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Laminitis

Chaired by Marianne Sloet

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08.30–08.45

Are there any correlations between external hoof capsule measurements and distal phalanx measurements?

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Aims: Foot pain is a major cause of forelimb lameness. There is limited information about orientation of the distal phalanx (P3) within the hoof capsule and its relationship with foot conformation. The objectives of this study were to determine relationships between external angles and linear ratios of the hoof capsule and the angles of P3. **Methods:** Photographs and lateromedial radiographs of 300 feet from 300 horses examined at the Animal Health Trust with foot pain were analysed. Hoof wall, heel and coronary band angles, hoof wall length and height, weight bearing length, coronary band length and dorsal and palmar height of the coronary band were measured on photographs. The following angles to the horizontal were measured on radiographs: dorsal hoof wall (Angle W); dorsal aspect of P3 (Angle P); concave, parietal solar surface of P3 (Angle C); solar border of P3 (Angle S). The reflex angle of P3 (Angle RA), length of the solar aspect of P3, height of P3 extensor process, weight bearing length of the foot and dorsal coronary band height were also measured. Descriptive statistics were undertaken and Spearman's Rank Correlations were used to test for associations between measurements. **Results:** External hoof capsule angles were weakly or moderately, positively correlated to P3 angles and weakly, negatively correlated to certain linear ratios. There was considerable variation between feet in angles C and S. **Conclusions and practical significance:** Angles and linear ratios of P3 could not be accurately predicted by external measurements of the hoof capsule. More work is required using sound horses to determine whether stronger correlations are seen and if there are breed differences in P3 shape. Clinicians should be careful assuming that foot conformation is an indicator of P3 position in horses with foot pain. **Acknowledgements:** The Bransby Home of Rest for Horses for funding.

08.45–09.00

The role of weather conditions in the occurrence of white line abscessation in donkeys in the UK

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Aims: Hoof disorders are very common in donkeys in the UK and include white line disease, laminitis, seedy toe and onchomycosis.

This study seeks to evaluate the role of environmental moisture levels in the development of white line abscessation (WLA). Prolonged exposure to water, urine and faeces has previously been shown to cause damage to the hoof wall in horses. We hypothesise that increased environmental moisture will be associated with an increase in the occurrence of WLA in donkeys in the UK. **Methods:** This study correlates the occurrence of WLA in a population of donkeys at the Donkey Sanctuary, Devon, with local levels of rainfall and sunshine. The hoof wall moisture content in healthy and diseased animals in the UK was assessed for forelimbs and hindlimbs and for healthy individuals in the arid environment of Luxor, Egypt. **Results:** A positive correlation between rainfall and incidence of WLA was found and a negative correlation between incidence of WLA and levels of sunlight. In forelimbs the hoof wall moisture was significantly higher in diseased (mean \pm s.d. 35.7 \pm 1.71%) compared to healthy hoof samples (mean \pm s.d. 29.9 \pm 3.47%). In hindlimbs there was no significant difference between the hoof wall moisture content of healthy (mean \pm s.d. 39.4 \pm 1.60%) and diseased (mean \pm s.d. 34.0 \pm 7.35%) samples. The moisture content in the hindlimbs was significantly higher than that in the forelimbs. Samples from Egypt had a significantly lower level of hoof wall moisture (mean \pm s.d. 25.0 \pm 5.38%) than UK samples. **Conclusions:** This study concludes that increased environmental moisture plays a role in the development of white line problems in the donkey amongst other predisposing factors. **Practical significance:** The control of environmental moisture levels may provide a way to reduce the occurrence of white line problems in the donkeys in the UK.

09.00–09.15

Plasma fructosamine elevations in horses with laminitis

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Aims: 1) To compare levels of plasma fructosamine (a marker of abnormal glucose homeostasis used in humans and small animals) in horses that present with laminitis with normal controls. 2) To investigate associations between elevated fructosamine at presentation in laminitic horses with: a) Single sample markers of insulin resistance, b) Outcome. **Methods:** Plasma fructosamine, fasted insulin and glucose were assayed on blood samples taken, (between 07.00 and 09.00 h) 24–72 h after diagnosis of laminitis from 30 horses that presented as first opinion cases to Bell Equine Veterinary Clinic between April and September 2009. Details of: signalment, clinical examinations, further diagnostics, treatment, management and outcome at 6 weeks were recorded. Plasma fructosamine was also assayed in a separate group of 19 nonlaminitic control horses. **Results:** Laminitic horses had significantly higher mean plasma fructosamine levels than normal horses ($P < 0.001$ Welch's t test). Laminitic mean = 288 μ mol/l (s.d. 43 μ mol/l) Normal mean = 253 μ mol/l (s.d. = 19 μ mol/l). Thirteen of 30 laminitic horses had fasting hyperinsulinaemia (>20 μ iu/ml) 2/30 had fasting hyperglycaemia (>6.9 mmol/l). In laminitic horses, nonparametric univariable analysis revealed statistically



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significant correlations between plasma fructosamine and fasting insulin, fasting glucose and RISQI (a proxy for insulin sensitivity). Trends for association between elevated plasma fructosamine and negative outcome at 6 weeks did not reach statistical significance.

Conclusions and practical significance: Hyperglycaemia is infrequently detected in horses. Plasma fructosamine may be a useful marker of transient hyperglycaemia associated with insulin resistance in horses with Equine Metabolic Syndrome or Equine Cushings Disease. Longer term follow-up of these cases and/or a larger study are required to assess the value of fructosamine as a prognostic indicator. These data support hypotheses implicating hyperinsulinaemia and aberrant glucose homeostasis in the pathogenesis of laminitis. **Acknowledgements:** This study was generously funded by a grant from the RCVS Trust.

09.15–09.30

Insulin and ACTH values in donkeys with and without laminitis in the UK

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Aims: To determine the values of insulin and ACTH in donkeys and evaluate the possible association of insulin resistance and pituitary *pars intermedia* dysfunction with the prevalence of laminitis. **Methods:** Blood samples were collected from 394 donkeys as part of routine clinical evaluation of new relinquishments to The Donkey Sanctuary, UK and insulin and ACTH were measured. Records were kept of the age, sex, body condition score (5 grade scales), history of previous laminitis and development of clinical laminitis within one month post sampling. Multivariate analyses were performed to determine statistically significant associations. **Results:** ACTH was only determined in 126 donkeys. The median age of donkeys was 12 years (range 1–49) and median BCS was 3.5. Of the 394 donkeys, 19% had a history of previous laminitis and 11% developed laminitis within one month post sampling. The normal mean values (\pm s.e.) of insulin (μ iu/ml) and ACTH (pg/ml) in nonobese donkeys (BCS \leq 3.5) without a history of laminitis were 4.95 (0.51) and 40.23 (3.42) respectively. Mean (\pm s.e.) insulin levels were significantly greater in donkeys with a history of laminitis (23.84 ± 4.17) vs. those without (8.51 ± 0.97), ($P < 0.001$); and greater in obese donkeys (20.86 ± 2.60) vs. nonobese donkeys (7.28 ± 1.13) ($P < 0.001$). There was no significant difference in mean ACTH levels (pg/ml) amongst those donkeys with or without a history of laminitis (51.73 ± 7.21 vs 39.61 ± 3.00), or with or without laminitis within a month post sampling (46.58 ± 9.92 vs. 41.08 ± 2.91) ($P \geq 0.11$). **Conclusions:** Higher insulin values were significantly associated with a history of laminitis and clinical signs of obesity, indicating that insulin resistance may be an important risk factor associated with laminitis in donkeys. **Practical**

significance: This study has determined normal values for insulin in the donkey. Evaluation of insulin values in donkeys may be a useful screening tool to identify donkeys at risk of developing laminitis.

09.30–09.45

Preliminary results of an epidemiological study on equine laminitis

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Aims: To determine risk factors for laminitis in Great Britain using a prospective cohort of horses/ponies under the care of a random sample of compliant practices, representative of the general equine veterinary population. **Methods:** A nested case-control study within the cohort study was used to quantify significant risk factors with data on exposure variables collected via owner-completed questionnaires. Sample size calculations indicate that 150 cases and 600 controls will be required to detect a minimum effect size of 2.0 based on assumptions of 5% significance, 80% power and a minimum exposure rate of 10% among controls and 4 controls per case. Preliminary analyses were conducted using Chi-squared/Fisher's exact and univariable logistic regression analyses to examine associations between selected risk factors and laminitis. **Results:** As of January 2010, 208 cases of laminitis were reported with 141 corresponding case questionnaires sent to owners willing to participate (67.8%). Eighty-one completed case questionnaires and 293 completed control questionnaires were received. Variables associated with an increased risk of laminitis were: previous episodes of laminitis (OR = 3.6, $P = 0.042$), not wearing shoes (OR = 1.7, $P = 0.04$), Cushing's disease (OR = 3.2, $P = 0.01$), Equine Metabolic Syndrome (OR = 3.6, $P = 0.04$) and retired horses compared to pleasure horses (OR = 2.3, $P = 0.01$). Variables associated with a decreased risk of laminitis were: geldings compared to mares (OR = 0.5, $P = 0.01$), height greater or equal to 15 hh (OR = 0.3, $P < 0.001$), transportation (OR = 0.2, $P < 0.001$), fed hard food (OR = 0.2, $P < 0.001$), competition horses compared to pleasure horses (OR = 0.6, $P = 0.005$). Variables with no statistically significant associations were: breed type (cross-breeds vs. pure-breeds), new health conditions and current medications. **Conclusions and practical significance:** These preliminary analyses have identified some modifiable factors significantly associated with laminitis. Further multivariable analysis on complete data should identify risk factors of practical significance, specific to Great Britain, and inform management strategies to prevent/minimise laminitis. **Acknowledgement:** This project is funded by World Horse Welfare.