May work alter horse’s welfare?

M. HAUSBERGER, C. LESIMPLE, C. LUNEL & C. FUREIX

Université de Rennes 1/ CNRS
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)

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

Free living Exmoor pony
(27 yr)

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.

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

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)

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 11-18
1) no spondylotic spurs of new bone on the vertebral bodies
2) no impinging dorsal spinous processes
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)
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)
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.

Outdoor living leisure horses

A « round » posture

Riding school horses

A « flat » posture

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)
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 (sEMG, ...)

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

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

<table>
<thead>
<tr>
<th>Neck roundness angle beta (here « hollow neck »)</th>
<th>C1</th>
<th>C3</th>
<th>C5</th>
<th>C7</th>
<th>T1</th>
<th>T3</th>
<th>L5</th>
<th>S1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing</td>
<td>rs=0.53 p=0.03</td>
<td>rs=0.57 p=0.02</td>
<td>rs=0.57 p=0.02</td>
<td>rs=0.75 p&lt;0.001</td>
<td>rs=0.79 p&lt;0.001</td>
<td>rs=0.54 p=0.03</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Work related welfare issues in horses
Work as a potential source of physical problems?

Comparison of two populations

Leisure horses

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

Riding school

$\text{sEMG Measures (standing)}$

$\Rightarrow$ Leisure horses have a “rounder” neck shape and lower muscular tension along spine

NECK SHAPE

Standing

MUSCULAR ACTIVITY

$3rd$ cervical

$10th$ thoracic

$5th$ lumbar

Lesimple et al, PloS ONE 2012
Neck roundness ($\beta$ angle) is correlated to evaluations of back disorders (practitioners, sEMG: both $p<0.01$)

Are chronic postures indicative of potential back problems?

Lesimple et al PLoS ONE 2012
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?

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

Videorecordings
(scan sampling / walk)

**Spine evaluation at rest**
(3 practitioners 94 to 100% agreement)

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

RS A

RS B

« Lengthen your reins » (Nb/h)

« You are too close » (Nb/h)

Mean % time with high hands

Mean % of time with high neck

Mean % affected vertebral sites

Riding teacher’s recommandations

Beginners’lessons

Riders’postures

Spearman $p < 0.05$

Horses’postures at work

Horses’ spine in stall

Mann Whitney tests

$p < 0.05$ $** p < 0.01$ $*** p < 0.001$

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

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

Lesimple et al in prep
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°)
  - PR: 26%
  - NR: 74%

- FLAT/HOLLOW NECK
  - PR: 42%
  - NR: 83%

- HORIZ. NECK (0<45°)
  - PR: 74%

- ROUND NECK
  - PR: 58%

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. Windsuckling is similar but no object is grasped.

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

\[ X = 1 \text{ (31.9%)}; \ Y = 2 \text{ (26.6%)} \]

<table>
<thead>
<tr>
<th>Dressage/high school</th>
<th>Licking/biting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jumping/eventing/advanced riding school</td>
<td>Licking feeder</td>
</tr>
<tr>
<td></td>
<td>Biting grids</td>
</tr>
<tr>
<td></td>
<td>Licking grids</td>
</tr>
<tr>
<td></td>
<td>Licking walls</td>
</tr>
<tr>
<td>Advanced riding school</td>
<td></td>
</tr>
<tr>
<td>Jumping</td>
<td></td>
</tr>
</tbody>
</table>

Eventing

Voltige

Tongue play

Dressage High school

Cribbing Windsucking

Head nodding / tossing

Hausberger et al. 2009
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

Hausberger et al. PloS ONE 2009
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...
Diversification of bits: attempts to communicate effectively and/or evidence of failure to achieve this? (Goodwin et al 2009)
Thank you for your attention!

Acknowledgements

Chiropractors and osteopathic Vet.
H. Menguy
G. Bohn
P. Le Collinet

Collaborators
E. Gautier
C. Muller

Riding Centers
Ecole Nationale d’Équitation

The Caisse Centrale de la Mutualité Sociale Agricole for funding

French Ministry of Research
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

Fureix et al Naturwissenschaften 2011