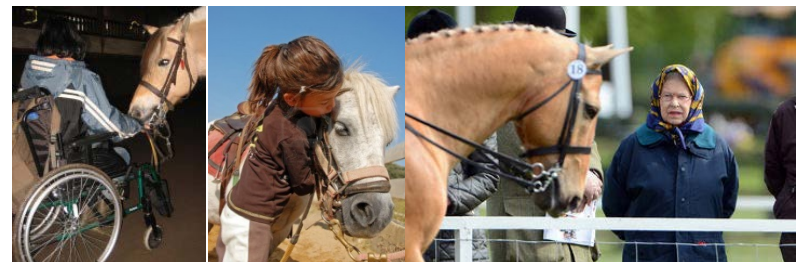
*In which conditions?*



*For what use? With which equipment?*



*For what relation?*



# Work related welfare issues in horses Towards solutions

## Offering the right conditions

-



*Housing*



*Feeding*



*Social conditions*



*Work*



*Relation to humans*



+

*Because psychological and physical wellbeing are related...*

# Work related welfare issues in horses Towards solutions: promoting respectful work



*Diversification of bits: attempts to communicate effectively and/or evidence of failure to achieve this? (Goodwin et al 2009)*



# Thank you for your attention!

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# Work related welfare issues in horses Work as a potential source of physical problems ?

*from « natural » postures (outdoor living leisure horses ) ...*

*Exploratory walk*



*Active walk*



*Standing resting*



*Observation*

