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HEMANGIOSARCOMA OF ORAL CAVITY IN A WORKING HORSE IN INDIA

Introduction
Development of an oral mass in an equine may adversely affect the animal’s work capacity and/or welfare depending on clinical progression.

Case presentation
A 6-year old stallion presented to the Brooke Hospital unit (India) for a gingival cricket ball-sized mass between the right maxillary canine (104) and second premolar (106), which was noted by the owner to be visibly increasing in size on a daily basis. Feeding induced discomfort and bleeding from the mass. The aim of this study was to identify the nature of the mass and to provide suitable resolution of the problem.

Management and outcome
With owner consent, surgical removal of the mass was performed. The surgery was performed under general anaesthesia, induced via Ketamine @2.2 mg/kg & Xylazine at 1.1 mg/kg IV. Upon removal, the mass was sent for histopathological examination to the Indian Veterinary Research Institute. Based on key histopathological features the mass was diagnosed as hemangiosarcoma. On re-examination four weeks post-excision, recurrence of the mass was noted at the surgical site. Based on poor prognosis for the animal’s welfare and work capacity, the stallion was euthanised.

Discussion
Hemangiosarcoma is a malignant and aggressive tumour which is prone to metastasis even after aggressive surgical management in a developed country context. The time interval between finding the initial lesion and euthanasia has been reported in horses to be on average about 18 months1. In a developing country, given the speed of regrowth following excision, the challenging location for achieving wide excision margins and the limited resource context, euthanasia was selected as the most realistic animal welfare based option.

References
EVALUATION OF BLOOD CULTURE RESULTS AND SURVIVAL IN COMPROMISED NEONATAL FOALS IN THE CZECH REPUBLIC.

Introduction
The aim of this study was to evaluate the blood culture results, sepsis score and additional clinical and clinico-pathological data and survival rate of neonatal foals admitted to the intensive care unit in the Brno Equine clinic. The presented study is the first one in the Czech Republic that is dealing with the results of blood culture together with survival of septic newborn foals.

Material and Methods
Neonatal foals (n=41) that were hospitalised at the Equine Clinic in Brno during the past two years were examined. Clinical and clinico-pathological data were recorded and sepsis scores were calculated.

Results
The blood culture was positive in 14 out of 41 foals, 13 different bacterial species were cultured. Out of 14 foals, in five gram-positive bacteria and in seven gram-negative bacteria were cultured. Two foals had a mixed bacterial population. Antibiotics were administered in 26 foals at the day of admission and during their hospitalization. Seventeen foals received penicilline in combination with an aminoglycoside, four foals received potentiated sulfonamides, four foals received 4th generation cephalosporins alone or in combination with metronidazole and one foal received a cocktail of penicilline, metronidazole and marbofloxacine. In 14 foals with a positive blood culture result an antibiogram was made. In 27 out of 41 foals, a sepsis score ≥ 11 was established. Sepsis was diagnosed in 28 out of 41 foals. Seventeen out of 19 septic foals (89.47 %) died or were euthanized and two out of 22 non-septic foals (9.09 %) were euthanized. Survival rate is significantly higher in the group of non-septic foals when compared to the group of foals with sepsis (p<0.033).

Conclusion
By performance of blood culture we confirmed the increasing trend of gram-positive infection in compromised newborn foals. Even within the Equine Clinic, the most common cause of death in newborn foals was sepsis. Percentage of non-surviving septic foals is unfortunately high. Sadly, these foals are quite often admitted to the clinic in a state of advanced sepsis or even septic shock.

The results of this study have significant implications for antibiotic policy for in-patient care and recommendations for equine field practice in the Czech Republic.
EFFECTS OF GENTAMICIN ON THE MOTILITY OF STALLION SPERMATOZOA AND MICROBIAL CONTAMINATION OF STALLION SEMEN

Introduction
Antibiotics are used as a standard component of seminal extenders. The objective of this study was to assess the effect of gentamicin on sperm motility and on bacterial growth during storage.

Material and Methods
In this study the first ejaculates of the day from 13 stallions were used. Sperm motility was observed immediately after collection. Semen samples were diluted with commercial extender (EquiPro® Minitube, Germany) without antibiotics and divided into part A, in which gentamicin was added (1g/l) and part B – without the antibiotics. Semen was stored at 4°C, after 6, 12, 24 and 48 hours of storage motility was determined and bacterial culture was done. For aerobic cultivation (Columbia agar with 5% sheep blood, Oxoid™, United Kingdom) samples were diluted 10x to 10 000x for quantification of microorganisms. The results were checked after 24 and 48 hours. Colony types were identified using MALDI Biotyper.

Results
There was a significant (p<0,05) negative effect of gentamicin on sperm motility at 6 and 24 hours after collection. From the 26 separately cultured samples, 32 types of bacteria were isolated, which were identified with MALDI Biotyper as commensals or bacteria from environmental contamination. The most commonly observed were families Staphylococeae and Micrococcacaeae. In samples without gentamicin there was a significantly (p<0,01) higher count of microorganisms at all culture time points. Dynamics of bacterial growth showed changes during 48 hours of storage: There was a significant decrease over time in the total count of microorganisms in samples with (p<0,01) but also without (P<0,05) antibiotics.

Conclusion
In line with other studies1,2, we confirmed the negative effect of gentamicin on sperm motility. On the other hand, adding the gentamicin significantly decreases bacterial contamination of insemination doses during cooled storage. However, the total count of bacteria decreases during storage, also in samples without gentamicin. Since there were no pathogens identified in ejaculates, it is worth reconsidering whether it is necessary to use gentamicin, especially in stallions with sperm motility problems.

References

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ABSTRACTS | EUROPEAN VETERINARY CONFERENCE VOORJAARSDAGEN 2013

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OCULAR SQUAMOUS CELL CARCINOMA IN A WORKING HORSE IN INDIA

Introduction
Neoplastic adnexal disease represents one of the most frequently encountered and therapeutically challenging ophthalmic problems of horses.

Case presentation
A six-year-old bay stallion with a mass on the medial canthus of the left eye was presented to the Brooke clinic in Kanpur, Uttar Pradesh. The owner reported that the mass was increasing in size daily. The mass caused obstruction of normal vision, irritation of corneal surface and discomfort due to gravitational forces. Consequently, the stallion had become anorectic, leading to progressive weight loss and reduced body condition. The tumor was diagnosed as ocular Squamous Cell Carcinoma (SCC) based on clinical history, symptoms and location.

Management and outcome
The cricket ball-sized (circumference 22 cm) mass was surgically excised under standing sedation with xylazine (1.1 mg/kg) and butorphanol tartrate (0.02 mg/kg). After three weeks, the mass recurred. Following the same procedure, the mass was excised adjunct with ampicillin-Cloxacillin (10 mg/kg IV) and combined with immunotherapy, comprising 3 consecutive shots of BCG (Bacilli Calmette Guerin) vaccine injected (1 ml) locally in the remnant of the mass at intervals of one week. Dexamethasone (0.5 mg/kg IV) was injected at the time of administration of each BCG injection to minimise risk of anaphylactic shock. Eight (8) weeks following the second excision no regrowth was noted and all surgical wounds had healed.

Discussion
SCC can appear anywhere on the body but in equines they are most often located in non-pigmented skin near muco-cutaneous junctions such as seen on the eye lids, vulva, or penis. Use of BCG-based immunotherapy in cases of equine sarcoid has been widely reported but few reports relating to successful treatment of SCC have been identified.

References

Images of Ocular Squamous Cell Carcinoma in a working horse

Fig.1 Squamous cell carcinoma at medial canthus of eye
Fig.2 Recurrence of tumour
Fig.3 & 4 BCG Injections in tumour lesion
Fig.5 Recovered animal
WEST NILE VIRUS – AN UPCOMING THREAT FROM THE SOUTH OF EUROPE

West Nile Virus (WNV) is an emergent pathogen of different species including horses and humans as incidental hosts. Horses are particularly susceptible to West Nile virus (WNV) infection showing clinical signs of acute encephalomyelitis, such as ataxia, rear limb paresis, muscle tremors and fasciculation, and recumbency. Although 80% of affected horses recover in 3–4 weeks, a small proportion may suffer from persistent neurological deficiency. The disease can also follow a fatal course and the mortality rate in recumbent horses can reach up to 60%. In the past few years WNV became endemic in Southern European countries from Greece to Spain(1,2).

In Croatia, between 2010 and 2012, seroprevalence of WNV infection in horses, on a state level, was 3.43%. Seroprevalence was declining from the eastern to the western part of the country during the years 2010 and 2011, which clearly illustrates the rapid spread(3).

During 2012, 1472 equine serum samples were collected from randomly selected healthy horses with no signs of clinical disease reported in the last 6 months. Animals were from six Croatian counties with the highest seroprevalence of WNV infection in 2010 and 2011. All samples were evaluated for IgG and IgM antibodies to West nile virus (WNV) by commercial ELISA tests (West Nile Competition Screening test; iD Screen® West Nile IgM Capture, ID.VET, Montpellier, France).

The results showed that IgG seroprevalence was significantly higher compared with the past season in four eastern counties. For the first time in Croatia, acute infections were confirmed in 12 horses (IgM positive). Furthermore, in the 2012 season for the first time clinical cases of WNV infection in humans were confirmed. Important to note is that clinical cases of neuroinvasive disease in humans were reported in the same area where increased viral activity in horses was encountered.

These results and epidemiological data from neighboring countries, confirmed an increase of viral activity in this part of Europe. Despite relatively low numbers of clinical cases in horses in Europe, further spread of WNV infection to the western European countries can be expected. Moreover, it can be expected that by the introduction of such a pathogen to a naïve horse population a clear increase of clinical cases can manifest itself.

With confirmed endemisation and significantly increased viral activity in Southern Europe and highly probable spread to the rest of Europe, WNV represents an important emergent and zoonotic pathogen and the need for a surveillance program to be implemented in all European countries becomes urgent. WNV infection therefore should be kept in mind in differential diagnosis of horses presented with neurological signs.

References
THE IMPACT OF SOCIAL MEDIA ON THE PUBLIC PERCEPTION OF AN OUTBREAK OF EQUINE HERPES MYELOENCEPHALOPATHY (EHM) IN THE NETHERLANDS IN 2012

Introduction
Outbreaks of EHV-1-associated myeloencephalopathy (EHM) are rare but occur worldwide. They may create considerable concern amongst horse owners and even the general public.

Materials and methods
Relatively large EHM-outbreaks occurred on two premises in the Netherlands in February 2012. The two outbreaks were epidemiologically connected as horses moved between the two facilities (Stable A and Stable B) on a weekly basis for riding lessons. A third case of EHM was confirmed in a geographically divergent location (Stable C) in a horse with a history of indirect contact with one of the horses of Stable B. A fourth case of EHM was confirmed in another stable without an apparent connection to the other outbreaks.

Results
On premises A and B most of the horses developed fever and about 25% of the horses developed neurologic signs consistent with EHM. Several horses had to be euthanized. Nasal swabs and EDTA-blood samples were EHV-1 positive by real-time PCR. Both premises were locked down. The EHV-1 strain was characterised by allele-specific PCR as the classical N752-strain. Although the number of outbreaks was limited and not significantly different from the normal EHM incidence in the Netherlands over the last 15 years, a media hype developed on radio, television, Facebook, Twitter, and other discussion platforms. Questions in Parliament arose whether EHM should become a notifiable disease. Regional and national competitions were cancelled.

Conclusion
Although the premises were locked-down immediately a media hype still developed.
VARIATIONS IN BIOMECHANICAL TENDON TISSUE PROPERTIES BETWEEN DIFFERENT HORSE BREEDS

Introduction
For ages humans have selected modern horse breeds for their locomotor capacities and presumably also their tissue properties developed concurrently. Given this background, the aim of this study was to compare tendon tissue properties between breeds biomechanically.

Materials and methods
For this purpose, the superficial digital flexor (SDft) and common digital extensor (CDEt) tendons of a group of middle-aged Friesian (FH, n=12), Warmblood (WB, n=12) and Thoroughbred horses (TB, n=8) were harvested and tested for their biomechanical tendon properties. This testing included Maximal Load (N), Ultimate Strain (%), Ultimate Stress (MPa), Elastic Modulus (MPa) and Cross Sectional Area (CSA, mm²). These tendon samples were tested to failure using a hydraulic testing machine. The Elastic Modulus was calculated dividing Ultimate Stress by Ultimate Strain. The cross-sectional area was measured using a mold, dental impression paste, digital photography and computerized image analysis. A one factor, repeated measurement GLM model was used to test for a significant breed difference at a level of p<0.05.

Results
It appeared that the SDft maximal load and ultimate strain were significantly different between FH and WB (p<0.05), while its modulus differed significantly between WB and TB (p<0.05). For the CDEt, the CSA in WB was larger than that of the other breeds, although this was not significant. Remarkably, at failure, the FH tendons seemed to stretch more than acutely break, as was observed in the TB tendons. Moreover, in nearly half of the FH samples, tendons only ruptured on the outer side, leaving the inner, axially located fibers overstretched only.

Conclusions
In conclusion, indeed there appear to be significant differences in tendon tissue properties between different breeds, possibly related to their intended locomotor performance. This could be a result of different genetic selection, but this definitely also needs further biochemical analysis as well as a genomic confirmation.
Adipose-Derived Mesenchymal Stem Cells in a Hyaluronic-Based Scaffold for Treatment of Osteoarthritis in Horses.

Introduction
Adipose-derived mesenchymal stem cells (ASC) make an ideal cell type for the regenerative treatment of osteoarthritis (OA) (1–3). Direct injection of stem cells for cartilage defects has seen success in animal models (2–4), but scaffolds for pre-differentiation and delivery have proven to increase efficacy of stem cell therapy (5–7). To treat subchondral cartilage defects without surgery a hyaluronic-acid scaffold containing ASC was developed and tested.

Materials and methods
From the horse’s own fat-tissue ASC were isolated and expanded in vitro. At passage two ASC were seeded in an ‘in situ’ cross-linkable hyaluronic acid hydrogel with chondrogenic growth factors and cultured for one week. MSC (control) and cell-laden hydrogels were characterized for stem cell properties (proliferation, chondrogenic differentiation, viability and cell surface markers). Experiments were carried out in triplicate and statistically analyzed by t-test. In addition, ten horses with OA were treated with the test product while a control group received hyaluronic acid only. Stem cells without scaffold have been tested before (unpublished data) but with undesirable results. Effects were measured after three and six months and compared to 24 hours before treatment; data were analyzed by ANOVA.

Results and conclusions
In vitro ASC in our hydrogel formulation were viable, promoted proliferation and retained stem cell properties (CD29+CD44+CD90+). After 24 hours, stem cells in the biostimulative matrix started to pre-differentiate to chondrocytes and after 1 week new cartilage regions were formed. In vivo there was clear evidence in all horses of reduced pain and increased mobility as measured by degree of lameness; decreased inflammation as measured by joint fluid levels (C-reactive protein, colour, clarity); and regeneration of cartilage evaluated by CT scan and/or arthroscopy.

After treatment 90% of horses walked and trotted without lameness and went back to training after 6 months. Long term studies are needed to evaluate OA progression.

References
Fig 2: increased growth factor levels enhance levels of aggregan and type II collagen in the ECM, stimulating chondrogenic differentiation (as evidenced by alcian blue staining after one week of culture).

Fig 3: Pre-chondrocyte formation within the ECM after one week (microscopic image).

Pre-chondrocytes

Proteoglycan [HA] extracellular matrix

Fig 4: Lateral view of the treatment (arthroscopy) of the stifle of a 4 years thoroughbred horse. (Left: Before treatment. Right: 3 months after treatment.)
RETROSPECTIVE STUDY OF DISTAL LIMB TENDON AND LIGAMENT INJURIES DETECTED USING ULTRASOUND IN FRIESIAN HORSES ADMITTED TO A UNIVERSITY HOSPITAL (2003-2012)

Introduction
The tendons of Friesian horses have been reported to be more elastic compared to previously reported data in Thoroughbreds [1]. This would suggest that their tendons and likely also their ligaments would demonstrate an injury incidence different from those found in other horse breeds. Therefore, the aim of this retrospective study was to evaluate aseptic, closed tendon and ligament injuries as found in a large group of Friesian horses presented to Utrecht University equine clinic over a longer time period.

Material and Methods
A group of (n=49) Friesian horses (FH) admitted to Utrecht University in the period 2003-2012 with tendon and ligament injuries diagnosed using ultrasound were included in this study. The mean age of the horses was 10.4 years. The retrospective study in Warmblood (WB, sport) and Standardbred (SB, race) horses of Van den Belt et al. [2] was used to provide reference groups.

Results
It appeared that the percentage of SDFT lesions in FH was 18%, while in WB this was 32% and in SB 37%. Intersesamoidean ligament (ISL) desmitis was found in 16% of the FH and only in the hind limbs, in contrast to the WB and SB horses where no ISL injuries were reported.

Conclusions
The incidence of injury to the intersesamoidean ligament was much higher in Friesian horses than in other breeds. However, injury to the SDFT was much less common in Friesian horses compared to Warmbloods and Standardbreds. Thus, Friesian horses seem to incur different tendon injuries than other breeds and it is tempting to suggest that these differences are possibly related to the different biomechanical properties of their tendons.

References
CONGENITAL NASOLACRIMAL ATRESIA IN AN ARABIAN HORSE

Introduction
Nasolacrimal duct obstruction is a blockage of the lacrimal drainage system. Obstruction of the nasolacrimal outflow pathway in horses is not uncommon. Causes of obstruction include foreign bodies, trauma, and congenital abnormalities.

Aim of the study
In this paper we describe the clinical manifestations, diagnosis, and treatment of congenital nasolacrimal duct atresia (nasal punctal atresia) in an Arabian horse.

Material & Methods
A 3-year-old Arabian mare was presented with a life-long history of purulent discharge from the left eye. Ocular examination revealed marked epiphora and mucopurulent conjunctival discharge. The examination was completed following pharmacological mydriasis with 0.5% pro-paracaine hydrochloride. Following application of pro-paracaine, nasolacrimal lavage was completed by cannulation of the upper nasolacrimal puncta with a 24 gauge x 3/4 inch intravenous catheter and flushing with 10 ml of sterile saline. Dacryocystorhinography was completed following administration of xylazine (0.5 mg/kg of body weight). Approximately 4 mL of Renografin-60 (Diatrizoate meglumine injection USP) was injected through the upper cannula and lateral and oblique radiographs were completed.

Results & Conclusion
Dacryocystorhinography accurately revealed an obstruction of the left distal portion of the nasolacrimal duct of suspected congenital origin (i.e., atresia). The nasolacrimal obstruction was treated by creating a new drainage opening by an incision in the nasal mucosa inside the nostril with placement of a stent for 3 weeks. Post-operative therapy consisted of topical antibiotic/corticosteroid combination, (gentamicin/dexamethasone), q12h for 3 weeks, then q24h until stent removal. In this case, there was no evidence of nasolacrimal obstruction noted after surgery.

Key words
Dacryocystorhinography, nasolacrimal duct, Arabian horse

References
THE FIRST REPORT OF EQUINE CUTANEOUS PROTOTHECOSIS

Introduction
Prototheca species are ubiquitous, achlorophyllous unicellular algae. They have been found in water, sewage, slime flux of trees and soil and reportedly cause a rare mycosis-like systemic or local disease in a wide variety of mammals including humans, dogs, cats, pigs and cattle. Protothecosis has been reported to occur associated with conditions that cause immunosuppression.

Material and Methods
In this report, a case of equine cutaneous protothecosis diagnosed histopathologically was described. A 10-year-old Turkmen horse was referred with multiple verrucous, ulcerated lesions up to 1.5 cm in diameter on the left external ear (pinna). The horse was vigorous and had a normal appetite and good body condition. A biopsy of the mass was procured and tissue sections stained with H&E, PAS and GMS. Also fungal culture of lesion material was carried out on SDA at 28°C & 37°C.

Results
Ten to fifteen µm, ovoid to reniform, pale basophilic organisms, each 2 to 3 µm diameter, were observed within the epidermis and keratin layer. The organisms were tentatively identified as Prototheca species by histopathological feature. The sporangia containing endospores by PAS and morulae–like internal septation among the necrotic material were observed. Histopathologically, moderate acanthosis of epidermis and a chronic severe granulomatous dermatitis was diagnosed. The organisms mentioned above were noted within giant cells in the superficial dermis. After incubation for 4 days on sabouraud’s dextrose agar, smooth creamy white moist colonies were obtained and were identified as Prototheca species by assimilation test using RapidID Yeast Plus test.

Conclusion
Finally, histopathologic examination & fungal culture confirmed cutaneous protothecosis. This seems to be the first report of cutaneous protothecosis in a horse.
MANAGEMENT OF COLIC DUE TO ENTEROLITH IN A WORKING MARE, INDIA

Introduction
Enteroliths have been reported in equids as a cause of colic.

Case presentation
A 6 year old mare presented with history of recurrent abdominal pain and not passing faeces for 48 hours. Animal was anorectic and anxious with distended abdomen. Clinical parameters recorded included pulse 44/min, respiration 22/min, rectal temperature 100.2°F, capillary refill time 3 seconds, visible mucous membranes pinkish. On auscultation gut motility appeared absent, the rectum was found empty on rectal examination and gastric reflux was not present when a nasogastric tube was passed. Based on history and clinical examination, impaction colic was diagnosed.

Management and outcome
Flunixin Meglumine IV (1.1mg/kg), Ringer Lactate IV (8 L), Sulphadiazene and Trimethoprim IV (20mg/kg), liquid paraffin through nasogastric intubation and a lukewarm water enema were administered. On the second day, the animal had not passed faeces but auscultation revealed slight GI motility. On rectal palpation a hard big mass was palpated at the distal end of the small colon but insufficient manipulation was possible to facilitate its removal rectally. Liquid paraffin was administered rectally after which slow manual evacuation of the softened mass was achieved per rectum. The mass was a 9 inch diameter sphere, weighing 300 grams. Within half an hour, the animal passed faeces and there was appreciable reduction in distension of the abdomen. No colic signs were observed for the next 5 days. Follow-up treatment was with TMPs, saline mixture¹ PO and laxative diet for another 3 to 4 days. Radiographic imaging of the hard mass revealed a small radio dense nidus centrally with concentric layers around it, indicating an enterolith.

Discussion
Diagnosis of this case was based on clinical sign and symptoms. The reported treatment efficacy and successful removal of the enterolith per rectum adds another dimension in the management and treatment of colic in equines.

References

¹ Saline mixture is composed of 100 gram(g) magnesium sulphate, 50 g sodium bi carbonate and 50 g table salt.
THE EFFECT ON REIN TENSION OF DIFFERENT TRAINING METHODS FOR GYMNASTIC NECK FLEXION IN BASE-LEVEL TRAINED SPORT HORSES AT THE WALK

Introduction
To date, there is a lively debate about the use of different head-and-neck positions (HNP’s) in gymnastic training of sport horses. Reins are one of the aids to achieve these HNP’s and with regards to rein tension the FEI rules prescribe “lightness”. Conversely, high rein tension could lead to development of physical disturbances in neck and back function of the horse. Objectively quantifying rein tension would contribute to limiting high rein tension, thereby promoting equine welfare. Therefore, the aim of this study was to evaluate two different training methods to obtain a desired HNP in unridden horses, the old, ‘classic’ draw reins (DR) as a static method compared to the newly developed Concord Leader (CCL) as a dynamic method.

Materials and methods
The left and right rein tension of n=11 base-level trained sport horses (age 10±3.2 years, mean±SD) was measured when walking with, in random order, DR or CCL. The desired HNP was standardized. Rein tension was measured at 10Hz for n=6 straight lines per method. Development and validation of the rein tension device has been accomplished at the Faculty of Sciences (Utrecht University) and reproducibility has been tested using weights. Statistical analysis was performed (paired t-test).

Results
Results showed that the horses experienced lower mean and maximal rein tension with the CCL compared to the DR (p<0.05). In addition, the percentage of zero tension recorded as simulating “lightness” was significantly higher with the CCL than with the DR (p<0.05).

Conclusions
In conclusion, the dynamic CCL achieves a similar HNP with a lower mean and maximal rein tension than the static draw reins, but more importantly with a greater proportion of “lightness”. Thus, this study provides objective data on rein tensions and HNP, which may help in educating riders in applying modern, gymnastic training methods.
MYOFASCIAL CHAINS IN THE HORSE

Introduction
Myofascial chains are rows of interconnected anatomical structures in the locomotion system. The main component of the chains is connective tissue. In humans the chains are so far found to play a crucial role in body-posture with major influence/impact on the biomechanics. Myers (2009) has dissected twelve chains in humans. These have yet to be shown in horses. The aim of this study was to identify and investigate three myofascial chains in horses.

Materials and methods
The superficial dorsal line (SDL); superficial ventral line (SVL) and lateral line (LL) were dissected in five horses. Functional interactions within and between the chains were evaluated and correlated to biomechanical theories e.g. “the bow-string” concept.

Results
The SDL holds structures that flex the hind legs and extend the hips, back and neck. The SVL performs antagonistically to SDL, and the LL is involved in lateral body flexion. The equine myofascial chains mirrored those in humans, but significant differences were found. In the equine head the SDL continues orally into the fascia occipitalis and m. temporalis onto the mandible and anastomoses with the SVL within the masseter muscle. In the equine limb the SDL passes from the tuber calcaneus into the tarsal retinaculum and ligaments; the suspensory ligament; the check ligament and other distal plantar structures. Via P3 and the extensor branch of the suspensory ligament the SVL connects to the SDL. The LL attaches to the SDL and SVL in the upper neck/head and distally in P3 and comprises structures, which flex the body laterally.

Conclusions
In conclusion it can be stated that SDL, SVL and LL complete a functional 3-D anatomical/structural ring, which balances the dorsal, ventral and lateral postures of the horse. The presence of these myofascial chains in horses gives rise to a very promising new tool to be used to evaluate biomechanics in e.g. poor performance horses and horses recovering from injuries, by studying closely the body posture and integrity between the myofascial chains.

References
EVALUATION OF SEASONAL CHANGES IN PLASMA ADRENOCORTICOTROPIN HORMONE (ACTH) LEVELS IN RESPONSE TO TRH ADMINISTRATION IN HORSES WITH AND WITHOUT CLINICAL SIGNS OF PPID IN THE NETHERLANDS

Background
The TRH stimulation test is a relatively new and potentially more sensitive diagnostic test for PPID in horses than previous tests, but clinical evaluation of this test is limited. Reference values were previously established in a small group of horses for winter, spring and summer in the USA.

Hypotheses/goal
The aim of this study was to evaluate seasonal changes in plasma adrenocorticotropin hormone (ACTH) levels in response to Thyrotropin Releasing Hormone (TRH) administration in horses with clinical signs of PPID and aged horses without signs of PPID in the Netherlands.

Materials and methods
The TRH stimulation test was carried out in 24 horses and 11 ponies in autumn (October) and winter (January) in the Netherlands. Synthetic TRH (1 mg dissolved in 5 ml NaCl 0.9%) was administered IV and plasma ACTH levels were measured before and 10 minutes after TRH administration. The animals were allocated to the PPID (n=14) or control group (n=21) based on presence or absence of typical clinical symptoms (i.e. hypertrichosis).

Results
Plasma concentrations of ACTH increased significantly after TRH administration in both groups. ACTH levels before and after TRH stimulation were significantly higher for horses with clinical symptoms of PPID compared to control horses. ACTH levels before and after administration with TRH were significantly higher in October than in January for both groups. In the control group, elevated ACTH levels post TRH administration outside the reference range were found in 6 of 21 horses.

Conclusions
All PPID horses responded to administration of TRH with ACTH levels outside the reported reference range in winter (>100 pg/ml), which makes the test suitable for confirming clinical PPID in this season. This reference value was not suitable for confirming PPID in October. The 6 control horses with a positive TRH stimulation test in January could be early PPID cases. Further research is needed to confirm this.
USE OF CARDIAC TROPOIN I AND T FOR DETECTION OF CARDIAC CHAMBER DILATATION IN HORSES

Background
Cardiac troponin I (cTnI) is routinely used in equine clinical practice for detection of myocardial damage. However, many cTnI assay varieties exist and assay availability is currently decreasing. In contrast, troponin T (cTnT) assays are widely available and the number of different assays is limited. Unfortunately, cTnT is poorly studied in horses. For both troponins, usefulness in case of cardiac dilatation remains unknown. The aim was to compare cTnI and cTnT concentration in healthy horses and horses with cardiac dilatation caused by structural heart disease.

Material and methods
Blood samples were collected from 20 healthy horses (body weight 572±54kg, age 7.9±4.3 years) and 24 horses with atrial or ventricular dilatation due to valvular regurgitation (body weight 570±115kg, age 11.6±7.3 years). Samples were centrifuged within 1 hour after collection and serum was stored at -20°C. Troponin I and T were determined using an Accu-cTnI assay (Beckman Coulter Inc. Fullerton, CA; detection limit: 0.03ng/mL) and a Cobas E immunoassay (Roche Diagnostics, Belgium; detection limit: 0.01ng/mL), respectively.

Results
The median cTnI and cTnT concentration in healthy horses was ≤0.03ng/mL (range: ≤0.03-0.04) and ≤0.01ng/mL, respectively. cTnI concentration (median: 0.07ng/mL) was significantly higher in horses with chamber dilatation (P<0.001; range: ≤0.03-30.92), while no significant difference in cTnT concentration was found between healthy horses and horses with chamber dilatation (P=0.183). The median cTnT level in horses with chamber dilatation was ≤0.01 ng/mL (range: ≤0.01-0.57).

Conclusion
Cardiac troponin I can detect atrial or ventricular dilatation. The currently used cTnT test did not perform well. Other, especially high sensitive, cTnT assays should be studied.

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Atrial Natriuretic Peptides Detect Cardiac Dilatation

Background
Atrial natriuretic peptides are released in case of atrial and ventricular stretch and might be useful in diagnosis and prognosis of valvular heart disease in horses. The aim was to compare atrial natriuretic peptide (ANP) and N-terminal proANP (NT-proANP) levels in healthy horses and horses with valvular heart disease and to determine ANP and NT-proANP stability in samples stored at -20°C and -80°C.

Method:
Blood samples were collected from 20 healthy horses (body weight 572±54kg, age 7.9±4.3 years), 21 horses with valvular regurgitation without dilatation (body weight 565±87kg, age 12±7.3 years) and 8 horses with valvular regurgitation associated with atrial or ventricular dilatation (body weight 566±60kg, age 13.7±5.2 years). Samples were centrifuged at 4°C within 30 min after collection and stored at -20°C and -80°C. ANP and NT-proANP concentration were measured using an equine and human ELISA (E90225EQ and E90484Hu, USCn, Wuhan, China), respectively. Ten samples were reanalyzed after 15-60 days.

Results
ANP levels were significantly higher in horses with atrial dilatation compared with healthy horses ($P_{ANP}^{H}=0.02; P_{NT-proANP}^{H}=0.08$). No significant difference was seen between horses with valvular regurgitation without atrial or ventricular dilatation and healthy horses ($P_{ANP}^{V}=1.0$ and $P_{NT-proANP}^{V}=0.91$). A significant decrease in ANP and NT-proANP levels was seen after storage at -20°C ($P_{ANP}^{20}=0.01$ and $P_{NT-proANP}^{20}=0.02$) and -80°C ($P_{ANP}^{80}=0.01$, $P_{NT-proANP}^{80}=0.03$). The decrease in NT-proANP was smaller than in ANP ($P=0.08$).

Conclusion
Chamber dilatation results in ANP and NT-proANP increase and these cardiac biomarkers could be used for clinical purposes. Sample storage time negatively influences (NT-pro)ANP levels. Therefore, sample analysis should be done as soon as possible.
THE EFFICACY OF TAUROLIDINE AS CATHETER LOCK SOLUTION IN THE PREVENTION OF CATHETER-RELATED THROMBOPHLEBITIS IN HORSES

Introduction
Thrombophlebitis is a serious complication of intravenous catheterization in horses. In human medicine, problems associated with long-term IV catheterization are addressed with catheter lock solutions. Taurosept®, containing taurolidine 2%, is one of the solutions tested and used. This study aims to investigate whether the use of Taurosept as catheter lock solution in horses reduces the incidence of thrombophlebitis.

Materials and methods
Horses admitted to our clinic between January 1st 2009 and June 30st 2010, needing an intravenous catheter for at least 48 hours were included. A polyurethane catheter was placed in one jugular vein, and was flushed with a sterile heparinised solution every 4 hours before filling it with 2.5ml Taurosept. The catheterised vein was examined twice daily and any sign of thrombophlebitis noted. If thrombophlebitis was suspected, an ultrasound examination was performed. After catheter withdrawal, its tip was submitted for bacteriologic analysis. The study group was compared to a control group part of which was prospective, including horses admitted to the clinic during 2011 needing an intravenous catheter for at least 48 hours. The same protocol as for the study group was followed, using physiologic saline solution instead of taurolidine.

Results
There were 47 horses enrolled in the Taurosept study group, of which 5 (10.6%) developed a thrombophlebitis. Thirty-two horses figured in the control group, of which 7 (21.8%) developed a thrombophlebitis, which was not significantly different. In the control group 63.6% of cultured catheter tips showed bacterial growth, whereas in the Taurosept group only 33.3% showed bacterial growth which was not significantly different.

Conclusions
These preliminary results compare favourably to the 20 to 50% incidence of thrombophlebitis reported in older literature1-3 and are comparable to an incidence of 7.5 to 10% of thrombophlebitis in more recent reports on postoperative complications after colic surgery4,5.

References
JUGULAR VEIN PHLEBECTOMY IN TWO HORSES WITH SEPTIC THROMBOPHLEBITIS UNRESPONSIVE TO MEDICAL TREATMENT

Introduction
Intravenous catheters provide continuous, secure access for the administration of therapeutic agents to horses. However, they can be associated with complications such as thrombosis and septic thrombophlebitis, requiring medical treatment with appropriate antimicrobials and anti-inflammatories. In rare cases, thrombophlebitis is unresponsive to medical treatment.

Case details
Two 5 year old mares with a previous history of colic were presented for unilateral jugular phlebitis that developed from 3 to 7 days after catheter removal. One case presented a swollen and hot right jugular vein from the head to the chest and fever, the other horse exhibited a large mass in the left mid-jugular area with head edema, fever, and a systolic heart murmur. No abnormality was noticed on cardiac ultrasound examination. This mare had already been treated with several antibiotics (successively 5 to 7 days of oxytetracycline, gentamicine, enrofloxacine, and ceftiofur) before referral. Ultrasonographic examination revealed a thrombus over the entire diameter of the vein as a heterogenous cavitating mass with multiple hyperechoic spots in one case, and a thrombus obstructing half of the jugular vein cranially to a mass filled with a hypoechogenic homogenous fluid content in the second case. A coagulase positive Staphylococcus and Streptococcus equi zooepidemicus were cultured from one blood aspiration, respectively, which were sensitive to usual antimicrobials. The suspected anaerobic bacteria was not cultured.

Treatment and outcome
Treatment was initiated with cefquinome and rifampicine (1 mg/kg intramuscularly twice a day and 5 mg/kg orally twice a day, respectively) in the mare with supposed anaerobic infection. In spite of local (topical cream containing lidocaine, prednisolone and dimethylsulfoxide) and systemic therapy, both cases got worse. A venous puncture to evacuate the serosanguineous fluid inside the mass was performed for the first mare, but it filled again quickly and ultrasound examination confirmed a fistula between the vein and the perivenous mass. A phlebotomy and a debridement were performed and a draining tract was created. Healing was complete within 13 days. In the other horse, necrotic tissue, purulent material around the vein and the extensive thrombus were removed and a sterile maggot therapy was initiated for three days. The opened surgical wound healed within 20 days.

Conclusions
When no response is achieved with appropriate antimicrobials, surgical treatment is necessary to avoid life-threatening complications such as endocarditis, pulmonary embolism, bacteremia and septicemia. Standing jugular phlebotomy is a simple and effective method for removing infected clots and resolving septic jugular thrombophlebitis and can be performed on a standing horse.
DIAPHRAGMATIC HERNIA IN A HAFLINGER HORSE

Introduction
Diaphragmatic hernias, which may be both acquired and congenital, are rare in horses\(^3\). The clinical signs are often non-specific; varying signs of colic or dyspnea\(^{1,3}\) can be observed and therefore this condition may be challenging to diagnose.

Case history
Our clinic veterinarian was called out to see an eleven year old Haflinger gelding, with a history of mild bronchitis, which had experienced a sudden onset of exercise intolerance. The owner noticed that the horse moaned when he tried to trot and occasionally seemed to have some difficulty breathing. A general physical examination revealed no other symptoms than a slightly elevated respiratory rate and enhanced respiratory sounds upon thoracic auscultation. A dry cough could be provoked. Supportive therapy with oral clenbuterol and prednisolone was started. A few days later the horse was presented to our clinic for further investigation. At this time, the horse showed increased respiratory effort and thoracic auscultation revealed muffled breathing sounds in the ventral lung fields. A bronchoscopy and a thoracic ultrasound were performed. Bronchoscopy showed no signs of bronchitis while thoracic ultrasound raised suspicion of fluid accumulation in both the left and right ventral hemithorax. Antibiotics (Cefquinome, 1 mg/kg SID IV) were given but the horse’s clinical condition deteriorated and the horse was referred to the Utrecht University Equine Clinic with a suspicion of liquothorax of unknown origin. At UUCEC, a clinical exam, CBC and chem panel were performed as well as repeat thoracic ultrasound. The horse was hospitalized and diagnosed with a bilateral liquothorax which was caused by a diaphragmatic hernia in which a lobe of the right lung had become incarcerated. A fine needle aspiration biopsy of the fluid was sent in for cytology and bacterial culture. The laboratory results showed no evidence of bacterial infection or malignancies.

Treatment and prognosis
The thorax was drained bilaterally with a chest drain, however the thoracic cavity refilled itself repeatedly, and the horse developed hypoproteinemia and hypoalbuminemia as a result. After extensive consultation with the owner and given the poor prognosis for full recovery, it was decided to euthanize the horse rather than to opt for thoracoscopic evaluation.

Conclusion
Acquired diaphragmatic hernia is a rare condition in the horse and can be difficult to diagnose. Ultrasound and/or thoracoscopy can be valuable diagnostic tools. Surgical intervention with mesh application\(^2\) under thoracoscopic guidance\(^1\) has been described but still has a poor to guarded prognosis\(^3\).

References
CLINICAL REPORT: GAMITHROMYCIN TREATMENT FOR RHODOCCOCUS EQUI PNEUMONIA IN FOALS

Introduction

*Rhodococcus equi* (R. equi) is a common cause of pneumonia in foals between 3 weeks and 5 months of age. Macrolides in combination with rifampicin have been used to treat this disease over the past 20 years. Several different macrolides have been evaluated in foals for pharmacokinetic properties and/or efficacy, including erythromycin, azithromycin, clarithromycin, tilmicosin, tulathromycin, tulathromycin and gamithromycin. The combination of erythromycin, azithromycin, or clarithromycin with rifampicin is currently the recommended treatment of choice. Gamithromycin, a relatively new azalide developed for the treatment and prevention of bovine respiratory disease caused by *Mannheimia haemolytica*, *Pasteurella multocida*, *Histophilus somni* and *Mycoplasma bovis*, has not been studied in foals in vivo previously.

Materials and methods

In this clinical report we share clinical results (see tables 1 and 2) achieved with gamithromycin in foals with *R. equi* over the last three years. The foals were either admitted to Wolvega Equine Hospital or treated as outdoor-patients by this clinic. The diagnostic criteria on which the diagnosis *R. equi* pneumonia was made were clinical signs of lower respiratory tract disease and ultrasonographic evidence of pulmonary abscesses. For practical reasons PCR swabs and cultures were only taken from three foals. Foals were between 2 weeks and 2.5 months old and received from 1 to 6 injections of gamithromycin (Zactran® 6 mg/kg IM every week) with or without rifampicin (Rifadin® 5 mg/kg BID PO for 4-6 weeks). All foals made a full recovery. Intramuscular injections were administered in the m. semimembranosus/semitendinosus, alternating left and right side. Stiffness and a painful injection site for one or two days were the only adverse reactions noticed and no permanent injection site lesions were recorded.

Results and conclusions

Although the numbers are small, there was no difference in outcome and time to clinical recovery between the foals that were on co-medication with rifampicin and those that were not. Further work needs to be done to evaluate if the efficacy of gamithromycin alone is the same as with co-medication with rifampicin. Advantages of gamithromycin treatment include that it allows for a once a week administration only, compared, for example, to twice daily oral medication with clarithromycin, and there is no risk of accidental enterocolitis in the accompanying mare. Based on this clinical report it seems that gamithromycin is not only effective in vitro, but also shows clinical efficacy in vivo.

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Table 1: Clinical data of 11 foals with thoracic abscessation treated with gamithromycin (* indicates horses for which the clinical diagnosis *R. equi* infection was confirmed by culture techniques and/or PCR)

<table>
<thead>
<tr>
<th>Number</th>
<th>Breed</th>
<th>Sex</th>
<th>Age</th>
<th>Clinical signs</th>
<th>Ultrasound thorax</th>
<th>WBC (10^9/l) Ref 5-11*10^9/l</th>
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<tbody>
<tr>
<td>1</td>
<td>Fjord horse*</td>
<td>F</td>
<td>2 months</td>
<td>Purulent nasal discharge, fever</td>
<td>Several small abscesses</td>
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<td>2</td>
<td>Friesian horse*</td>
<td>M</td>
<td>6 weeks</td>
<td>Coughing, fever</td>
<td>Thoracic abscessation grade 3</td>
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<tr>
<td>3</td>
<td>Dutch Warm-</td>
<td>M</td>
<td>1 month</td>
<td>Snoring, fever</td>
<td>Large thoracic abscess</td>
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<tr>
<td>4</td>
<td>Friesian horse</td>
<td>M</td>
<td>2.5 months</td>
<td>Coughing, purulent nasal discharge, fever</td>
<td>Thoracic abscessation</td>
<td>11.9</td>
</tr>
<tr>
<td>5</td>
<td>Friesian horse</td>
<td>F</td>
<td>2 months</td>
<td>Coughing, fever</td>
<td>Thoracic abscess</td>
<td>11.3</td>
</tr>
<tr>
<td>6</td>
<td>Friesian horse</td>
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<td>2 weeks</td>
<td>Coughing, fever</td>
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<tr>
<td>7</td>
<td>Friesian horse</td>
<td>F</td>
<td>1 month</td>
<td>Dyspnea, purulent nasal discharge, fever, coughing</td>
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<tr>
<td>8</td>
<td>Friesian Horse</td>
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<td>Coughing, fever</td>
<td>Thoracic abscess</td>
<td>13.6</td>
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<td>Friesian Horse</td>
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<td>n/a</td>
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<td>Thoracic abscess</td>
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<tr>
<td>11</td>
<td>Standard-bred</td>
<td>M</td>
<td>2 weeks</td>
<td>Coughing, fever</td>
<td>Thoracic abscesses grade 2</td>
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Table 2: Clinical data of 11 foals with thoracic abscessation treated with gamithromycin.

<table>
<thead>
<tr>
<th>Number</th>
<th>No. of injections gamithromycin (6 mg/kg b.w. once a week)</th>
<th>Rifampicin PO 5 mg/kg b.w. BID</th>
<th>Time to full clinical recovery</th>
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<td>8</td>
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<td>6 weeks</td>
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<tr>
<td>11</td>
<td>1</td>
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<td>2 weeks</td>
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