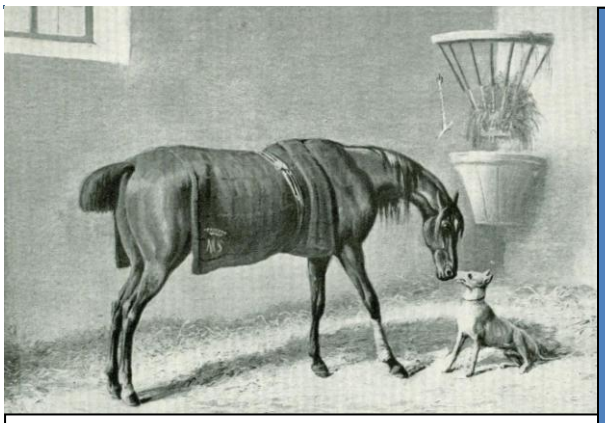
EFTBA Veterinary Newsletter 17



Of the disorders of the musculoskeletal system tendon disorders rank first or second

Business and Ethics of Racing

Part I

October 2015

. Modern risks for the transmission of endemic and exotic infectious diseases force us to reconsider and revise biosecurity measures

. Data bases and screening methods can help identify horses at high risk for injuries

. Early exercise is beneficial for both joint and tendon health and longevity

"Many thanks to Mrs. Eva-Maria Bucher-Haefner, Moyglare Stud Farm, for her valued sponsorship of this newsletter."

Welcome to EFTBA's veterinary newsletter

Dear European breeders,

It is our common goal to work for the future. In the current context of great mediatisation, we should not content to rest on our laurels but continue to question ourselves on potential improvements in our breeding. This is what this EFTBA Newsletter intends to do and we are guided towards different topics aimed to challenge and improve our approach of farm management, prevention of injuries and raising young stock.
We are convinced that the whole industry, and not only veterinarians, could benefit from these in-depth discussions.
Wishing all of you a profitable reading.

Hubert Honoré

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Chairman, EFTBA

Editorial

The idea of a "newsletter" implies the reporting on current affairs and events, and according to a report of Des Leadon, the EFTBA and the European & Mediterranean Horse Racing Authorities (EMHRA) met in Paris at the begin of October. One of the actual topics on the agenda was "Welfare - the ethics of horse production for racing and the usage of that product in the racing industry in an increasingly critical public environment". In this respect it was agreed "that the entire industry needs to document what it does well in terms of horse welfare and to acknowledge areas that require improvement and to begin to work to address these issues". With this newsletter, we already follow these intentions and occupy ourselves with five presentations of the conference "Business and Ethics of Racing" in August in Baden-Baden. Further information will follow.

Hanspeter Meier

Dr Hanspeter Meier

EFTBA veterinary advisor & Newsletter editor

Free Eagle (IRE, 2011) by High Chaparral – Polish Gem (Danehill) bred and owned by Moyglare Stud

Introduction

"Old and unsolved problems and important changes in the conditions of Thoroughbred racing are the foundation for the conference 'Business and ethics of racing and the role of the veterinarian', discussing both the future of racing and the position of the veterinarian within the system." These were words of welcome of Dr. Hans D. Lauk, the organizer of this forum and editor of the publication 'Pferdeheilkunde/Equine Medicine'. In accordance with these targets, the conference dealt with considerations on strategic analysis and planning of racing today and in the future, veterinary subjects, ethics, genomics, nutrition and the role of the veterinarian.
In this issue, medical information is supplied and we hope the themes find your interest. - It is very satisfying to notice that modern science proves common sense and empirical convictions.

Presentations on veterinary subjects
(summarized abstracts)

- Farm Management
- Prevention of injuries
- Raising young stock

Farm Management

Biosecurity on stud farms
Harald Sieme, University of Hanover

Prof. Sieme, one of the members of the EFTBA veterinary advisory committee as well, stated that the modern risks for the transmission of endemic and exotic infectious diseases force us to reconsider and revise biosecurity measures - to the benefit of both the health and welfare of the horse and the economy of our industry.
With greater global traffic in animals and potential insect vectors due to world-wide climatic changes, the risks of transmission of infectious pathogens become more likely and the need to urge vigilance by all horsemen remains very important. He illustrated this with several outbreaks in the last 20 years as e.g. Hendra Virus in Australia, West Nile Virus in North America, Equine Viral Arteritis in New Mexico and Utah (US), Influenza in Australia, the importation of EIA positive horses from Romania into other EU states and the officially confirmed case of Glanders in Germany.

Biosecurity can be defined as all hygienic practices and measures designed to prevent the occurrence of infectious disease. It includes hygienic practices designed to prevent the occurrence of contagious diseases – e.g.:
- preventing the introduction of infectious agents,
- controlling the spread within populations or premises, and
- the containment or disinfection of infectious materials.

Veterinarians take a leading role in improving the state of equine infection control and biosecurity in equine breeding and training facilities, veterinary hospitals, and any place where horses join from multiple locations. All personnel involved (owners, technicians, and caretakers) must understand the implications, share the responsibilities, and implement specific management procedures.

Fig. 1 Luckily, terms relating to "disinfection" can even be understood by a Swiss in Turkey (on the occasion of an invitation for EFTBA-members 2010)

Communication with and education of all personnel on infectious disease control measures is mandatory.
Properly implemented biosecurity measures, codes of practice respectively, are desperately needed before an outbreak happens.
Regularly reviewed and updated measures require solid training in periodical intervals.

Basic principles to control infectious disease include:
- understanding the clinical signs and epidemiology of infectious disease and route of pathogen transmission,
- assessing of exposure risk and subsequent grouping of horses,
- daily monitoring,
- realizing proper hygiene and disinfection protocols,
- advising the horse community and
- having a contingency plan in place.

On stud farms infectious disease control measures should include the segregation of horses into small groups based on age, use and gestational time. This measure may not eliminate infectious diseases in horses but may limit the severity of the problem by minimizing the number of affected animals.
Boarding studs should provide functionally adequate stalls/barns – ideally separate quarantine facilities – where new arrivals are kept in individual stalls with no direct contact to other horses. Each horse should be considered at risk and handled like a single unit. Obligatory prequarantine testing and documentation must escort new arrivals.
Copies of the **vaccination and health maintenance record** should accompany any horses arriving or being moved. Horses should be appropriately vaccinated no later than 1 month before entering or leaving. The health status of such horses needs to be assessed and possibly recorded daily.
Strategic testing of biological samples collected from high risk horses on admission and at regular intervals during the entire quarantine could be an effective prophylactic measure to minimize spread.
If equipment is shared between horses, it should be cleaned and disinfected after every individual use. Movement of horses and staff should be reduced as far as possible.
Major principles of biosecurity in case of an outbreak are daily monitoring of horses, hand hygiene, personnel protective equipment (coveralls, disposable gloves, dedicated clothing and foot wear), and disinfection (foot bath etc.). Thorough cleaning of surfaces always precedes disinfection. Even the best disinfectants are less effective in the presence of organic matter. Thus, it is necessary to use a disinfectant that has activity in the presence of organic materials such as phenolics or an accelerated hydrogen peroxide product. All products should be used in accordance with the manufacturer's recommendations and label instructions. All staff of the affected premises must be familiar with the specifics of infection control for gastrointestinal, respiratory, and venereal pathogens. The time at which a horse may return to the normal farm population without being a source of infection and a source of contamination will vary with the infectious agent involved.
To minimize the risk of disease introduction at a breeding facility, the following steps should be undertaken:
- examine all new horses on arrival for signs consistent with a contagious disease;
- determine the status of the stallion/mare for selected infections prior to use; - separate new arrivals from resident horses;
- monitor horses daily for signs of infectious diseases;
- use hygienic procedures during breeding;
- properly clean and store breeding equipment, increase cleanliness at breeding facility (Fig. 2).

Fig. 2 Individual twitches in a breeding shed

Stud managers should use **Guidelines/Codes** as an important part of their biosecurity policy:
- Codes of Practice of the Horserace Betting Levy Board with a wealth of useful advice and guidance (available by www.hblb.org.uk).
- www.beva.org.uk/uploads/documents/ai-biosecurity-protocols.pdf
- www.lwk-niedersachsen.de/index.cfm/portal/tier/nav/228/article/15206.html).

Prevention of racing injuries

Using databases to predict risk

Tim Parkin, University of Glasgow

The long-term aims of this area of work are, first, to quantify the risk of fatal and non-fatal injury for individual horses on entering a race. Secondly, to develop automated start entry risk indicators. In conjunction with software developers, these investigations hopefully will allow the identification of horses at particular risk for injuries.
The **Equine Injury Database** contains information on flat racing injuries of Thoroughbreds from racetracks across North America and was officially launched by The Jockey Club in 2008.
Models that predict the probability of a horse sustaining a fatal injury prior to a race were developed.

Based on the risk factor analysis, more than 20 factors have been identified that were consistently found to be significantly associated with fatal injury across the final multi-variable models.
The risk factors identified are related to the horse, the trainer, the race, the horse's expected performance and the horse's racing history. For example:
- horses running on a dirt course are at 41% higher risk than those running on a synthetic course;
- horses are at 54% higher risk per additional unit of purse-to-claiming-price ratio;
- horses are at 8% higher risk for each start they had between three and six months prior to the race;
- the longer a horse remains with the same trainer the lower is the risk by 1.6% per month.
Correctly identifying the risk factors associated with horseracing injuries and accurately measuring their significance could help design future intervention strategies to decrease the risk of sustaining a fatal injury in the equine flat horse racing population.
Additionally, the results obtained from our predictive models could help identify horses at high risk when entering a race and inform the design and implementation of preventive measures aimed at minimizing the number of Thoroughbreds sustaining fatal injuries during racing in North America.
However, with predictive abilities in the region of 0.65, further work is required before these models can be used 'in the field'. There are several aspects of data that are currently not available to us and therefore not contributing to these models. Most notable perhaps is the fact that we do not have access to medical or training records.

Unravelling the relationship between subchondral pathology and catastrophic fracture

Tim Parkin, University of Glasgow

This paper reports the findings of one aspect of an Horserace Betting Levy Board (HBLB) funded study **investigating geometric, structural and pathological features of the distal third metacarpus** (MCIII, cannon bone) that are associated with **lateral condylar fracture**. Here we focus on the findings relating to structural changes that may increase the risk of this fracture. **Condylar fractures** of the third metacarpus/metatarsus (MC/TIII) are the **most common reason for euthanasia on UK racecourses**. They are associated with 45% of all fatal distal limb fractures that occur during racing in the UK. In the USA, condylar fractures are the second most common site of catastrophic fracture. A reduction in the likelihood of this specific type of fracture would therefore have a significant global impact on the number of Thoroughbred racehorses subject to euthanasia as a result of injury incurred during racing.
The aim of this part of the wider study was to identify differences in subchondral bone (SCB) and cartilage thickness that may be associated with lateral condylar fracture and to investigate if these differences could be used to predict this risk (Fig. 3).

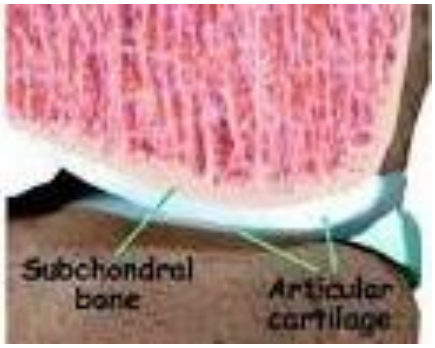

Fig. 3 Diagrammatic view of a joint, depicting the investigated structures 'subchondral bone' (SCB) and the adjoining 'articular cartilage'.

Material and Method: Third metacarpal bones from an archive of material accumulated during two previous HBLB funded projects were used during these investigations. A total of 47 pairs of MCIIIs from horses that sustained lateral condylar fracture of one bone during racing were compared with 49 pairs of bones from horses that died or were subject to euthanasia for reasons unrelated to limb injury.
Magnetic resonance imaging was performed and the thickness of hyaline cartilage and subchondral bone was measured at fourteen fixed sites; seven sites in two planes were used. A number of statistical analyses were performed in order to identify if structural changes associated with lateral condylar fracture were present at the level of the horse or the level of the bone.
Results: Compared to bones from horses that had not sustained a fracture there was a significant increase in SCB thickness proximal to the lateral parasagittal groove in both fractured bones and non-fractured bones from case horses. Analysis indicated that, at an optimal cut off of SCB thickness of 1.6 cm, 90% of bones were correctly classified as fractured or not fractured. Using this cut off, the positive predictive value for the correct identification of fractured bones, in this population, was 83%.
Discussion: These results indicate that bone level markers for lateral condylar fracture of MCIII are present. The thickness of the SCB proximal to the lateral parasagittal groove is significantly greater in

fractured bones than in bones from horses without fracture. Identification of markers such as these, that can be detected using MRI, suggests that reliable screening methods for fracture risk may be developed. The potential value of MRI as a screening tool for fracture risk, using this and other markers currently being investigated, will be the focus of future analyses. The routine use of such screening tools would enable the introduction of interventions, such as alterations to training regimens based on known risk factors for lateral condylar fracture, that may reduce the likelihood of fracture in susceptible horses.

Raising young stock

The following two studies from the Netherlands (Prof. van Weeren) deal with the subject of exercising young horses. We discussed this subject also in our newsletters 9-11 (2013 & 14). The results of the Dutch investigations support our views of the positive effect of early exercise for racehorses.

Early exercise: beneficial or detrimental for joint health and longevity ?

P. René van Weeren, University of Utrecht

Joint disorders rank among the primary causes for wastage in racehorses. The poor long-term prognosis of joint problems is strongly related to the largely immutable character of articular cartilage due to the extremely long turnover time (of hundreds of years !) of collagen type II that forms the backbone of cartilage extracellular matrix, making repair difficult. These turnover times apply to mature individuals, but not to young, still growing horses in which there is an active process of continuous remodelling and maturing.
Early exercise will theoretically influence this process and hence affect eventual cartilage quality and thus vulnerability to injury. There are now data that this is true indeed.

Due to anatomical and geometric particularities, joints are not loaded evenly over their surface. These variable loading conditions can only adequately be met by cartilage that possesses different mechanical properties in different sites and hence features different biochemical and ultrastructural characteristics (or 'topographical heterogeneity'). This heterogeneity is for the larger part not present at birth, but develops after birth during the early juvenile period. The changes during early life occur in a structural sense as well.
This transition from a blank, neonatal joint to the mature joint featuring topographical heterogeneity is driven by biomechanical loading. In this study 3 groups of foals were exercised differently from age one week onwards. One group was kept in box stalls for 24 hours per day; another one in identical box stalls, but additionally subjected to short bouts of exercise; the third group had free pasture exercise. The exercise regimens were maintained until weaning at 5 months of age when 24 foals were euthanized and the remaining 19 subjected to a moderate exercise regimen, followed by euthanasia at 11 months.
Topographical heterogeneity developed in the pastured group and in the boxed/sprinted group alike, but failed to develop in the boxed foals. This was direct proof of the steering effect of biomechanical loading.
The most interesting observation was that, where proteoglycans and other factors such as subchondral bone density became normal after the common training programme from 5 to 11 months, collagen parameters remained abnormal. Therefore, **for collagen there seems to be a limited window in time when the process of functional adaptation can take place**.
There is growing evidence that exercise in early life has a moulding influence on the extracellular matrix of articular cartilage. **Withholding exercise during this early juvenile period will result in retardation of the normal development.**
Thus far, free pasture exercise comes out best and it can now be stated that **foals should always be raised in a way that they are subjected to a workload that is at least equal to what they would be having if moving freely at pasture**.
Scientific evidence so far supports encouragement rather than discouragement of early training in racehorses.

Will early exercise strengthen or weaken the equine tendon ?

P. René van Weeren, University of Utrecht

The responsiveness of certain musculoskeletal tissues and especially bone to exercise, also in mature individuals, has been known for long. Bone is not a homogeneous tissue with respect to biochemical composition and structure, but adapts to the amount and direction of the loads it is subjected to. This principle, known as Wolff's law, was discovered more than a century ago (Wolff 1892). The insight

that this principle applies to more tissues than bone alone, is from a much more recent date.

Of the disorders of the musculoskeletal system, tendon disorders rank first or second to articular cartilage problems, depending on breed or equestrian activity involved. The effect of exercise on tendons depends on the type of tendon involved. It has been shown in pigs that exercise led to an increase in cross-sectional area (CSA) in extensor tendons, but not in energy-storing flexor tendons. There may be a good biological reason behind this: if the CSA of flexor tendons would increase considerably with unchanged material properties, this would imply an increase in stiffness and hence a decrease in elasticity. There are some indications, however, that **the exercise level may affect the development of the flexor tendons in the early juvenile period too**. It was found that free exercising foals had a larger CSA of the superficial digital flexor tendon (SDFT) and the tendons ruptured at a higher load with less tissue stiffness than in foals raised with limited exercise. There were also differences in collagen fibril diameter distribution and biochemical composition with higher cellularity and higher levels of polysulphated glycosamino-glycans (PSGAG) and hyaluronic acid (HA) in free exercising foals compared to box-rested foals. Interestingly, when after 5 months the foals from the different exercise groups were combined in a single group that was subjected to a moderate exercise regimen, at 11 months the differences between foals that had been box-rested respectively pastured during the first 5 months had disappeared. However, animals that had originally been subjected to the combination of box-rest and heavy exercise showed a significantly lower PSGAG/DNA ratio, which was interpreted as a negative long-term effect of that specific exercise regimen.

There is growing evidence that **exercise in early life has a moulding influence on the extracellular matrix of musculoskeletal tissues, including tendons**. The analogy between articular cartilage and tendons is great, both with respect to their basic composition (a collagen structure with interspersed proteoglycan aggregates), their relative immutability in mature individuals, and their response to early exercise. One of the few epidemiological studies on the issue has indicated that animals taken into training or racing early enjoy better musculoskeletal health and have better longevity than horses starting their careers later.
There are good reasons to answer the question "Should equine athletes commence training during skeletal development ?" in an affirmative way.

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See also: www.hippiatrika.com

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