Osteoarthritis of the thoracolumbar synovial intervertebral articulations: Clinical and radiographic features in 77 horses with poor performance

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Aims: To describe the radiographic appearance and location of facet joint lesions, the clinical signs and to determine if there was any breed, gender, age, bwt or discipline predilection. Methods: Data from 77 horses examined at the Animal Health Trust between January 1997 and September 2007 with evidence of thoracolumbar pain and radiographic changes of the facet joints were reviewed. The presence of either other osseous abnormalities of the thoracolumbar region or other problems potentially contributing to poor performance were recorded. Facet joint lesions were graded radiographically and their location determined. Influence of breed, gender and discipline on the presence of lesions, effect of location on the type of lesion and the influence of impinging dorsal spinous processes on the clinical features were assessed using Chi-squared tests. Results: There was no effect of breed, gender, age or bwt on prevalence of facet joint lesions. Showjumpers were less affected than horses from other disciplines (P<0.0001). There were commonly 2–5 affected facet joints, usually in the caudal thoracic and cranial lumbar spine (T15–L1). Sclerosis, periarticular new bone and narrowed joint space were the most frequent radiographic lesion types. Clinical features were different between horses with and without impinging dorsal spinous processes (P<0.0001). Conclusions and Practical Significance: Osteoarthritis of the facet joints of the thoracolumbar spine can occur alone in horses with back pain, or in association with other osseous abnormalities. Severity of clinical signs was related to the presence of other osseous abnormalities, not the number of facet joints involved or the severity of lesion type. Further investigation of the prevalence of osteoarthritis in horses without clinical signs of back pain is merited.

Osseous abnormalities associated with injury of the collateral ligaments of the distal interphalangeal joint

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Aims: To determine the prevalence of osseous abnormalities associated with injury of the collateral ligaments (CLs) of the distal interphalangeal (DIP) joint; describe the distribution and character of osseous abnormalities; determine if there was an association between the presence of osseous abnormality and increased radiopharmaceutical uptake (IRU); evaluate the association between osseous abnormalities and prognosis. Methods: High-field magnetic resonance images of 148 consecutive horses, in which a definitive diagnosis of CL injury of the DIP joint was made, were reviewed. Osseous abnormalities were categorised according to location and type. Scintigraphic images were evaluated prospectively for the
presence of IRU at the origin/insertion of a CL. Follow-up information was obtained by telephone questionnaire. **Results:** The medial CL of the DIP joint was most frequently injured (81%). 33% of horses had associated osseous pathology. The most common abnormalities included: cortical irregularity of the distal phalanx at the ligament's insertion (14%); mineralisation of the ipsilateral aspect of the distal phalanx (12%); entheseous new bone at the insertion of the CL (12%); endosteal reaction at the ligament's origin (9%); and osseous cyst-like lesions in the distal phalanx (5%). Twenty-eight percent of horses with CL injury without osseous abnormalities had IRU; 61% of horses with osseous abnormalities had IRU. Other injuries within the digit which may have contributed to lameness were identified in 61% of the study population. **Outcome:** Thirty-four horses had CL injury alone, of which 29% came sound; 22 horses had CL injury and osseous pathology, 45% of these returned to previous athletic function. Prognosis was poorer for horses with CL and other injuries without (25%) or with (15%) osseous pathology. **Conclusions and Practical Significance:** A negative scintigraphic result does not preclude the presence of osseous lesions. Further study in a larger population of horses is underway to provide more accurate prognosis.

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**Epidemiology of joint injuries in Thoroughbred racehorses in training: Preliminary findings**


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**Aims:** To estimate the incidence of exercise-induced carpal, metacarpophalangeal (MCP) and metatarsophalangeal (MTP) injuries in young Thoroughbreds in race training; to identify risk factor for such injuries, particularly relating to training regimens; and to determine the association between serum concentrations of cartilage biomarkers and early joint damage. **Methods:** Thoroughbred yearlings that entered training in the autumn of 2006 are being monitored until the end of their 3-year-old racing season (Autumn 2008). Data are collected on daily exercise regimens and carpal and MCP/MTP injuries. In a nested case-control study, injured horses and controls are blood-sampled soon after injury and monthly thereafter, to measure serum concentrations of C2C and CTX II (cartilage degradation) and CS846 and CPII (cartilage synthesis). **Results:** Between October 2006 and January 2008, 445 horses from 13 trainers contributed around 4624 horse months of data to the study. In total, 129 carpal and MCP/MTP injuries were reported in 107 horses, resulting in an overall joint injury incidence of 29% (95% CI = 25–33%) or a rate of 2.8 per 100 horse months (95% CI = 2.3–3.3). Approximately equal numbers of fetlock (n = 66) and carpal injuries (n = 63) were recorded, although this varied by trainer. Preliminary analyses of serum samples from 13 case-control sets showed that, in the period following injury, cases had significantly higher concentrations of CS846 (P = 0.02) and a higher CS846/C2C ratio (P = 0.03) than controls. **Conclusions and Practical Significance:** Carpal and MCP/MTP injuries are a common cause of morbidity in young racehorses. Identification of modifiable risk factors for these injuries may help to reduce their incidence. Specific serum cartilage biomarkers may provide a useful tool for the diagnosis and monitoring of equine joint injuries. **Acknowledgements:** Participating trainers and veterinary surgeons, and Horserace Betting Levy Board.

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**Risk factors for tendon injury in National Hunt racehorses in training**


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**Aims:** To test the hypothesis that horses that were previously in training for flat racing would be more likely to suffer a tendon/ligament injury (TLI) than NH ‘stores’ that started training at a later age. This hypothesis is based on evidence that training of tendon after maturation leads to accumulated micro-damage. We determined the incidence of, and modifiable
risk factors for, superficial digital flexor tendon (SDFT) and suspensory ligament (SL) injuries in National Hunt (NH) racehorses. **Methods:** In a 2 year cohort study, exercise and injury data were collected from horses trained by a convenience sample of 14 UK NH trainers. Exposure variables associated with the odds of TLI were identified in a nested matched case-control study, using conditional logistic regression. **Results:** 1223 horses spent nearly 9500 months at risk of TLI. In total, 205 TLIs were diagnosed, of which 89% were SDFT injuries, resulting in an incidence rate of 2.0 per 100 horses per month (95% CI: 1.7–2.2). In multivariable analyses, there was a strong negative interaction between canter and high speed exercise distances in 30 and 60 day periods prior to TLI. TLI risk was highest in horses accumulating considerable high speed exercise distances combined with little cantering. TLI odds increased with age in a nonlinear way and trainer also significantly affected TLI risk. Gender and background (ex-flat vs. ex-store) did not affect TLI risk. **Conclusions:** These data do not support the hypothesis that early training has detrimental effects on the SDFT. The observation that TLI risk increases with age suggests that tendon, unlike bone, has a limited capacity to repair accumulated micro-damage associated with exercise and/or ageing. **Practical Significance:** Modification of training regimens may reduce TLI incidence. **Acknowledgements:** Participating trainers, yard staff and veterinary surgeons: Alice Murphy, Elizabeth Morgan and Peter Dron, and Horserace Betting Levy Board.

09.30–09.45

Heritability estimates for the major causes of retirement from racing in the Thoroughbred racehorse in Hong Kong


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**Aims:** In Hong Kong more than 25% of the racehorse population retire each year and 63% of these retirements can be attributed to veterinary reasons (Lam et al. 2007). It is likely that these figures are generally representative and that other racing jurisdictions have similar attrition rates. The aim of this study was to identify for which of the major reasons for retirement the greatest variation in outcome could be potentially attributable to genetic factors. **Methods:** Content analysis using WordStat v 5.1 (Provalis Research) was used to identify reasons for retirement from racing at the Hong Kong Jockey Club (HKJC) between 1992 and 2006. Sire models were used to estimate heritability for the most common reasons for retirement from racing at the HKJC (STATA SE 9.2, Statacorp, College Station, Texas). **Results:** Between 1992 and 2006, 4369 horses retired from racing in Hong Kong. The most common reasons for retirement from racing were tendon injury (15%), poor performance (13%), degenerative joint disease (DJD) (10%), epistaxis (7%) and suspensory apparatus injury (7%). The pedigrees of the retired horses were complex, with 4004 dams, 1316 sires, 1492 sires of dams and 463 grandsires. Estimates of heritability varied considerably for the different reasons for retirement from racing. For example, for epistaxis, heritability was estimated to be 37%, whereas for poor performance the estimate was only 4%. **Conclusion:** Future studies aimed at identifying potential genetic markers for disease or injury should focus on diseases with high heritability estimates. In this study these included epistaxis, tendon injury and DJD. These results would suggest that studies that aim to investigate genetic factors associated with performance may be less likely to identify significant associations. **Acknowledgements:** Funding provided by Defra and the Scottish Funding Council for VTRI fellowship.

**Reference**

09.45–10.00

Investigation of the maximum performance levels in racehorses with superficial digital flexor tendon (SDFT) injury

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Aims: To assess the effect of SDF tendonitis on the maximum performance of racehorses pre- and post injury. To investigate if the performance level in the race immediately before injury is at or near the maximum performance level.

Methods: Racehorses (n = 401) with a first occurrence of a superficial digital flexor tendonitis injury were identified from clinical records at Donnington Grove Veterinary Surgery between 1997 and 2004. One yard, sex and age matched control was selected per case. The accepted measurement of performance within the racing industry is lbs (weight). For this reason rating in lbs was used as a marker of performance. Shapiro-Wilks tests were used to identify normally distributed data. Paired t tests and Wilcoxon signed rank tests were used to identify differences between cases and controls. The difference in maximum pre and post injury rating and the difference in maximum pretreatment date rating and the rating immediately before the treatment date were compared between cases and controls.

Results: There was no significant difference in the change in maximum pre- and post treatment date rating between case and control horses (P = 0.35). The mean reduction in maximum rating was 6.6 lbs and 4.5 lbs for case and control horses, respectively. The difference in maximum rating and the rating immediately before the treatment date was significantly smaller for case horses (9.6 lbs) compared to control (17.0 lbs) horses (P<0.001).

Conclusions and Practical Significance: Case horses were more likely to be near their peak performance at time of tendon injury. This finding warrants further investigation and could have implications in terms of prediction of tendon injury. This study did not identify any association between tendon injury and reduced performance. This was an unexpected finding and also requires further investigation in a large scale study.

10.00–10.15

Is there a relationship between clinical presentation, diagnostic findings and outcome in horses with osteoarthritis of the small tarsal joints?

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Aims: To investigate the relationship between clinical presentation, diagnostic findings and treatment outcome in horses with osteoarthritis of the small tarsal joints. Methods: Cases that were diagnosed with osteoarthritis of the small tarsal joints from 2002–2007 were reviewed. Inclusion criteria were: a positive response to intra-articular anaesthesia of the tarsometatarsal and/or centrodistal joint, complete clinical record, radiographs, treatment details and follow-up. Radiographs were scored independently by 2 observers. Statistical analysis (Gamma statistic for 2 ordinal variables and Kruskal-Wallis Test) was used to assess the association between variables. Significance value was set at P<0.05.

Results: Ninety-one cases were included (61 unilateral and 30 bilateral lameness). Duration of lameness ranged from 2–4 weeks to >6 months. Median lameness on the straight was 2/10. Response to block was ‘good’ in 81% cases and ‘partial’ in 19%. Complete follow-up was available for 48% cases. 52% were able to return to the same level of exercise after treatment, with an improvement seen in 70%. There was no association between duration and degree of lameness or radiographic findings. A significant association was seen between the severity of radiographic changes within the tarsometatarsal joint and the response to treatment (P = 0.017). Those cases that improved tended to show less marked radiographic change.
Conclusions and Practical Significance: There was no association between duration and degree of lameness, clinical presentation and radiographic findings. Response to block and response to treatment were associated with the severity of radiographic change within the tarsometatarsal joint, but not the centrodistal joint. Radiographic findings do not correlate with clinical severity of the condition, so should not be used in isolation for a diagnosis. Osteoarthritis of the small tarsal joints warrants a guarded to fair prognosis with 52% cases returning to function. Acknowledgement: The Horse Trust.

10.15–10.30

Comparison of three approaches for arthrocentesis of the equine proximal interphalangeal joint

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Aim: To identify the optimum approach for arthrocentesis of the proximal interphalangeal joint (PIPJ). Methods: Five veterinary students with no prior experience of arthrocentesis were asked to inject radiographic contrast agent into the PIPJ of cadaver limbs. Three approaches were used: dorsal, dorsolateral and palmarolateral. For each approach, 5 limbs were used by every operator (n = 75 limbs). The number of attempts to position the needle prior to injection was recorded, with any repositioning by 0.5 cm or more recorded as a further attempt. Following injection radiographs of the limbs were obtained to determine the location of the contrast agent. Statistical analysis used generalised linear mixed-effect models with poisson and binomial errors. Results: There was no significant difference in the number of attempts between approaches (P = 0.153; median [range] dorsal = 5 [1–20], dorsolateral = 2 [1–11], palmarolateral = 4 [1–13]), or in the percentage of limbs with the correct location of the contrast (P = 0.450) despite varying from 38% (dorsal) to 56% (palmarolateral). Finally, there was no significant interaction between the number of attempts and approach in terms of the correct location of the contrast agent (P = 0.075). However, 48% of the palmarolateral injections inadvertently were in the tendon sheath, compared to none of the dorsal or dorsolateral injections. Conclusion and Practical Significance: Although the palmarolateral approach was the most successful in achieving joint injection, it was also associated with the greatest chance of inadvertent injection of the tendon sheath. We therefore recommend the dorsolateral approach, which had a higher number of successful injections than the dorsal approach. These results will aid clinicians in selecting the optimum approach to the PIPJ and alert them to the risk of inadvertent tendon sheath injection, which may lead to erroneous diagnoses in lameness investigations.
10.45–11.00

Induction of articular inflammation in horses using intra-articular IL-1, and modulation of response to IL-1 by a dietary nutraceutical

Sasha’s EQ

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**Aims:** To test the hypotheses that: 1) intra-articular IL-1 in healthy horses will induce mild inflammation as measured by increased synovial fluid [PGE2], [GAG] and [nitrite] without resulting in lameness, and 2) ingestion of a dietary nutraceutical (Sasha’s EQ: SEQ) for 14 days will inhibit the IL-1 induced inflammation. **Methods:** Ten horses without articular inflammation received control diet (CON; n = 5) or control diet containing SEQ (15 g/day; n = 5) for 28 days. All horses received intra-articular injections of IL-1 (10 and 100 ng on Days 14 and 15, respectively) into one intercarpal joint in order to induce mild articular inflammation. Contralateral joints were injected with saline. Data were analysed using 2-way repeated measures ANOVA (with respect to intra-articular challenge and time) to determine effects of IL-1 in each diet group. Three-way ANOVA (with respect to intra-articular challenge, time and diet) was used to identify significant effects of diet. **Results:** Intra-articular IL-1 increased (P<0.05) synovial fluid [PGE2], [GAG] and [nitric oxide]. Fourteen days of SEQ increased (P<0.05) synovial fluid [GAG] prior to IL-1 injection. Intra-articular IL-1 did not increase synovial fluid [GAG] or [PGE2] in SEQ horses compared with intra-articular saline, and synovial fluid [GAG] and [PGE2] were higher and lower, respectively, in SEQ horses compared with controls. **Conclusions and Practical Significance:** Intra-articular IL-1 administered to horses without pre-existing articular inflammation alters synovial fluid composition in a manner that is consistent with mild inflammation, and is a useful model for evaluating anti-inflammatory effect of dietary nutraceuticals. SEQ resulted in significant inhibition of IL-1 induced inflammatory response, and these data support the use of SEQ as a preventive for articular inflammation in horses. **Acknowledgements:** Research funding provided by Interpath Pty Ltd. (Melbourne Australia) and the National Sciences and Engineering Research Council of Canada.
11.00–11.15
Micro-computed tomography with angiography of early lesions of osteochondrosis in the tarsus of foals
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Aims: To examine predilection sites for osteochondrosis (OC), in the tarsus of foals that were predisposed to the disease, with micro-computed tomography (micro-CT) and angiography. Methods: Nine Standardbred foals bred from parents with OC were sacrificed at weekly intervals from birth to 7 weeks of age. Permanent barium angiograms were created within one hindlimb post mortem and 2 predilection sites for OC in the tarsus sampled and examined with 2D and 3D micro-CT, and histology. The project was approved by The Norwegian Animal Research Authority. Results: Histological examination identified 8 early subclinical lesions of OC within 6 joints from the 9 foals. Micro-CT with angiography detected 7 lesions in the same sites as histology, but was unable to separate spatially 2 lesions that were histologically distinct in one site. Lesions consisted of nonperfused foci of growth cartilage. No perfused vessels exited from bone into cartilage deep to any lesion. Six of the 8 lesions were associated with focal indented defects in the subchondral bone plate. Evidence of ongoing ossification was seen in 3 out of the 8 lesions and included a separate centre of ossification. Conclusion: Micro-CT was a useful technique for examination of early lesions of OC. The results were compatible with failure of cartilage canals at the point where they crossed the ossification front. Comparison of histological and micro-CT results confirmed that resultant lesions of ischaemic chondronecrosis were associated with focal delay in enchondral ossification as visualised in 3D. Micro-CT also clarified the role of different forms of ossification in the secondary repair responses to lesions. Practical Significance: A summary table was constructed that provides a basis for extrapolation to future conventional CT examination of foals. Acknowledgements: The Norwegian Research Council, The Astri and Birger Torsted Foundation.

11.15–11.30
Repeatability of a Footscan system in the evaluation of forelimb peak vertical force symmetry in sound ponies
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Aims: To assess the use of the Footscan system for future clinical application, the repeatability of forelimb Peak Vertical Force (PVF) symmetry ratios was evaluated on different days in a group of sound ponies. Methods: Five sound mixed-bred ponies (bwt 279 ± 54.9 kg, height at the withers 1.19 ± 0.05 m) were walked and trotted over a Footscan 2 m pressure plate, embedded in a runway of 20 m by 2 m covered with a 5 mm rubber mat. For each pony, 5 valid trials were recorded at 2 different days with one week interval (D0 and D7). A trial was considered valid if both forelimb hooves hit the pressure plate consecutively and if the velocity of the pony was within a range of 1.1–1.5 m/s at walk and 2.5–3.5 m/s at trot, assessed by using 2 photocell-activated gates. The PVF symmetry ratio of each pony was calculated as the mean lowest/highest value x 100% of each set of 5 valid trials per day. A mixed-model analysis of variance was used to assess day to day difference and inter-individual difference in PVF symmetry. Results: At a mean velocity of 1.3 ± 0.1 m/s at walk and 2.9 ± 0.2 m/s at trot, mean PVF forelimb symmetry was 99.5 ± 2.9% at walk and 99.5 ± 1.9% at trot, which was not significantly different between D0 and D7 nor between ponies (α = 0.05). Conclusions: Mean symmetry ratios of the ponies were very high and showed low variability, which appears similar to previously reported findings in adult ponies on a force plate. Practical Significance: The clinical use of the turnkey Footscan system would allow an acceptably precise, objective registration of forelimb symmetry plus a detailed, real-time insight into the hoofloading pattern of lame ponies.
11.30–11.45

**Effect of distance from lesion on glycosaminoglycan turnover in early osteoarthritic equine joints**

*Dunleavy, J.M.*, Sharif, M. and Fuller, C.J.*

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**Aims:** To determine whether distance from a focal osteoarthritic (OA) lesion affects glycosaminoglycan (GAG) turnover in macroscopically normal equine cartilage from focally damaged joints, and the relevance of this to predisposition to degradation. **Methods:** Macroscopically normal cartilage was sampled from 6 sites on the mediodistal metacarpal condyle from joints with mild focal OA lesions restricted to the transverse ridge (TR) (n = 7, mean age 10.6 ± 1.7 years). Sampling sites were at distances from the medial TR and were, from dorsal to palmar, 1-2-3-[TR]-4-5-6. Cartilage metabolism was assessed using a 4-day explant system where samples were cultured ± 10 ng/ml interleukin-1 beta (IL-1β). GAG loss was quantified for each site using a dimethylmethylene blue dye-binding assay, and GAG synthesis quantified for Sites 4–6 only utilising a competitive inhibition assay kit to measure chondroitin sulphate 846 epitope (CS846). Results were expressed as cumulative percentage GAG loss over 4 days and total CS846:GAG ratio, respectively. **Results:** Unstimulated explants: GAG loss was higher at Sites 1 and 4, which are commonly affected by OA lesions, although this was not statistically significant. A significant stepwise decrease in CS846:GAG was shown from Sites 4–6 (P<0.05). Stimulated explants: A trend for reduced GAG loss from Sites 1–3 was demonstrated, and this pattern was repeated from sites 4–6. Site 4 explants had significantly higher GAG loss than at sites 2 (P<0.05) and 3 (P<0.01), while CS846:GAG demonstrated a stepwise, though insignificant, decrease from Sites 4–6. **Conclusions and Practical Significance:** Macroscopically normal cartilage from focally damaged joints demonstrates a pattern of GAG loss and synthesis, which appears to be independent of distance from an OA lesion. Biomechanical factors may therefore be responsible for alterations in cartilage metabolism, susceptibility of sites to IL-1β challenge and predisposition to OA lesions. **Acknowledgements:** University of Bristol, Department of Anatomy.

11.45–12.00

**Co-culture of tendon fibroblasts with mesenchymal stromal cells increases collagen type I expression**


Department of Veterinary Clinical Science, University of Liverpool, Leahurst, Neston, Cheshire, UK; and *Royal Veterinary College, University of London, UK.

**Aims:** To assess the interaction of mesenchymal stromal cells (MSCs) and tendon fibroblasts (TF) when co-cultured in 3D collagen gels with and without the application of tensile strain. **Methods:** Equine TF were harvested from the superficial digital flexor tendon and MSCs were harvested from the sternal bone marrow of horses subjected to euthanasia. Cells were then seeded into 3D collagen gels using the method described by Garvin et al. (2003). Collagen gels were seeded with 100% TF, 50% TF 50% MSCs or 100% MSCs. Half of the collagen gels loaded with the different cell types were subjected to 1 h/24 h of sinusoidal 11% tensile strain at 5 Hz, the remainder serving as unstrained controls (Tissue Train, Flexcell Int.). Collagen gels were collected following 5 days of culture and analysed using histology and qPCR. Statistical analysis was carried out using a linear mixed effects model using S-Plus software. **Results:** TF cultures and co-cultures of TF with MSCs produced more collagen type I than cultures of 100% MSCs (P = 0.05, P = 0.04 respectively). The ratio of collagen type V/I was highest for TF and lowest for MSCs (P = 0.05, P = 0.01 respectively). Strain reduced the ratio of type V/I collagen (P = 0.02). **Conclusions and Practical Significance:** Co-culture of MSC with TF increased the expression of type I collagen supporting the use of bone marrow MSCs for clinical treatment of tendinopathy of the superficial digital flexor tendon. A higher ratio of type V/I collagen is reported to be a good indicator of thinner diameter collagen fibrils. It is interesting that application of strain reduces this ratio suggesting a possible increase in collagen fibril diameter. **Acknowledgements:** The Horseracing Betting Levy Board fund S.E. Taylor’s Research Training Scholarship.

**Reference**

12.00–12.15

Cell signalling pathways controlling contraction of platelet-derived growth factor stimulated fibroblast populated collagen matrices as a model of wound contraction

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Aims: To establish an in vitro model of equine wound contraction to allow testing of potential topical agents that may stimulate healing and to allow the elucidation of the mode of action of any positive reagent. Methods: Fibroblast cultures were established from lip skin of horses post-slaughter. Floating fibroblast populated collagen matrices (FPCM) contained 1.56 mg/ml collagen and 8.3 x 10⁴ cells/ml were floated in DMEM with 2% FBS; 10 ng/ml platelet-derived growth factor (PDGF) was added to the appropriate matrices as this had previously been proven to successfully stimulate contraction. Controls contained only 2% FBS. To elucidate how PDGF stimulated contraction, inhibitors of Rho-kinase (Y27632 or hydroxyfasudil) and p38 (SB202190 or SB203580) cell signalling pathways were added to the media to determine if inhibition of these pathways blocked contraction. The structurally unrelated inhibitors were used to demonstrate specificity of the inhibitor to the required pathway. Matrices were measured daily for 5 days. Results: In all cases, 10 ng/ml PDGF led to a significant increase (P<0.001) in contraction compared to controls (2% FBS). Inclusion of either of the Rho-kinase inhibitors completely blocked PDGF stimulated contraction and returned contraction levels to that seen in controls (P<0.001). The p38 inhibitor SB202190 similarly blocked PDGF stimulated contraction to control levels (P<0.001). SB203580 also inhibited PDGF stimulated contraction (P<0.001), but contraction was still significantly more (P<0.001) than in controls. Conclusions and Practical Significance: PDGF stimulated matrix contraction via both Rho-kinase and p38 pathways, although it appears that Rho-kinase has the stronger effect on contraction. Manipulation of these pathways may speed healing. The model is appropriate for testing potential stimulators of wound contraction that may be used for topical application to wounds, and allows modes of action to be elucidated. High throughput screening of various plant extracts is currently underway using this model. Acknowledgements: European Social Fund, Biomatrix Pharma Limited.

12.15–12.30

The same markers of osteoarthritis are altered in subchondral bone as in the articular cartilage of horses with palmar osteochondral disease

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Aims: To investigate the role of subchondral bone in cartilage breakdown during the process of osteoarthritis, we compared the expression of various genes in the subchondral bone (SCB) and articular cartilage of horses affected by palmar osteochondral disease (POD). Methods: Sections of 24 condyles from 12 horses were collected at post mortem examination from a population of Thoroughbred racehorses that required destruction on humane grounds. RNA was extracted from the articular cartilage and SCB and cDNA was generated by reverse transcriptase reaction. Real time PCR (relative to GAPDH) was performed to quantify the expression of MMP-1, MMP-3, MMP-13, collagen-I, collagen-II, collagen-X, TIMP-3, biglycan and IL1, in the cartilage and SCB. Histological examination was also performed and samples were grouped into affected or unaffected for POD. Data was plotted for normality and statistical analysis was performed using the independent t test (normal data) or the Kruskal Wallis test (nonparametric data). Results: MMP-3 gene expression was upregulated in both cartilage (P = 0.03) and SCB (P = 0.04) from condyles affected by POD as compared to those without evidence of POD. TIMP-3 was downregulated in both cartilage (P = 0.04) and SCB (P = 0.02) affected by POD. Biglycan was downregulated in both affected cartilage (P = 0.02) and subchondral bone (P <0.01). No significant differences in expression of MMP-1, MMP-13,
Collagen -I, -II, -X or IL1 were found in either the SCB or articular cartilage between affected or normal groups. **Conclusions and Practical Significance:** We have shown that the pattern of alteration in gene expression in the SCB is mirrored by that of the cartilage in a naturally occurring model of osteoarthritis. These data give further evidence of the importance of SCB in the pathophysiology of OA and suggest that there may be some synchrony between gene expression in SCB and overlying cartilage. **Acknowledgements:** HBLB, BBSRC and The Hong Kong Jockey Club.

12.30–12.45

**Can we predict tendon strain in relation to conformation with subject specific computer models?**

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**Introduction:** Tendinopathies are one of the most common musculoskeletal injuries in horses. Quantification of tendon strain and stress is essential in the investigation of the aetiopathogenesis of tendinopathies. Several computational models have been developed to determine the strain in horse tendons noninvasively, although none of these models allowed for the adjustment of leg geometry or muscle-tendon properties to match individual horses. **Hypotheses:** (1) stable computer models can be created based on the data from individual horse legs; and (2) the tendon strain predicted by the computer model is closer to the experimentally measured tendon strain for the individual horse than to the average tendon strain of the sample population. **Materials and methods:** Leg geometry and muscle-tendon properties were determined for 9 elbow-down equine frontlegs in a series of in vitro experiments. Based on these data a computer model of each leg was built within the software package SIMM (MusculoGraphics Inc., USA). The models were validated by simulating axial compression of the leg to the maximum force measured in the experiments. The output was then compared to the experimental data. **Results:** Stable computer models were created for all legs. Average tendons strains as predicted by the computer model were not significantly different from the experimental strain in all tendons, but the deep digital flexor tendon. Only in the suspensory ligament, however, was the predicted tendon strain closer to the individual tendon than to the average. **Conclusion:** Horse legs can reach a stable configuration in a variety of combinations of joint/segment geometry and muscle-tendon properties, which was simulated in the computer model. It was not possible to predict the strain in all tendons accurately and future work will concentrate on identifying how different sources of error influence these predictions.

12.45–13.00

**Equine cartilage repair? An in vitro comparison of bone marrow stromal cells and articular cartilage derived progenitor cells**

**McCarthy, H.E., Bara, J. and Archer, C.W.**

*Connective Tissue Biology Research Group, Cardiff University, Wales, UK.*

**Aims:** To compare the potential reparative ability of equine bone marrow derived stromal cells (BMSCs) and equine articular cartilage derived progenitor cells (ACPCs). **Methods:** Distal forelimbs of 10 horses age 2–8 years were obtained from LJ Potter Ltd, Taunton. A progenitor cell population was isolated from the surface zone cartilage of the MCP joint by differential adhesion onto fibronectin. BMSCs were isolated from bone marrow stroma of the cannon bone. Both cells types were expanded in monolayer and subsequently cultured as pellets in chondrogenic differentiation media. **Results:** BMSC pellets were larger and more cellular than ACPC pellets. Both types intensely stained with Safranin-O and produced type II collagen. Type X collagen was found throughout the extra-cellular matrix of BMSC pellets but was mainly intra cellular in ACPC pellets. **Conclusions and Practical Significance:** Damaged articular cartilage has a limited repair capacity and remains a major concern for the athletic horse. Preliminary results from this study suggest that ACPCs are superior to BMSCs in producing cartilage capable of functional repair. BMSCs became hypertropic; this is considered disadvantageous to any repair process as cells may undergo terminal differentiation and differentiate into osteoblasts.
13.00-13.15
Novel device to test tendon biomechanical properties in a murine model of injury

Facility of Life Sciences, University of Manchester; *Division of Plastic and Reconstructive Surgery Research, University of Manchester; and †Department of Veterinary Clinical Science, University of Liverpool, Leahurst, Neston, Cheshire, UK.

Aims: To validate a device developed to study the biomechanical properties of murine Achilles tendons following treatment.

Methods: A jig was designed and fabricated for use with the Instron 1121 tensile testing system. Left Achilles cadaver tendons from an 11–12-week-old male C57/Bl6 mice (group 1) and one ≥10-week-old female transgenic mouse were injured using a 23 gauge needle, a model previously validated in live animals (O’Brien et al. 2008). All mice weighed between 24.0 and 32.5 g. Left and right tendons were tested at 5 mm/min without preconditioning, the site of failure recorded and the force-extension curve plotted. Results: Percentage extension at failure, force at failure and slope of the linear portion of the curve (proportional to stiffness) for injured (14.84%, 6.48N, 0.01836, n = 5) and uninjured (16.84%, 6.68N, 0.01914, n = 5) tendons were measured (Group 1) but these differences were not statistically significant (P = 0.23, 0.76, 0.68). Within animal comparison between injured and uninjured tendons (2 mice from Group 1 plus one female transgenic mouse) showed a significant difference in force to failure (5% mean, P<0.05) but not percentage extension or slope of the curve. All tendons failed by avulsion.

Conclusions and Practical Significance: Within animal comparison may be the most appropriate way to detect statistically significant changes in tendon biomechanical properties following treatment. Testing is underway in live mice to assess the tolerance of bilateral injury and to measure biomechanical properties in injured and uninjured tendons at selected time points following injury. This device will generate useful data on the effects of treatment on tendon biomechanics in a convenient laboratory model.


Reference

13.15-13.30
Finite element modelling of the biomechanics of the equid digit

Collins, S.N., Murray, R.C., *Stanek, C. and *Hinterhofer, C.
Orthopedic Research Group, Centre for Equine Studies, Animal Health Trust, Newmarket, Suffolk, UK; and *Clinic for Orthopedics in Ungulates, University of Veterinary Medicine Vienna, Austria.

Aims: Greater knowledge of the biomechanics of the equid digit is essential to achieve improvements in management and treatment. The finite element (FE) modelling technique uniquely provides mechanical information that is unachievable by other noninvasive means. Our aims were to develop FE models of the horse and donkey digit from computed tomography data, using a ‘forward engineering’ approach developed by the authors, to include functionally relevant osseous and nonosseous anatomy. In addition, to perform simulations to replicate prestrain in the flexor tendons, and quasi-static weightbearing at mid-stance.

Methods: Anatomical data for the right front digit of a horse and donkey were obtained under general anaesthesia (GA). Anatomical rationalisation into 32 functionally relevant components was achieved by a ‘design for manufacture’ approach. 18/32 components, comprising the osseous structures, flexor tendons, hoof capsule, digital cushion, and cartilaginous structures, were segmented directly. The FE mesh was generated by a ‘forward engineering’ technique, and the extensor tendon and ligamentous structures represented by truss elements. Material properties were applied to each component according to published data.

Prestraining of flexor tendons was achieved by z-direction displacement, and quasi-static weightbearing, by the application of a load (equivalent to 1 x bwt) to the centre of mass of the metacarpal bone. Results: Z-direction displacement of the flexor tendons to compensate for GA relaxation gave stress levels up to 1.34 and 0.56 MPa for the deep and superficial respectively. Stress distribution was highest where physiological tendon reinforcement occurs. Quasi-static weightbearing resulted in capsular deformation patterns consistent with in vivo observations, and maximum stress levels of 1.46 MPa focused on the dorsal aspect.

Conclusions and Practical Significance: These sophisticated models give new insight into the mechanics of the digit, and internal tissue stress levels. They will ultimately provide a new mechanistic basis for enhanced preventative and remedial management.

Acknowledgements: Austrian FWF project V56-N14.
A lateral approach for the lag screw fixation of spiral third metacarpal and metatarsal medial condylar fractures: Nine cases

Smith, L.C.R., Greet, T.R.C. and Bathe, A.P.
Rossdales Equine Hospital, Exning, Newmarket, Suffolk, UK.

Aims: To describe a lateral approach for the fixation of medial condylar fractures. Sample population consisted of 9 Thoroughbred flat racehorses aged 2–3 years with athletically induced fractures.

Methods: Three forelimb and 6 hindlimb nondisplaced fractures, with a mean length of 125.6 mm (90.6–150.7 mm), received internal fixation, under general anaesthesia, using multiple lag screws nonconventionally located with the head of the screw positioned in the lateral aspect of the limb. Fractures were repaired with 4.5 mm cortical screws under radiographic or fluoroscopic guidance. Cases received broad-spectrum antibiotics and were recovered in half limb casts. Seven cases underwent free recovery; 2 cases were recovered using a rope-recovery system. All horses received 2 months box rest followed by one month in-hand walking and follow-up radiographic examination 3 months post repair.

Results: All 9 horses recovered uneventfully from the general anaesthetic. All horses survived 9 months post surgery. Five horses went onto race; one returned to training, 2 were retired to stud and one horse was lost to follow-up.

Conclusions and Practical Significance: The lateral approach allowed the operator to position screws perpendicular to the fracture line as it spiralled dorsoproximally without interfering with the soft tissue structures on the palmar/plantar aspect of the cannon bone. With an increasing trend towards standing orthopaedic procedures to avoid the risks associated with recovery from general anaesthesia; fixation of these fractures from the lateral aspect maybe substantially easier in the standing horse.

Acknowledgements: Follow-up racing data were obtained from www.racingpost.co.uk. The remainder of the follow-up data were obtained with help from colleagues working in the racing industry.

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Mean: 4.78 5 8.78 14.49 125.6 5.24

Median: 5.00 4 6.00 13.20 127.6 5.72
A study of the use of mitomycin C in the treatment of equine ocular squamous cell carcinoma

Aims: To assess the efficacy of mitomycin C as a primary or adjunctive therapy for the treatment of equine ocular squamous cell carcinoma (SCC). Materials and Methods: Eight horses with ocular SCC affecting 11 eyes were admitted for treatment. Eight of the eyes were treated with mitomycin C as a sole therapy and 3 as an adjunct to surgical resection. The protocol involved topical application of 0.08 mg mitomycin C to the eye every 6 hours in rounds of 7 days on and 7 days off therapy. Rounds of therapy were repeated until full regression occurred. In the cases that underwent surgery, mitomycin C therapy was commenced 48 hours post resection. Results: Of the 8 eyes treated with mitomycin alone, clinical resolution occurred in 75%, of which 83% have showed no recurrence to date. A mean of 3 rounds of therapy (ranging from 1–4) were required to bring about full regression. Follow up times currently range from 4–10 months. Of the eyes that underwent surgical debulking prior to mitomycin C therapy, one is still undergoing treatment, one has showed no recurrence to date and the other failed to respond to these therapies and subsequent radiotherapy. Conclusions and Practical Significance: These results show that mitomycin C is a promising therapy for equine ocular SCC. Response rates were not as good as they have been in the treatment of human ocular surface neoplasia but this may reflect delays in the diagnosis and instigation of therapy in horses. Traditionally surgical resection or laser ablation of ocular SCC with adjunctive radiotherapy has given the best non-recurrence rates (89% with iridium brachytherapy). The expense and limited availability of radiotherapy makes mitomycin C a practical, effective alternative therapy for equine ocular SCC.

Carbon dioxide laser surgery as a treatment for equine sarcoid: Outcome and complications in 24 patients

Aims: To assess the efficacy, complications and longer-term outcome of carbon dioxide (CO2) laser excisional surgery as a treatment for equine sarcoid. Methods: Between October 2005 and February 2008, 24 horses and ponies of various breeds and ages that had been diagnosed with one or more fibroblastic, nodular, occult and/or mixed sarcoids were treated with excisional surgery utilising a CO2 laser. The surgery was conducted under standing chemical restraint in all but one of the patients; this single animal required general anaesthesia in order to facilitate surgical access. Patients were discharged on the day of surgery with 5-day courses of both oral potentiated sulphonamides and an oral nonsteroidal anti-inflammatory (suxibuzone). Results, complications, disease-free outcomes and owner satisfaction were assessed either by revisiting the patient and/or by contacting the animal’s owner. Results: Currently, the disease-free rate after one year can be assessed in 16 of these cases and is 94% (15/16). Neither secondary infection complications nor wound breakdowns were reported in any of the cases. Owner satisfaction with the procedure was recorded as 100%. Conclusions and Practical Significance: The disease-free rate after one year compares very favourably with other recognised treatments for equine sarcoïd, such as topical applications of cytotoxic preparations, cryosurgery and sharp excision. The single case that proved refractory to CO2 laser treatment was originally given a poor prognosis prior to surgery due to the advanced state of disease with multiple, large, ulcerated tumours which were widely disseminated and repeated failures using other recognised treatment regimes. The absence of secondary infections and wound-breakdowns, combined with rapid, uneventful healing and a swift return to work contributed to the high level of owner satisfaction. Acknowledgements: Sigmacon UK Ltd generously donated the CO2 laser used in this study.
16.00–16.15
Dorsal hoof wall resection and a hoofcast as a successful salvage procedure in Friesian horses with grade 4 laminitis

Brujin de, C.M., Ydema, J. and *Back, W.
Wolvega Equine Hospital, Friesland, The Netherlands; and *Department of Equine Sciences, Utrecht University, The Netherlands.

Aims: To develop an ethically acceptable salvage procedure to treat horses with grade 4 laminitis.

Methods: In a prospective study, 7 adult Friesian horses (age 3–12 years) with grade 4 laminitis that did not respond to conservative treatment alone and were about to be subjected to euthanasia, were treated according to a salvage procedure. The protocol consisted of removal of the dorsal hoof wall (DHWR) under general anaesthesia with an electrical grinder to expose dead tissue and allow drainage of infected lamellar tissue. Thereafter, the feet were shod every 8 weeks with a reversed shoe with long branches that served as a mould for a hoof cast. A cellona cast was used to replace the removed hoof wall and to fill all space between the branches of the shoe, and dynacast was applied to strengthen the outside. All horses were box rested and received phenylbutazone for periods ranging from 6 weeks to 12 months. Casts were changed every 2 weeks for 2–4 times until the newly formed horn of the white line and sole were sufficiently dry and solid for the cast to be left off permanently.

Results: After one year, 4 horses, one of which had undergone DHWR of only one hind foot, were sound at the trot on a straight line. One horse was barely sound walking, one had to be subjected to euthanasia because of lack of improvement and one died of an unrelated cause.

Conclusions: DHWR is often discussed but rarely reported, except in a group of ponies. This study shows that such a salvage procedure may also be successful in a group of horses.

Practical Relevance: DHWR combined with a cast may be considered as a salvage procedure for certain chronic refractory laminitic horses with a possible success rate of around 50% and a complete recovery time of almost one year.

16.15–16.30
Retrograde venous angiography (venography) of the equine digit during experimentally induced acute and chronic laminitis

*Baldwin, G.I. and †Pollitt, C.C.
Rossdale and Partners, Beaufort Cottage Stables, High Street, Newmarket, Suffolk, UK; and †Australian Equine Laminitis Research Unit, School of Veterinary Science, The University of Queensland, Brisbane, Australia.

Aims: To evaluate the changes in digital vasculature using venography (retrograde venous angiography) of the equine digit during the acute and chronic phases of experimentally induced laminitis.

Methods: Laminitis was induced in 10 Standardbred horses using the carbohydrate (oligofructose) overload model. Serial weightbearing lateral to medial venograms were taken of the left fore foot prior to induction (n = 10) and then at 48 h (n = 3), 96 h (n = 2), 7 days (n = 10) and 6 weeks (n = 4) post induction. Laminitis was graded 6 hourly for 72 h then daily using the Obel lameness
scale. **Results:** Horses developed Obel grade 1 laminitis \( (n = 1) \), grade 2 \( (n = 4) \), grade 3 \( (n = 4) \) and grade 4 \( (n = 1) \). Venographic changes were classified in order of severity. Of the 10 horses induced, one had no evidence of venographic changes, 5 were mild, 2 were moderate and 2 were severe. The severity of the venographic changes correlated with the degree of displacement of the distal phalanx within the hoof capsule and clinical lameness. Increased width of the sublamellar vascular bed and the circumflex vessels were significantly different \( (P<0.05) \) from pre-induction measurements. There was a positive correlation \( (r_s) \) between the increase in sublamellar vascular bed width and maximum Obel grade and also between the increase in dorsal hoof wall thickness and maximum Obel grade at 7 days. **Conclusions and Practical Significance:** Venographic changes are identifiable at 7 days post induction and occur with minimal displacement of the distal phalanx. No venographic changes were detectable during the acute phase. Venographic evidence of vascular compromise occurs at the initiation of the chronic phase of laminitis and is therefore an important reference point for the implementation of supportive therapy to prevent further pedal bone displacement. **Acknowledgements:** Rural Industries Research Development Corporation, Australia and the Animal Health Foundation, USA.

16.30–16.45

**Tubule density of donkey hoof horn and comparison with pony and horse hoof horn**

*Hopegood, L., Collins, S.N., Latham, R.J. and Reilly, J.D.*

Faculty of Health and Life Sciences, De Montfort University, Leicester; UK; *Present address: School of Animal, Rural and Environmental Sciences, Nottingham Trent University, Brackenhurst, Southwell, Nottinghamshire, UK.

**Aims:** Tubule density (expressed as the number of tubules/mm\(^2\)) is vitally important as it influences the mechanical properties and moisture content of hoof horn. The quality of hoof horn is also thought to be determined by the number and size of tubules. The aims were to establish the tubule density of the dorsal hoof wall of donkey hoof horn, and to compare the pattern of tubule distribution revealed with that previously identified for pony and horse hoof horn. **Methods:** The tubule density of the Stratum medium of the dorsal hoof wall of the donkey hoof was determined in samples taken from the left forefeet of 9 donkeys after Reilly et al. (1998). **Results:** Tubule density for the stratum medium of donkey hoof horn was 10 tubules/mm\(^2\) which was significantly lower \( (P<0.01) \) than that previously reported for both pony and horse hoof horn. There was a dorso-palmar decrease in the tubule density of donkey hoof horn in the outer ~50% of the stratum medium from 34 to ~9 tubules/mm\(^2\). The remainder of the dorso-palmar depth of the hoof wall showed a uniform value for tubule density of ~9 tubules/mm\(^2\). This pattern for donkey hoof horn resembled a 3-zoned pattern. **Conclusions and Practical Significance:** The pattern of tubule density distribution for donkey hoof horn was different to the 4-zoned stepped pattern that had previously been reported for pony and horse hoof horn. It has been suggested that the structural organisation of the stratum medium may be affected in pathological conditions of the foot. This normative data, together with development of this work, may provide a method for screening for these pathological conditions. Other factors such as the effect of nutrition on tubule density may also be examined further. **Acknowledgements:** The Donkey Sanctuary for sponsoring LH.
16.45–17.00

**Conservative management of large colon displacements in the horse**

**McGovern, K., Fraser, B. and Bladon, B.**

*Donnington Grove Veterinary Surgery, Newbury, Berkshire, UK.*

**Aims:** A retrospective study to determine the number of colon displacements managed medically vs. surgically over a 10 year period at a single centre. **Methods:** Records of all horses admitted for colic from 1998–2008 were examined. A diagnosis of a large colon displacement was made on the basis of clinical and rectal examination by board certified surgeons. Horses were managed conservatively with exercise, i.v. fluids and analgesia (nonsteroidal anti inflammatories or alpha-2 agonists). Nephrosplenic entrapments were additionally administered phenylephrine. **Results:** One-hundred-and-eight horses were treated for suspected displacement of the large colon. Included were 42 nephrosplenic entrapments, 64 right displacements, one 180° volvulus and one pelvic flexure retroflexion. Seventy-six responded to conservative management and were successfully discharged (70%). Four horses died or were subjected to euthanasia for economic reasons. Twenty-eight horses (initially treated conservatively) underwent surgery due to severe and persistent pain (8 right displacements, 4 nephrosplenic entrapments, one 180° volvulus and 15 noncolon related.) All 13 horses with surgical diagnosis of colon displacement survived to hospital discharge. Over the study period, 232 horses were operated on for colic including 3 cases of colon displacement not diagnosed preoperatively. Of a total of 96 horses diagnosed pre- or intraoperatively with colon displacement 92 (96%) survived to discharge. The proportion of colon displacements treated surgically is significantly different from other published data (Phillips and Walmsley 1993, P = 0.0001; Mair and Smith 2005, P = 0.0003). The frequency of colon displacements treated is not significantly different from other studies (Phillips and Walmsley 1993, P = 0.43). **Conclusions and Practical Significance:** Horses with a simple colon displacement, in the absence of signs of circulatory shock and toxaemia may respond to conservative management including exercise. This can result in a significant saving to the client in terms of reduced convalescence period, duration of hospitalisation and cost of veterinary fees.

17.00–17.15

**Sand colic at a UK equine hospital: The clinical features in a series of 22 cases**


*The Liphook Equine Hospital, Forest Mere, Liphook, Hampshire, UK.*

**Aims:** To describe the clinical presentation, treatment and long-term outcome of recent cases of confirmed sand colic (simple large intestinal obstruction associated with evidence of abnormal intestinal sand content) diagnosed at a UK equine hospital. **Methods:** Case records of all horses with a surgical diagnosis of sand colic between February 2004 and January 2008 were reviewed. Long-term follow-up was conducted by telephone questionnaire. **Results:** Sand impaction was recorded as the primary cause of colic in 22 horses (age range 4–20 years, mixed breed and sex) undergoing emergency exploratory laparotomy. Horses typically presented with mild but persistent abdominal discomfort and large intestinal tympany. Impaction was rarely palpable. The most frequent sites of sand accumulation were right dorsal colon (44%), right...
ventral colon (15%), transverse colon (13%) and diaphragmatic flexure (8%). More than one site of obstruction was identified in 12 horses (55%). Twenty horses (91%) survived to discharge. In 2 cases that did not survive to discharge, euthanasia was performed after rupture of the large colon following manipulation at surgery. Long-term (>12 months) survival rate for 11 horses discharged from the hospital and for which follow-up information was available was 91%.

Conclusions and Practical Significance: Sand colic has tended to be associated geographically with arid conditions, but this study shows that it should not be overlooked as a differential diagnosis in horses with colic in the UK. Persistent, mild abdominal pain in a horse with a history of access to sandy pasture might raise a specific suspicion. The long-term prognosis for the condition appears favourable, but the intraoperative death of 2 horses following iatrogenic colon rupture emphasises the care that must be taken when handling bowel that is injured and difficult to manipulate because of the weight of its contents.

17.15–17.30
Determination of risk factors for post operative ileus and evaluation of the effectiveness of preventive lidocaine treatment: A retrospective study on 132 small intestinal surgical colic cases

Torfs, S., Delesalle, C., *Dewulf, J., †Devisscher, L., †Gasthuys, F. and Deprez, P.
Department of Internal Medicine and Clinical Biology of Large Animals; *Department of Reproduction, Obstetrics and Herd Health; and †Department of Surgery and Anaesthesia of Domestic Animals, Unit for Veterinary Epidemiology, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium.

Aims: To determine risk factors associated with post operative ileus (POI), and to assess the effectiveness of preventive i.v. lidocaine treatment. Methods: A retrospective study was performed on 132 small intestinal surgical colic cases that had survived surgery by at least 24 h. The association of 31 pre-, intra- and post operative variables with POI was tested in a univariate logistic regression model, followed by a multivariate logistic analysis. Results: Univariate analysis demonstrated that age, heart rate, capillary refill time, packed cell volume, quantity of reflux at admission and performance of a small intestinal resection were significantly associated with an increased risk for development of POI. Preventive treatment with lidocaine significantly decreased the prevalence of POI. In the multivariate model, this protective effect of lidocaine remained significant; the parameters age, heart rate, quantity of reflux at admission and performance of a small intestinal resection were independently associated with an increased propensity for development of POI. In horses already suffering from POI, lidocaine treatment also had a significant positive effect on short-term survival. Conclusions and Practical Significance: The aforementioned parameters can be a useful aid in identifying horses at risk of POI and in providing a more accurate prognosis. In the studied population, the use of lidocaine reduced the prevalence of POI and increased the odds of survival. Timely referral, adequate cardiovascular supportive therapy and preventive and curative lidocaine treatment in the post operative period can help to improve prognosis in horses undergoing small intestinal surgery.

17.30–17.45
Investigating the reliability of a single faecal egg count to quantify the true faecal worm egg shedding rate of a horse

Denwood, M.J., Love, S., Reid, S.W.J. and Innocent, G.T.
Institute of Comparative Medicine, Faculty of Veterinary Medicine, University of Glasgow, UK.

Aims: The faecal egg count test is widely used in equine clinical parasitology, but the statistical implications of making inference from a single faecal egg count are not well understood. Using repeated sampling, the usefulness of such a procedure is explored. Methods: A group of 5 stabled horses was followed over a period of one week, and a faecal egg
count performed twice daily on each horse. For each sample, the number of eggs in 10 McMaster's chambers were recorded. In addition, a single faecal ball and faecal pat were each sampled in the same way a total of 5 times for 2 individuals. **Results:** Analysis of the egg counts between different samples taken from the same faeces indicated a large degree of variability in faecal egg concentration, from a minimum faecal egg count of 100 eggs/g to a maximum of 850 eggs/g in the same faecal pat of one animal (mean 454 eggs/g). If a single FEC had been used to determine whether or not this animal was below a threshold of 350 eggs/g, a false negative diagnosis would have been made in 28 of 100 (28%) cases. Using a simulation study based on this work, it is possible to quantify the minimum number of eggs to count in order to achieve a reliable indicator of mean egg shedding rate. **Conclusions:** Faecal egg concentrations appear to show a large degree of variation, making a single faecal egg count a poor indicator of mean egg shedding rate. It is useful to quantify the minimum number of repeat samples and chambers to examine in order to achieve an accurate measure of the egg shedding rate, so that the reliability of this test in clinical applications can be improved. **Acknowledgements:** This project was carried out as part of the Defra funded VTRI project O1D1.