UNIVERSITEIT VAN PRETORIA

FAKULTEIT VEEARTSENYKUNDE
FACULTY OF VETERINARY SCIENCE

11th Faculty Day
de Fakulteitsdag

September 30, 1994

PROGRAM EN OPSOMMINGS
PROGRAMME AND SUMMARIES

FAKULTEIT VEEARTSENYKUNDE, UNIVERSITEIT VAN PRETORIA
FACULTY OF VETERINARY SCIENCE, UNIVERSITY OF PRETORIA

11th FACULTY DAY — 11de FAKULTEITSDAG

30 SEPTEMBER 1994

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MESSAGE FROM THE DEAN

Prof. R.I. Coubrough

Faculty Day always has a special significance. Apart from allowing us to focus on the results of Faculty research, it also provides an ideal opportunity to display the manifold other Faculty talents, a chance to take stock at the culmination of a set programme, a chance to share experiences and a chance to reward achievement.

Man has always been imbued with an innate desire to enquire, to pry the unanswered and to delve into the unknown (ostensibly in the pursuit of truth). From the simplistic investigations that originally satisfied his inquisitive nature, research has developed into an exact and sophisticated science governed by stringent ethical norms and limited only in its extent by resource constraints. In eager anticipation the researcher subjects his findings to the critical appraisal and scrutiny of his peers, always eager to put any new hypothesis to the test.

Despite the greater complexity of modern veterinary research, the basic aims remain essentially the same as they have been for decades, namely: to alleviate suffering and improve the quality of life of man and animal, and to raise livestock production to meet the ever increasing needs of the burgeoning masses. Diminishing resources dictate greater relevance and there is clamour for community driven projects. Hopefully this will not be at the total exclusion of basic research for a balance between basic and applied research is fundamental to the viability, and indeed the survival, of any profession. Research must be well planned, competently executed and conform to international standards. "Multidisciplinary" is the current buzz word and measured against the complexity of the problems that need attention, the wisdom of this approach is self evident.

A significant part of any research programme is the report back. Ultimately the findings, be they negative, confirmatory or entirely new must be communicated to our peers and the public we serve. Without "feed back" research cannot be justified. Faculty Day therefore provides an ideal forum for this purpose, allowing the established researcher as well as the novice an opportunity to meet on common ground and test the critical waters of scientific appraisal. It is often the first link in the chain of communication. It allows the exposure of a new hypothesis, a re-look at old perceptions casting them in a fresh light and possibly even the opportunity to share the unravelling of hidden secrets through the discovery of new facts.

The air of expectancy, the excitement and anticipation that precede the break of a Faculty Day are essential components of a positive research ethic. A great deal of hard work goes into the preparation of the material presented to ensure that one's best foot is put forward. This is in effect our shop window and the scientific status (and integrity) of the individual, and indeed of the institute, are open to public scrutiny and are thus at stake. It is a meeting of intellectually and scientifically attuned minds that gather to listen, discuss, criticize and guide. Hopefully the day serves (for this is the aim) to catalyze and fuel the inner desire of the established and novice research worker, as well as our students, to strive to greater research heights, or to consider research as a career, as the case may be.

Curriculum Vitae

Dr W. Plowright

Walter Plowright was born on 20 July 1923 in Sutton Bridge, Lincolnshire, England. He graduated from the Royal Veterinary College, London during 1944.

He started his career in 1944 when he joined the Veterinary Corps of the Royal Army. In 1948 he took up the post of Demonstrator in Pathology at the Royal Veterinary College in London, and in 1950 became a Veterinary Research Officer at the Veterinary Research Laboratory, Department of Veterinary Services, Kabete, Kenya. In 1954 he went to Nigeria as a Veterinary Research Officer at the Federal Veterinary Laboratory and in 1956 returned to Kenya where he worked as Veterinary Research Officer, later to become Principal Scientific Officer and Senior Principal Scientific Officer at the East African Veterinary Research Organisation, Maguga, Kenya. He also became Head of the Departments of Pathology and Virology.

In 1964 he went back to England to join the Animal Virus Research Institute at Pirbright. In 1971 he was appointed to the Chair of Veterinary Microbiology and Parasitology of the Royal Veterinary College, London. From 1978 to 1983 he served as Head of the Department of Microbiology at the Institute for Research on Animal Diseases, Compton, Newbury, England.

Dr Plowright has received various degrees and awards during his career. In 1964 he received the D.V.Sc. degree from the University of Pretoria. In 1965 he received the J.T. Edwards Memorial Medal from the Royal College of Veterinary Surgeons in London and in 1972 the R.B. Bennett Commonwealth Prize of the Royal Society of Arts, London. He was appointed Companion of the Order of St. Michael and St. George by H.M. Queen Elizabeth II in 1974. In 1977 he was elected to Fellowship of the Royal College of Veterinary Surgeons and in 1979 was awarded the Beldisloe Trophy of the Royal Agricultural Society of England. He was elected Fellow of the Royal Society of London in 1981. During 1984 he received the King Baudouin Prize for International Development and the Dalrymple-Champneys Award from the British Veterinary Association. In 1984, the degree D.Sc. (*Honoris causa*) was conferred upon him by the University of Nairobi, Kenya and in 1986 the degree D.Sc. (*Honoris causa*) by the University of Reading. In 1987 he was elected Fellow of the Royal Veterinary College, London, in 1988 received a Gold Medal of the Office International des Epizooties, Paris, in 1991 received the Outstanding Scientific Achievement Award, Animal Health Trust, U.K. and in 1994 the Gold Medal of the European Society for Veterinary Virology.

PROGRAMME PROGRAM

Faculty Day 30 September 1994 Fakulteitsdag

07:45 - 08:15 **Registrasie en Koffie / Registration and Coffee**

07:45 - 17:00 **Art Exhibition / Kunsuitstalling**

08:15 - 08:30 **Verwelkoming deur die Dekaan / Welcoming by the Dean**

08:30 - 10:00 **Research Programme: Session I / Navorsingsprogram: Sessie I**
Session Chairman : Dr A. Olivier : Sessievoorsitter

1. The effect of ketoprofen on a soft-tissue inflammation model in Thoroughbred horses
A.J. Guthrie, C.R. Short, G.E. Swan, M.S.G. Mülders, V.M. Killeen & J.P. Nurton

2. Comparison of stereospecific pharmacokinetics of ketoprofen in conditioned and unconditioned Thoroughbred mares
G.E. Swan, A.J. Guthrie, C.R. Short, M.S.G. Mülders, J.P. Nurton & V.M. Killeen

3. Characterization of a standard exercise to fatigue test in Thoroughbred horses
C.W. Travers, A.J. Guthrie & R.J. Lund

4. A novel approach to controlling worms in horses in South Africa
R.C. Krecek, S. Weyers & A.J. Guthrie

5. Histological detection and quantification of specific types of equine endometrial pathology by computerized interactive morphometry
C. Gerstenberg & D.H. Volkmann

6. Duodenal ultrasonography in the normal horse
R.M. Kirberger, J.S. van den Berg, R.D. Gottschalk & A.J. Guthrie

10:00 - 10:15 **Toekenning aan "Dosent van die Jaar" / "Lecturer of the Year" Award**

10:15 - 11:00 **Tea and Viewing of Posters / Tee en Plakkaatbesigtiging**

11:00 - 12:00 **Sir Arnold Theiler-gedenklesing: Dr W. Plowright**
"Rinderpest Research and the Cell Culture Revolution"
Oorhandiging van die Theiler-gedenktrusttoekenning

Sir Arnold Theiler Memorial Lecture: Dr W. Plowright
"Rinderpest Research and the Cell Culture Revolution"
Presentation of the Theiler Memorial Trust Award

12:00 - 13:00 **Lunch** (for registered participants) / **Middagete** (vir geregistreerde deelnemers)

13:00 - 14:30 **NAVORSINGSPROGRAM: SESSIE II / RESEARCH PROGRAMME: SESSION II**
SESSIEVOORSITTER : PROF. B.L. PENZHORN : SESSION CHAIRMAN

7. COMPARATIVE EFFICACY OF D-PENICILLAMINE AND TRIENTINE AS COPPER CHELATORS IN SHEEP
C.J. BOTHA, T.W. NAUDÉ & G.E. SWAN

8. A MODEL TO QUANTIFY UPTAKE OF NUTRIENTS IN THE MAMMARY GLAND OF THE COW
D.G. WARD, I.J. LEAN & J.M. GOODEN

9. DIAGNOSING HYPOCALCAEMIA WITH CARCASS BLOOD IN SHEEP
G.F. BATH, A. OLIVIER & J. JANSE VAN RENSBURG

10. SELECTIVE FOETAL RESORPTION IN THE POUCHED MOUSE
L.M. WESTLIN, J.T. SOLEY, N.J. VAN DER MERWE & Y.J. VAN DYK

11. MICROBIOLOGICAL STATUS OF CHICKEN CARCASES AT SELECTED CRITICAL CONTROL POINTS IN A POULTRY PROCESSING PLANT
M. OLIVIER, T.E. CLOETE, C.M. VEARY & A. VON HOLY

12. EQUINE ARTERITIS VIRUS: ISOLATION FROM DONKEYS AND DEMONSTRATION OF VENEREAL AND IN-CONTACT TRANSMISSION IN SOUTH AFRICA
J.T. PAWESKA, D.H. VOLKMANN & B.J.H. BARNARD

14:30 - 15:00 **FOCUS ON: EQUINE RESEARCH CENTRE / FOKUS OP: PERDENAVORSINGSENTRUM**

15:00 - 15:15 **TEE EN PLAKKAATBESIGTIGING / TEA AND VIEWING OF POSTERS**

15:15 - 16:00 **RESEARCH PROGRAMME: POSTERS / NAVORSINGSPROGRAM: PLAKKATE**
SESSION CHAIRMAN : PROF. C.M. VEARY : SESSIEVOORSITTER

16:00 - 17:00 **NAVORSINGSPROGRAM: SESSIE III / RESEARCH PROGRAMME: SESSION III**
SESSIEVOORSITTER : PROF. S.R. VAN AMSTEL : SESSION CHAIRMAN

13. EVALUATION OF TWO DRY-CHEMISTRY ANALYZERS FOR USE IN A VETERINARY OUTPATIENTS CLINIC
F. REYERS & E. MYBURGH

14. AN EXPERIMENTAL VACCINE AGAINST SOUTH AFRICAN *BABESIA CANIS*
B.D. LEWIS & B.L. PENZHORN

15. STERILIZATION OF *BABESIA CANIS* INFECTIONS
B.L. PENZHORN, B.D. LEWIS, D.T. DE WAAL & L.M. LÓPEZ-REBOLLAR

16. AN INVESTIGATION OF THE OXYGEN STATUS AND ACID-BASE BALANCE IN NATURALLY INFECTED CASES OF CANINE BABESIOSIS, BEFORE AND AFTER WHOLE BLOOD TRANSFUSION
A.L. LEISEWITZ, A.J. GUTHRIE, F. REYERS & W.L. BERRY

17:00 - 17:10 **DEAN'S AWARD FOR BEST PAPER AND POSTER**
DEKAANSTOEKENNING VIR BESTE REFERAAT EN PLAKKAAT

17:10 - 17:15 **AFSLUITING / CONCLUSION: PROF. B.L. PENZHORN**

17:15 - 18:30 **COCKTAIL PARTY / SKEMERPARTYTJIE**

THE EFFECT OF KETOPROFEN ON A SOFT-TISSUE INFLAMMATION MODEL IN THOROUGHBRED HORSES *

A.J. Guthrie, C.R. Short[1], G.E. Swan[2], M.S.G. Mülders[2], V.M. Killeen & J.P. Nurton

Equine Research Centre, [1]Department of Pharmacology & Toxicology (Visiting Professor), and Department of Veterinary Physiology, Pharmacology & Toxicology, Louisiana State University, Baton Rouge, Louisiana, USA, [2]Department of Pharmacology & Toxicology

Ketoprofen is a 2-arylproprionic acid anti-inflammatory agent. It is claimed to be effective in blocking both the cyclo-oxygenase and lipoxygenase pathways, and is thus becoming increasingly popular for the therapy of soft-tissue inflammatory conditions associated with training in racing horses. The aim of this study was to evaluate the effects of ketoprofen on a soft-tissue inflammatory model.

Six Thoroughbred mares had two subcutaneous tissue chambers surgically implanted on the lateral aspect of the neck. The body of the tissue chamber was constructed of a thermoplastic (*Delrin®*) and the open face covered with a silastic membrane which lay directly under the skin after implantation; this facilitated sampling of interstitial fluid via percutaneous needle puncture. The chambers were sterilized using ethylene oxide and were aseptically implanted while the horses were under general anaesthesia. Between 28 and 35 days, the stability and sterility of the chambers were evaluated. At least 42 days after implantation, the first phase of the trial commenced. Inflammation was induced in one chamber by injection of 1 mℓ of a 1% carrageenan solution; the second chamber served as the control. Seven days later ketoprofen (*Ketofen 10%*, Rhône Mérieux) administration commenced. Following six intravenous doses of ketoprofen (2,2 $mg.kg^{-1}$) the one chamber was inflamed again. Samples of the tissue fluid were collected from both chambers immediately prior to the injection of carrageenan, and at 4, 8, 12, 24, and 72 hours post-injection. The tissue fluid was analyzed and the following determined: cellularity; acid-base and gas status; concentration of total protein, albumin, prostaglandin E_2 (PGE_2) and leucotriene B_4. The data were statistically analyzed using a repeated measures analysis of variance.

PGE_2 concentrations in the inflamed chambers were significantly reduced at 4, 8, 12, 24 and 72 hours following the administration of ketoprofen. No significant differences were observed in any of the other variables measured.

This study demonstrated that the tissue chamber model produced a reliable controlled mild local soft-tissue inflammatory reaction in the horse. The only effect of ketoprofen on this model was to reduce the concentration of PGE_2. Although ketoprofen was very effective in reducing the PGE_2 concentration in the inflamed chambers, it did not appear to have any effect on the other indices of inflammation which were measured. As ketoprofen has a short half-life it may not be effective in controlling the more long-term effects of the inflammation.

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* Research Project No. 36.5.83. Approved by the Faculty Ethics and Research Committees.

COMPARISON OF STEREOSPECIFIC PHARMACOKINETICS OF KETOPROFEN IN CONDITIONED AND UNCONDITIONED THOROUGHBRED MARES *

G.E. Swan, A.J. Guthrie[1], C.R. Short[2], M.S.G. Mülders, J.P. Nurton[1] & V.M. Killeen[1]

Department of Pharmacology & Toxicology, [1]Equine Research Centre, [2]Department of Pharmacology & Toxicology (Visiting Professor), and Department of Veterinary Physiology, Pharmacology & Toxicology, Louisiana State University, Baton Rouge, Louisiana, USA

Ketoprofen is a 2-arylproprionic chiral compound registered as an anti-inflammatory agent for use in horses in the USA and Europe. The commercial product (*Ketofen 10%*, Rhône Mérieux) is a racemic mixture of the two isomers R(-) ketoprofen and S(+) ketoprofen. Ketoprofen has been shown to have a stereospecific action with the S(+) enantiomer being a more potent inhibitor of cyclo-oxygenase than the R(-) form. Stereospecific pharmacokinetics have been reported for ketoprofen in rats and horses, but not in man. In man, drug metabolism has been shown to be affected by conditioning. The aim of this study was to compare the stereospecific pharmacokinetics of ketoprofen in unconditioned and conditioned Thoroughbred horses.

Eight healthy Thoroughbred mares were used in a cross-over designed study. During each crossover period there were equal numbers of horses that had been either subjected to a standard 6 week intensive conditioning programme or left untrained. Six doses of ketoprofen (2,2 $mg.kg^{-1}$) were administered intravenously at 12 hourly intervals to each horse. Blood samples were collected from a jugular catheter immediately prior to each treatment and 5, 10, 15, 20, 25, 30, 40, 50, 60, 75, 90, 105, 120, 150, 180, 240, 300, 360, 480 and 720 minutes after drug administration. Serum samples were stored at -20°C until analyzed. Measurement of R and S ketoprofen serum concentrations was performed by high pressure liquid chromatography following liquid extraction and L-leucinamide derivatisation. Pharmacokinetic parameters were determined by non-linear analysis using *PC-Nonlin®*. Analysis of variance for a cross-over design was performed on data for conditioned and unconditioned horses.

The data best fitted a single open compartmental model with first order rate constants. The results observed in this trial confirm the pharmacokinetic stereoisomer results of ketoprofen previously reported in horses. The predominance of S(+) ketoprofen is probably explained by the inversion of R(-) ketoprofen to S(+) ketoprofen. No significant differences ($p > 0.05$) were noted between the pharmacokinetic parameters determined in unconditioned and conditioned horses.

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* Research Project No. 36.5.83. Approved by the Faculty Ethics and Research Committees.

CHARACTERIZATION OF A STANDARD EXERCISE TO FATIGUE TEST IN THOROUGHBRED HORSES *

C.W. Travers, A.J. Guthrie[1] & R.J. Lund[1]

Department of Medicine, [1]Equine Research Centre

Standard Exercise Tests on high speed treadmills have been used widely to asses performance of equine athletes. It has been suggested that these tests yield inconsistent results and do not allow for clear differentiation of the performance abilities of different horses. Recent studies in man have shown that Standard Exercise to Fatigue (SEF) tests are accurate in assessing speed and endurance ability. The aim of this study was to characterize a practical SEF test that may be accurate in assessing the performance ability of equine athletes.

Five Thoroughbred mares ranging from 3 to 12 years of age were used in this study. The horses were warmed up by walking for 5 minutes and trotting for 5 minutes. They then ran at a speed of 7,5, 9, 11, 13 or 14,5 $m.s^{-1}$ at a 3° inclination on a high speed treadmill until fatigued. Horses were considered fatigued when they could no longer keep up with the treadmill belt despite vigorous verbal encouragement. The time to fatigue was recorded using a stopwatch. The horses were rested for at least 48 hours between running each different speed test. Regression analysis was performed using *SigmaPlot® 5.0.*

The time to fatigue ranged from 39 minutes 45 seconds at 7,5 $m.s^{-1}$ to 1 minute at 14,5 $m.s^{-1}$. Regression analysis showed that there was an excellent relationship between the logarithm of the time to fatigue and treadmill speed in all subjects. The coefficients of determination of this relationship for individual subjects ranged from 0,988 to 0,996. The intercept of the regression equations ranged from 4,36 to 5,02 and the slope ranged from -0,14 to -0,21.

Due to the excellent log/linear relationship between time to fatigue and treadmill speed, it is possible to reliably characterize this relationship for an individual horse using only two different treadmill speeds. The large differences in both the slope and intercept of the regression equations between individuals are possibly an indication of differences in the power and endurance capabilities of the subjects. Further studies using this test in elite race and endurance horses will be necessary to fully evaluate the importance of these findings. The SEF test at treadmill speeds of 9 $m.s^{-1}$ and 13 $m.s^{-1}$ at a 3° inclination were best accepted by the horses and thus these speeds will be used in further studies. In this study, we characterized a practical SEF test which may have great potential in the assessment of performance ability of horses.

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* Research Project No. 36.5.134. Approved by the Faculty Ethics and Research Committees.

A NOVEL APPROACH TO CONTROLLING WORMS IN HORSES IN SOUTH AFRICA *

R.C. Krecek, S. Weyers & A.J. Guthrie[1]

Department of Veterinary Tropical Diseases, [1]Equine Research Centre

Internal parasites of horses, comprised mainly of nematodes, have been implicated as one of the major causes of colic. Little information exists concerning the extent of the problem caused by these parasites in South African horses. There is also a dearth of knowledge on how parasite levels compare in horses kept under different management schemes. A study was therefore designed to compare the nematodes of two groups of horses under differing management. The horses in Group 1 (n=27) were largely on zero grazing and were treated 4 times a year with antiparasitic remedies. The horses in Group 2 (n=16) grazed on irrigated pastures and received antiparasiticides twice a year.

The two groups were each divided into conventional and selective subgroups. Whereas the conventional subgroups were treated as previously described, the selective subgroup animals received treatment if the quantitative nematode egg count was greater than or equal to 300 eggs per gram (epg) of faeces.

The egg counts and larval cultures were carried out every four weeks. It was found that strongyle eggs and cyathostome larvae predominated. Statistical analyses were performed on mean egg counts for the conventional and selective subgroups within each group of horses.

The mean egg counts were statistically different between the two groups ($p < 0,05$). The means for Group 1 were 414 epg for the conventional subgroup (n=21) and 245 epg for the selective subgroup (n=6); for Group 2, the means were 444 epg for the conventional subgroup (n=10) and 270 epg for the selective subgroup (n=6). Fewer treatments were required for the selective subgroup of Group 1 as compared to the conventional subgroup. Group 2 showed a decrease in egg counts, compared with a previous study, suggesting that regular monitoring of nematode levels does lead to effective reduction of worm levels.

The number of antiparasitic treatments for individual horses were considered. In both groups some horses required more treatments over the two year trial period while others required fewer. Clearly some horses appear to be "wormy" and others demonstrate a resistance as evidenced by lower nematode counts.

Selective chemotherapy is a novel approach to controlling worms in horses. We feel it has considerable potential since some horses have an innate type of resistance to infestation. By capitalizing on the innate resistance of these animals treatment costs can be rationalized, further development of antiparasitic remedy resistance will be avoided, worm contamination of pasture will be decreased and, ultimately, worms will be controlled in horses.

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* Research Project No. 36.5.21. Approved by the Faculty Ethics and Research Committees.

HISTOLOGICAL DETECTION AND QUANTIFICATION OF SPECIFIC TYPES OF EQUINE ENDOMETRIAL PATHOLOGY BY COMPUTERIZED INTERACTIVE MORPHOMETRY *

C. Gerstenberg & D.H. Volkmann

Department of Theriogenology

In 1993 a novel computerized image analysis method for the quantitative histological evaluation of equine endometrial biopsies was presented. After analyzing a number of biopsies with the programme written for Computerized Interactive Morphometry (CIM), as well as by conventional subjective methods, we can now report results which support the validity of the computerized system.

Twenty-four dioestrus biopsy sections were used in this study. They were all analyzed by CIM, while duplicate sections were evaluated by two experienced independent observers using the subjective Kenney-Doig System. The results of the subjective evaluations of seventeen sections were sufficiently conclusive to allow them to be grouped as follows: *normal group* (n=5), *acute endometritis group* (n=5), *chronic endometritis group* (n=5) and *endometrosis group* (n=2). Ranking lists, based on the severity of each type of pathological change, were established by CIM and by both subjective evaluators.

On each section 189 histological variables were determined by means of CIM. The values determined on the five *normal sections* were used to define a reference range (mean $\pm$ 1 SD) of CIM values for all variables. Based on published information, variables which were considered appropriate for diagnosing a particular type of pathology were termed *relevant variables*, while those variables which were considered pathognomonic for that type of pathology were termed *indicator variables*. All *relevant variables* for a specific type of pathology which fell frequently or consistently outside the reference range were referred to as *useful variables*. By comparing the CIM results for each biopsy to the two subjective evaluations, the set of *useful variables* (including *indicator variables*) was then tested for its sensitivity to detect and quantify a specific type of pathology.

There were considerable differences and inconsistencies between the two subjective evaluations, but excellent agreement between the combined comments of both observers and the CIM evaluation. The *indicator variables* proved accurate in detecting the presence of a specific type of pathology. Values for *useful variables*, which fell outside the *normal reference range*, were mirrored by comments on the same pathological change in one or both of the subjective evaluations. The CIM data were more consistent than the subjective observers in determining the severity of change. Furthermore, the subjective and CIM ranking lists concurred in identifying the sections with the most severe manifestations of each type of pathology.

Although the groups were too small to perform more involved statistical tests, it could be shown that the computer programme used in this study is a better system for evaluating endometrial pathology than subjective evaluation. CIM can thus be used in further studies requiring the quantitative evaluation of equine endometrial biopsies. Once a larger number of sections has been analyzed the results might be used to establish databases for different types of pathology and to construct a diagnostic algorithm for each type.

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* Research Project No. 36.5.55. Approved by the Faculty Ethics and Research Committees.

DUODENAL ULTRASONOGRAPHY IN THE NORMAL HORSE *

R.M. Kirberger, J.S. van den Berg[1], R.D. Gottschalk & A.J. Guthrie[2]

Department of Surgery, [1]Department of Medicine, [2]Equine Research Centre

Ultrasonographic evaluation of the gastrointestinal tract has been found to be a valuable diagnostic tool in humans and small animals. No reports have been published describing the ultrasonographic evaluation of the gastrointestinal tract of the horse. The aim of this project was to formulate a standard procedure for the ultrasonographic evaluation and interpretation of the duodenum in the normal horse under different dietary conditions.

Six normal horses, alternatively fed diets of concentrates and hay, hay only and after 36 hours of starvation were evaluated in a balanced crossover design. The horses were scanned using a 5 MHz electronic convex sector transducer and the following information was recorded for each horse in each grouping:

- The anatomical location of the duodenum with factors influencing its visualization.
- The ultrasonographic appearance of the duodenal wall.
- The cross sectional diameter of the duodenum, from serosa to serosa, during maximum distension and maximum contraction.
- The number of duodenal distensions and circular contractions over a three minute period and averaged to one minute.
- The appearance of the duodenal content, including direction of movement.
- Extra-duodenal structures where appropriate.

The duodenum was consistently visualized just ventral to the right kidney at the 16th and 17th intercostal spaces on a line joining the *Olecranon* and *Tuber sacrale*. Cranial to the 16th intercostal space visibility depended on the thickness of the interposing liver and lung field interference. Duodenal distensions, contractions and content were described. Starved horses had fewer contractions and distensions than horses on hay or hay and concentrate diets but the difference was not statistically significant. Duodenal wall thickness ranged from 3 to 4 mm. Five layers, corresponding to the mucosal surface, mucosa, submucosa, muscularis propria and serosa, could be identified ultrasonographically. A necropsy specimen of the duodenum was evaluated histologically and ultrasonographically in a water bath for comparison.

The normal duodenum was readily evaluated by means of diagnostic ultrasound. Further experience in scanning gastrointestinal pathology is necessary to determine whether this imaging modality will prove to be of benefit in evaluating the duodenum and adjacent large bowel during the clinical workup of the horse with abdominal pathology.

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* Research Project No. 36.5.6. Approved by the Faculty Ethics and Research Committees.

COMPARATIVE EFFICACY OF D-PENICILLAMINE AND TRIENTINE AS COPPER CHELATORS IN SHEEP *

C.J. Botha, T.W. Naudé & G.E. Swan

Department of Pharmacology & Toxicology

The objective of this study was to compare d-penicillamine and trientine as *in vitro* chelators in preventing copper-induced haemolysis of ovine red blood cells, and then to compare their *in vivo* cupruretic effect following copper loading in sheep.

An *in vitro* technique for haemolysing sheep red blood cells with copper sulphate was validated. This technique was then applied to test the efficacy of trientine and d-penicillamine in preventing haemolysis.

Trientine concentrations of 0,5, 1,0 and 1,5 mM were found to be the most effective ($p < 0,05$) in reducing copper-induced haemolysis. Concentrations of 1,0 and 1,5 mM d-penicillamine were also effective ($p < 0,05$), but in this experiment a 0,5 mM concentration failed to protect the erythrocytes.

Based on the promising *in vitro* results, the cupruretic effect of d-penicillamine and trientine were assessed in twelve fistulated S.A. Mutton Merino rams of approximately six months of age, following copper loading. Each animal received 20 mg copper sulphate per kilogram body weight as an aqueous solution, intraruminally, daily for 35 days. The animals were then randomly assigned to a d-penicillamine treatment group (n=4), a trientine treatment group (n=4), or an unmedicated control group (n=4). Three rams that had not been copper loaded were kept as a separate control group. Urinary copper excretion was measured before and during treatment. All the sheep were housed individually but were periodically placed in steel metabolic crates to facilitate urine collection.

The results indicated that d-penicillamine significantly ($p < 0,05$) increased urinary copper excretion. Trientine failed to increase urinary copper excretion when compared to the two control groups.

The apparent discrepancy in efficacy of trientine as a copper chelator in the *in vitro* and the *in vivo* studies was ascribed to poor bioavailability of the drug following intraruminal administration. It is proposed that trientine is biodegraded in the rumen and is therefore unavailable for absorption. The oral administration of trientine is therefore not recommended for the treatment of chronic copper poisoning in stud or other valuable sheep.

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* Research Project No. 36.5.27. Approved by the Faculty Ethics and Research Committees.

A MODEL TO QUANTIFY UPTAKE OF NUTRIENTS IN THE MAMMARY GLAND OF THE COW

D.G. Ward, I.J. Lean[1] & J.M. Gooden[1]

Department of Physiology, [1]Department of Animal Science, University of Sydney, Camden, New South Wales, Australia

The Fick Principle is commonly used to study the uptake of nutrients in the mammary gland of the cow. The principle utilizes mammary blood flow (MBF) and the arteriovenous (AV) difference across the gland for a particular nutrient. The traditional weakness of applying this technique to mammary gland nutrient uptake has been the accurate estimation of MBF and true venous drainage from the gland. To overcome these problems a new model using transit-time ultrasonic blood flow probes and ligation of the external pudendal vein (EPV) was developed.

In the past, researchers believed that blood samples obtained from the milk vein (MV) were truly representative of the udder's venous outflow. However, this study showed that in at least one cow, the blood composition in the two main veins draining the mammary gland (EPV and MV) differed significantly ($p < 0,05$): oxygen saturation differed by 6,3%, acetate (C^2) by 13,3%, propionate (C^3) by 9,3%, butyrate (C^4) by 5,4%, and 3-betahydroxybutyrate (3OHB) by 8,1%. Non-significant differences were measured in glucose (3,0%) and non-esterified fatty acids (NEFA) (1,7%). This result suggested that the blood in both veins (EPV and MV) must be considered to accurately define mammary uptake of substrate nutrients.

The model which was then developed utilized ligation of the EPV to standardize the udder's venous drainage. A blood flow probe was placed around the external pudendal artery (EPA) to accurately measure MBF, and another probe was placed around the MV to ascertain whether all the blood flowing into the gland was leaving *via* this vein. An indwelling intravenous catheter was placed in the MV and blood samples were taken on days 4, 7, 10, 14, and 21 following surgery. The samples were analyzed for oxygen saturation and for the concentrations of the milk precursors described earlier (C^2, C^3, C^4, 3OHB, Glucose, NEFA).

Blood flow through the MV was found to be $0,75 \pm 0,10\ \ell.min^{-1}$ less than that through the EPA in the two cows studied. This discrepancy in blood flow was accounted for by the demonstration of a small collateral vein in the udder's medial suspensory ligament. This vein was normally dormant but became patent whenever the MV was occluded.

This model therefore allows a much more precise determination of AV differences in that it accurately defines MBF and the true venous drainage of the udder. This in turn permits a more precise determination of the net uptake of milk precursors in the mammary gland.

DIAGNOSING HYPOCALCAEMIA WITH CARCASS BLOOD IN SHEEP *

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Hypocalcaemia is an important disease of ewes, but it is difficult or impossible to diagnose with certainty after death because of the lack of characteristic lesions. The condition may therefore be diagnosed at necropsy either too seldom, or too often. It was hypothesised that the analysis of serosanguinous fluid from carcasses could give a good indication of antemortem calcium concentrations ([Ca]).

To test this hypothesis, pooled normocalcaemic blood was partially dialysed to give three batches of blood representing severe hypocalcaemia ([Ca] 0,6 mmol.ℓ^{-1}), moderate hypocalcaemia ([Ca] 1,5 mmol.ℓ^{-1}) and normocalcaemia ([Ca] 2,2 mmol.ℓ^{-1}). To mimic some of the conditions which could affect calcium levels in carcasses, samples of these batches were placed in test tubes and incubated at 5°C, 20°C or 37°C, with or without the addition of *Escherichia coli*, and for periods of 0, 3, 6, 12, 24 and 48 hours. The blood samples were centrifuged and the serosanguinous fluid was collected and stored for [Ca] analysis by spectrophotometry.

Results showed no diagnostically important variations in serosanguinous fluid [Ca] incubated at 5°C, except in the low [Ca] samples held for 48 hours. Fluid incubated at 20°C also showed diagnostically important changes in [Ca] starting at 24 hours, again only in the low [Ca] samples. Fluid incubated at 37°C showed these changes starting at 12 hours in the low [Ca] samples, from 24 hours in the intermediate [Ca] samples, but not in the normocalcaemic samples. The presence of *E. coli* did not appear to affect the [Ca]. From visual appraisal of the samples, it was clear that the degree of haemolysis was consistent with the apparent drop in [Ca], and it appeared that severe haemolysis interfered with the spectrophotometric analysis used.

It was concluded that, provided severe haemolysis or putrefaction do not interfere with the analytical method used, the calcium concentration of serosanguinous fluid taken from carcases can be diagnostically useful.

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SELECTIVE FOETAL RESORPTION IN THE POUCHED MOUSE

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Mating and fertilization in the pouched mouse (*Saccostomus campestris*) (Cricetidae) appear to be independent of environmental cues and adjustment of reproductive output has to be made after conception. In the laboratory, however, pre-natal mortality is extremely rare in *S. campestris* and abortions have never been reported. Yet on two occasions, when the mice were transferred to new housing facilities, females due to give birth within two days either produced small litters or none at all. Very late resorption of the foetuses appeared to be the only explanation for this phenomenon.

Foetuses (n=105, 21 ♀♀) were studied from sixteen days of pregnancy to term, to determine how resorptions could occur at such a late stage of gestation. Fresh foetuses were weighed and measured (greatest length). After fixation some foetuses were prepared for light microscopy, while others (whole foetuses) were specifically stained to facilitate the study of cartilage- and/or bone-development.

Partial resorption was in progress in seven of the twenty-one females, while four females had resorbed their whole litter. In four females, the resorbing foetuses were of two different sizes, indicating that the process of resorption had started on two different occasions. Hairs in the uterine compartment of some resorbing foetuses indicated that their resorption was initiated no earlier than Day 17 to 18. The placentas appeared similar to those of healthy foetuses.

Foetal growth followed the equations for growth rates published earlier for this species. Actual growth plotted against gestation time revealed a lag-period between Days 18 and 19. This phenomenon has not been described in any other mammal at this stage of pregnancy. It may represent a "last-minute-hesitation" in the pregnant female, during which time final resorption can be initiated or normal development allowed to proceed. The mechanism whereby this is achieved is as yet unknown. At Day 17 of gestation, the pouched mouse reveals morphological features typical of Carnegie stage 23 described in other rodents (e.g. the secondary palate is closed and the organ systems are laid down). Only growth, histological differentiation and the onset of function must still occur prior to birth. Ossification is, however, delayed in the pouched mouse. This is contrary to what has been demonstrated in other rodents with similar gestation periods. At that stage of development, rats, mice and Chinese hamsters demonstrate widespread ossification.

We believe that these observations provide sufficient evidence that female pouched mice are not only capable of resorbing foetuses on more than one occasion during a pregnancy, but that the last resorption, due to selective developmental inhibition, may occur as late as 72 to 48 hours prior to parturition. This is made possible by retarded growth during the lag-period and also by retarded ossification. This is, to our knowledge, a unique feature in a mammal and, in a species that has no other way of controlling its reproductive output, may serve the purpose of avoiding a great loss in energy-investment at times of sudden and potentially fatal environmental changes.

MICROBIOLOGICAL STATUS OF CHICKEN CARCASES AT SELECTED CRITICAL CONTROL POINTS IN A POULTRY PROCESSING PLANT *

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A pilot study was conducted to determine baseline data on the microbiological status of broilers slaughtered at a South African Grade B poultry abattoir. The abattoir's throughput varies but up to 3 000 birds are slaughtered daily; the processing is labour intensive.

Three broiler carcases were selected at critical control points. The control points chosen were as follows:

- after defeathering
- after evisceration
- after chilling.

The carcases were sampled at the following locations:

- neck skin
- meat from both sides ventral to the wings
- skin from both sides ventral to the wings
- meat caudal to breastbone
- skin caudal to breastbone
- skin cranio-dorsal to pygostyle
- skin from back between the wings
- skin $\pm$ 2 cm cranial to the centre of the breast.

Total bacterial counts were performed on the samples. The greatest bacterial counts were obtained from the neck skin samples. The samples were incubated at 37°C and the organisms were identified. The dominant Gram negative organisms were *Escherichia coli*, *Proteus vulgaris*, *Acinetobacter baumanii* and *Citrobacter intermedius*. The dominant Gram positive organisms were *Staphylococcus saprophyticus*, *Staphylococcus aureus* and *Enterococcus cecorum*.

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EQUINE ARTERITIS VIRUS: ISOLATION FROM DONKEYS AND DEMONSTRATION OF VENEREAL AND IN-CONTACT TRANSMISSION IN SOUTH AFRICA

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The horse is the only reported host for equine arteritis virus (EAV). However, a recent serological investigation indicates a widespread distribution of the disease among donkeys in South Africa. In subsequent investigations the virus was isolated from serologically positive stallions and both venereal and in-contact transmission have been demonstrated.

Five clinically healthy and sexually mature donkey stallions with antibodies against EAV were used for virus isolation. Using an artificial vagina, semen samples were collected from each stallion and stored at -20°C. For virus isolation the samples were thawed, sonicated and centrifuged (2500 g) at 4°C for 15 minutes. The supernatant was diluted 1:50 and 0,5 mℓ volumes were inoculated onto monolayers of rabbit kidney (RK-13) cells in 25 cm^2 plastic flasks. Two blind passages were made before a sample was regarded as negative and the identity of isolated viruses was confirmed by virus neutralization with horse anti-EAV serum. Two jacks could be identified as shedders of EAV.

To detect venereal transmission, two seronegative jennies were test bred twice daily for four consecutive days to a shedder jack, and a seronegative jack was exposed to one of the mated jennies to determine non-venereal transmission. During an observation period of 30 days disease signs were recorded and samples were collected for serological testing and virus isolation.

The rectal temperature of the jennies increased and reached a peak nine to ten days after exposure while the in-contact jack's highest temperature (40.0°C) was recorded thirteen days after the first exposure. Disease signs which were most prominent during the febrile stage were mild conjunctivitis, lacrimation and a serous nasal exudate. These signs were shown most prominently by the in-contact jack which also developed ataxia and general weakness.

In all exposed animals homologous seroconversion was detected. EAV was isolated from buffy coat and nasal samples collected during the febrile stage of the infection.

These results indicate that the mode of transmission in donkeys is the same as in horses.

No cases of EAV among horses have been reported in South Africa since the demonstration, in 1987, of a small number of seropositive horses associated with an imported stallion identified as a shedder. Consequently EAV among donkeys poses a threat to the horse industry of South Africa and further investigation to determine the susceptibility of horses to the donkey EAV isolate is deemed necessary.

EVALUATION OF TWO DRY-CHEMISTRY ANALYZERS FOR USE IN A VETERINARY OUTPATIENTS CLINIC *

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Department of Medicine

Two different dry-chemistry analyzers (Instrument A and Instrument B) are available to veterinary practitioners in South Africa. The authors were approached by the distributors to evaluate these instruments.

The evaluation was conducted in two phases. Phase 1 was carried out in the Clinical Pathology Laboratory, where the assays were performed by qualified technologists. Phase 2 was conducted in the Outpatients Clinic, where final-year veterinary students conducted the assays after forty minutes of instruction by the vendor. Samples for assay were obtained from 100 canine patients and divided chronologically equally between the two phases. A panel of five tests (AℓT, GGT, Urea, Creatinine and Glucose) was performed on split plasma samples from each patient using the two test instruments as well as on a "reference" automated chemistry analyzer. Total plasma protein (TPP) and Albumin (ALB) were also assayed on Instrument A and the reference analyzer (methodologies not available on Instrument B).

Reproducibility (precision) was assessed as the day-to-day variation using three commercial quality assurance sera. Accuracy was determined from the slope and intercept of the regression of instrument results on reference analyzer results as well as the classification consistency of patient results (low, normal, high) when compared with those obtained on the reference analyzer. Speed of assay was assessed by the time taken from blood sampling until results were recorded.

Precision on Instrument A was good for creatinine, glucose and GGT and on Instrument B for AℓT and GGT only. Accuracy for Instrument A was acceptable for AℓT, urea, glucose and GGT, although classification consistency was poor for high glucose. Accuracy and classification consistency for instrument B was acceptable for AℓT and GGT whilst poor classification consistency was found for low urea, high creatinine and high glucose. Sample colour (haemolysis and jaundice) appeared to play a major role in causing poor results.

Instrument A was considerably faster than Instrument B and was preferred by the students. There was no difference in accuracy regardless of whether the instrument was used by qualified technologists or students.

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AN EXPERIMENTAL VACCINE AGAINST SOUTH AFRICAN *Babesia canis* *

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A vaccine against *Babesia canis* has been available in France for a number of years. The vaccine is based on non-living parasite material produced in an *in vitro* cell culture system. The vaccine efficacy in France is in the region of 70%, but it is totally ineffective against South African parasites. In light of the problems caused by canine babesiosis in this country, it was decided to investigate South African *B. canis* parasites with a view to developing an experimental vaccine.

A strain of *B. canis* parasites vector-specific to *Haemaphysalis leachi* was isolated using tick transmission trials. An indirect fluorescent antibody test was developed for the strain, and 277 dogs from four different regions of the country were tested for the presence of antibody specific to the strain. Nearly 50% of the dogs tested had positive antibody titres to the isolated strain.

With a prevalence of nearly 50% in the dogs tested, it was decided that the isolated parasite strain would be suitable for immunological studies and experimental vaccine development.

The immune responses of two beagles to live parasites of the isolated *B. canis* strain were tested. These dogs were infected with live parasites and when necessary were treated with a half dose of trypan blue (*Trypan Blue SS®*, Centaur) to reduce the parasitaemia but allow parasites to be present for long enough to evoke an immune response. Once recovered from the initial infections, both dogs received two separate homologous challenges with live parasites.

During the first challenge, one dog required anti-babesial treatment. During the second challenge, neither dog showed clinical signs of disease and examination of blood smears showed that the parasites had gone into a state of premunity with the dogs.

Parasites were grown in a microaerophilous stationary phase cell culture system to provide (a) antigen-containing supernatant material and (b) pellet material containing dead parasites. These two antigenic products had saponin added as an adjuvant. Two dogs each were inoculated with the two different formulations of the experimental vaccine, and one month later were given a booster dose of the appropriate formulation. One month after the booster, all four dogs were challenged with live parasites. Three of the four dogs recovered from the challenge without any anti-babesial treatment indicating that the experimental vaccine had successfully protected them against parasite challenge.

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STERILIZATION OF *Babesia canis* INFECTIONS *

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Although canine babesiosis is an important disease in Southern Africa, many basic questions remain to be answered despite the considerable scientific attention already devoted to the topic. In certain quarters there is an erroneous perception that dogs never develop immunity against *Babesia canis*, and that the treatment of choice should therefore be sterilisation of the infection. Perusal of the literature immediately dispels the commonly-held notion that the recommended therapeutic doses of diminazene (*Berenil®*, Hoechst Ag-Vet) or imidocarb (*Forray-65®*, Hoechst Ag-Vet) will sterilise the infection in every case.

The possibility of sterilising *B. canis* infections with imidocarb alone or in combination with diminazene was therefore investigated. Splenectomised Beagles bred under tick-free conditions were infected intravenously with the so-called Thomas strain of *B. canis*, which is transmitted by *Haemaphysalis leachi*. On the day that the parasitaemia reached 0,2% (*ca* one parasite seen per field in a thin blood smear), the dogs in Group A (n=2) were given 7,5 $mg.kg^{-1}$ imidocarb, while the dogs in Group B (n=4) received 3,5 $mg.kg^{-1}$ diminazene, followed by 6 $mg.kg^{-1}$ imidocarb the next day.

As it was only necessary to prove that the parasites in the stabilate batch used were not sterilised by the recommended therapeutic dose of trypan blue (*Trypan Blue SS®*, Centaur), a single control dog sufficed. This dog received 10 $mg.kg^{-1}$ trypan blue on the day that the parasitaemia reached 0,2%.

On Day 28 after treatment, 5 mℓ of blood was collected into a heparinised tube from the jugular vein of each dog, pooled (Groups A and B, respectively) and subinoculated into two recipient dogs.

In both Groups A and B, parasites were first seen on thick blood smears on Days 2 to 4, and the dogs were treated on Days 4 to 6. Parasites had disappeared from blood smears two or three days after treatment. Blood smears remained negative up to the end of the trial. Parasites were first seen on Day 4 in blood smears from the control dog, which was treated with trypan blue on Day 6. On Day 7, a few degenerating parasites were seen in the blood smear, after which the smears remained negative until Day 15, when parasites were seen again. Neither dog receiving pooled blood showed any clinical signs of babesiosis, and remained negative on blood smear.

Practitioners should consider whether sterilisation of the infection is the desired approach, as the dog is not exposed to antigenic stimulation and therefore does not develop an immunity. While we would recommend using a drug which does not sterilise the infection, it is necessary to be aware of relapses which may require further treatment of the dog.

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AN INVESTIGATION OF THE OXYGEN STATUS AND ACID-BASE BALANCE IN NATURALLY INFECTED CASES OF CANINE BABESIOSIS, BEFORE AND AFTER WHOLE BLOOD TRANSFUSION *

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Babesia canis is an intra-erythrocytic protozoal parasite of dogs causing intra- and extravascular haemolysis. In Southern Africa, canine babesiosis is a severe disease and is invariably fatal if left untreated. The main pathophysiological mechanisms are anaemic hypoxemia, carboxyhaemoglobinaemia and metabolic lactacidosis.

The aims of this project were to investigate the temporal acid-base and oxygen status response of patients to fresh whole blood transfusion.

Arterial blood samples were collected from six control dogs and seven dogs with severe babesiosis (Hct $< 0{,}12\ \ell.\ell^{-1}$). Samples from the latter group were collected on admission, immediately following transfusion, and three days later. The blood gas and acid-base status of each specimen were determined and haemoxymetry was performed. These data were then substituted into the Oxygen Status Algorithm.

There were significant differences ($p < 0{,}05$) between the means of the haemoglobin concentration, arterial oxygen content and oxygen extraction tension of the controls, and those of the patients on admission, immediately following transfusion, and three days later. The patients' arterial carbon dioxide tension and alveolar oxygen partial pressure were significantly different to those of the controls on admission and immediately following transfusion, but had returned to control values within three days.

Previously when treating canine babesiosis, emphasis has been placed on the direct correction of acid-base imbalances. This study shows that it is essential to restore oxygen status by increasing haemoglobin concentration, and in so doing improving the blood buffering capacity which corrects the acid-base imbalance.

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QUANTIFICATION OF DUST IN SELECTED RACING STABLES AND ON ASSOCIATED TRAINING TRACKS IN THE TRANSVAAL *

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Race horses spend approximately 22 hours a day in their stables. Previous studies undertaken by the Equine Research Centre have shown that the ventilation characteristics of most stables are deficient. The aim of this project was to measure and compare the amounts of suspended airborne particulate matter in the stables and on the tracks of four training centres in the PWV area.

Air samples were collected using an *Air-Con 2*® (Gilian Instrument Corporation) portable high-volume air sampling device with an automated sequential sampler. Samples are collected by drawing air at a known flow rate through pre-weighed 8 μm and 0,4 μm polycarbonate filters in series, trapping the non-respirable and respirable air particles respectively. Following dust collection, the filters were re-weighed and the amount of particulate matter per cubic meter of air was calculated. Over a 48 hour period, four six-hour samples were collected monthly from a horse's stable and the related training track. The amount of suspended particulate matter collected in the stables each month was compared to that collected at the track.

The average concentration of total suspended particulate matter measured in the stables was usually in great excess (3 to 5 fold) of that measured at the related track. This average concentration varied from stable to stable, while readings from the different tracks were similar. The average concentration of respirable particulate matter was very similar in the stable and at the track; no temporal variation in concentration occurred. Differences in total particulate concentration can thus be mainly ascribed to changes in the concentration of non-respirable particles. No clear temporal trends could be identified.

The variation in total suspended particulate matter between the four stables is mainly due to stable management. The higher concentrations of non-respirable particles in stables have been reported by other workers, and is probably responsible for causing chronic irritation of the conducting airways. The added effects of exercise and the inhalation of cold air on the already sensitised airways is probably responsible for the coughing reported by trainers when they take their horses to the track to train.

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ANTIBODIES TO VIRAL DISEASES IN CHEETAH IN NAMIBIA *

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Cheetahs (*Acinonyx jubatus*) that are captured as "problem animals" in Namibia are screened for the presence of various diseases before they are rehabilitated. Blood sample assays were performed at the Department of Veterinary Tropical Diseases (VTD) and at the Washington Animal Disease Diagnostic Laboratory (WADDL), College of Veterinary Medicine, Washington State University, Pullman, Washington State, USA. Assays were performed according to the standard methodologies currently employed by the respective laboratories.

To date, 122 animals have been screened at VTD. Specimens have been tested for the presence of antibodies to the following viruses:

- Feline immunodeficiency virus (FIV)
- Feline corona virus (FCoV)
- Feline herpes virus (FHV)
- Feline calici virus (FCV)
- Feline panleukopenia virus (FPLV)

Sixty one animals have also been screened for antibodies to *Toxoplasma gondi*.

One hundred and seven animals were screened at WADDL for the following viruses:

- Feline immunodeficiency virus (FIV)
- Feline corona virus (FCoV)
- Feline leukemia virus (FeLV)

None of the animals tested were positive for antibodies to FIV. Antibodies to FCoV were found in 35% (VTD) and 72% (WADDL) of animals tested. Thirteen percent were positive for FHV, 22% for FCV and 53% for FPLV (28% had been vaccinated). Thirty four animals had been vaccinated against FPLV, FHV and FCV but the response shown in 33 animals may or may not be to FPLV. Three animals were found to be positive for FeLV. Seventy five percent of the animals were positive for toxoplasmosis.

The presence of FCoV antibodies in so many of these animals is a cause for concern. It has been shown that FCoV is capable of precipitating outbreaks of feline infectious peritonitis in cheetahs when they are stressed by factors such as capture and malnutrition. FIV has been shown to occur in cheetahs in Botswana and it is therefore important to monitor the Namibian population as the territories of the two populations overlap. FHV and FCV antibodies have been detected in other free ranging non-domestic felids in Namibia and their presence in the cheetah population can be expected. The presence of FeLV is a cause for concern as it causes immuno-suppression leading to the animals being more susceptible to diseases and, ultimately, premature death.

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CLINICAL CHICKEN ANAEMIA AGENT INFECTION IN A BROILER UNIT

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Chicken Anaemia agent (CAA) infection is ubiquitous in all major chicken-producing countries of the world. The disease, characterized by aplastic anaemia and generalized lymphoid atrophy with concomitant immunosuppression, has frequently been isolated from chickens in Japan, Germany, Sweden, England and the USA but has not been diagnosed in chickens in Australasia or Africa.

This report concerns an outbreak of suspected CAA infection or infectious anaemia, which occurred in two broiler flocks at four weeks of age originating from one broiler breeder flock in South Africa. CAA infection in the breeder flock was subclinical, with no apparent effects on mortality patterns and performance.

Chicken anaemia is caused by a virus from a newly classified family, Circoviridae. Chicken anaemia virus is spherical with an isometric symmetry, which appears to be unique among animal viruses. The virus contains single-stranded DNA estimated at 2300 bases, and is about 19 to 24 nm in diameter. In this outbreak anaemia and a gangrenous dermatitis were observed. Birds were clinically depressed with a ruffled appearance, and appeared anaemic. The haematocrit values varied between 11 and 26%.

At necropsy gross lesions were consistent with those of CAA infection and included thymic atrophy and dark red bone marrow. Gangrenous dermatitis with subcutaneous haemorrhage and a serous exudate was present. The carcasses appeared anaemic. Bursal atrophy, described in some outbreaks, was not a consistent finding.

Histologically the bone marrow manifested extensive, focally disseminate necrosis, congestion and haemorrhage. Moderate atrophy of the residual tissue was also apparent. The thymus was moderately atrophic with scattered areas of single cell necrosis. The spleen showed marked lymphoid atrophy and reticular cell hyperplasia.

Serologically using ELISA the broilers tested positive for chicken anaemia agent.

CAA-induced disease constitutes a serious economic threat with immunosuppression and secondary infections causing severe mortalities in broiler units. There is no specific treatment for chickens affected by CAA infection. Treatment with broad-spectrum antibiotics to control bacterial infections may be considered, but efficacy is usually poor. CAA infection can only be effectively controlled by immunization of parent flocks several weeks prior to egg production, as CAA is a trans-ovarially transmitted disease. At present no vaccine is available in South Africa. Routine serological monitoring of breeder flocks for the presence of anti-CAA antibodies should be performed to prevent vertical transmission of CAA infections.

VELLETSELS LATERO-PROKSIMAAL VAN DIE SPRONGGEWRIG BY JONG SWEEDSE WARMBLOED-VULLENS

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Daar was opgemerk dat vullens vanaf dag 2 velletsels op die agterbeen toon. Daar word dikwels aanvaar dat die vullens beseer is. Die letsels kom in 'n mindere of meerdere mate op verskillende plase voor. Dit kan uni- of bilateraal wees. Die doel van die studie was om vas te stel wat die oorsaak van die letsels is.

Vullens word met 'n normale huid gebore, maar op dag 2 is daar 'n verhewe area teenwoordig, wat gekenmerk is deur hare wat regop staan. Dit kom lateraal van die spronggewrig, dorsaal van 'n lyn tussen die *Malleolus lateralis* en die *Tuber calcanei* op die vlak van die *M. extensor digitorum lateralis* en *M. flexor digitorum lateralis*, voor. Dit strek dorsaalwaarts in 'n band $\pm$ 2 cm breed en $\pm$ 5 cm in lengte. Op dag 3 is daar 'n ulseratiewe letsel teenwoordig op die spesifieke area en daarna vind genesing plaas. Dit is sigbaar in volwasse perde as haarlose areas of areas met ongepigmenteerde hare.

Vier Sweedse Warmbloedvullens wat in die Etologie Departement geteel is, is ondersoek. Biopsies van vel is in vullens van dag 1 tot dag 3 geneem en volgens standaard prosedure geprosesseer vir lig- en elektron-mikroskopiese ondersoeke. Die letsels dui op oormatige keratinisasie asook 'n *Staphylococcus* infeksie. Histochemiese ondersoeke word beplan.

Hierdie letsels kom lateraal voor op dieselfde vlak as die swelvrat op die mediale kant, dit wil sê moontlik 'n rudimentêre metakarpale velkussing lateraal.

PRESENCE OF VIRAL ANTIBODIES IN JACKALS IN ZIMBABWE

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This study forms part of an ongoing project that surveys jackal populations in Zimbabwe for the presence of infectious and parasitic diseases. The objective of the project is to gain a better understanding of the factors that influence jackal population control and ecology. Both the black-backed (*Canis mesomelas*) and the side-striped jackal (*Canis adustus*) populations are under examination.

The viruses screened for include canine distemper virus, canine parvo virus and canine adeno virus. Viral antibodies were detected using standard immunofluorescence procedures performed according to the standard methodology currently employed by the Department of Veterinary Tropical Diseases. Sera from 22 black-backed and 16 side-striped jackals from seven geographical areas were examined.

The tests revealed the presence of all three viruses in all the seven areas surveyed, with the largest number of animals being positive for canine distemper virus.

These results suggest that canine distemper may play an important role in jackal population control. Unvaccinated domestic dogs are the most probable source of infection.

HIPERGLISEMIE EN HIPOINSULINEMIE IN DRAGTIGHEIDSKETOSE IN SKAPE *

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Departement Geneeskunde

Ondervinding met veldgevalle van dragtigheidsketose in skape by die Veterinêre Akademiese Hospitaal Onderstepoort het getoon dat ongeveer vyftig persent van gevalle wat in 'n goeie kondisie of oorvet is, hiperglisemies blyk te wees, ongeag of die fetusse dood is of nie. 'n Ondersoek is dus uitgevoer om die konsentrasie van plasmaglukose in gesonde, dragtige ooie te vergelyk met die konsentrasie in gevalle met dragtigheidsketose en om die moontlikheid van 'n insulientekort in sodanige gevalle te ondersoek.

Bloedmonsters is versamel van beide normale nie-dragtige ooie (n=9) en dragtige ooie met eenling- (n=10) en meerlingdragtighede (n=10) tydens die laaste trimester van dragtigheid vir die bepaling van plasmaglukose en seruminsulien. Seruminsulien is ook bepaal op gestoorde sera van onbehandelde, hiperglisemiese veldgevalle met tweeling-dragtigheid en dragtigheidsketose (n=10). Die 95% betroubaarheidsreikwydte van die plasmaglukosekonsentrasie van die verskillende dragtige en nie-dragtige groepe is bepaal. Verder is beide die gewone en aangepaste insulien tot glukose verhouding vir die verskillende dragtige groepe bereken. Die verskillende groepe is daarna statisties vergelyk met behulp van die "Statgraphics" rekenaarpakket (*Statgraphics® Version 5.0*) ten opsigte van hul plasmaglukose, seruminsulien en insulien tot glukose verhoudings.

Die resultate toon dat dragtigheid volgens hierdie ondersoek geen betekenisvolle invloed op die konsentrasie van plasmaglukose het nie. Hiperglisemiese gevalle van dragtigheidsketose kom egter wel voor ongeag of die fetusse dood is of nie. Geen betekenisvolle verskil is gevind tussen die seruminsulien-konsentrasies van die gesonde, dragtige ooie en die hiperglisemiese, ketotiese ooie nie. Laasgenoemde groep se insulien tot glukose verhoudings was egter hoogs betekenisvol laer as dié van die normale dragtige groepe.

Die laer insulien tot glukose verhoudings van die hiperglisemiese, ketotiese ooie is waarskynlik nie as gevolg van 'n moontlike normale afplatting van insulienvrystelling nie, aangesien die insulienvlakke glad nie verhoog was nie. Moontlike oorsake van die laer verhoudings sluit in inhibisie of uitputting van die vermoë om insulien te produseer of vertraagde insulienvrystelling. Hierin mag vetheid of die lewende/dooie status van die fetusse moontlik 'n rol speel.

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* Navorsingsprojek No. 36.5.68. Goedgekeur deur die Fakulteit Etiek- en Navorsingskomitees.

MICROLIVESTOCK - AN ALTERNATIVE FOOD RESOURCE IN SOUTH AFRICA

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Department of Theriogenology

In 1991, the National Research Council in the USA published *Microlivestock: Little-known Small Animals with a Promising Economic Future*. This book reveals that the utilization of small animals as a food resource is rapidly increasing around the world. A large variety of animals are listed in the book, and although not all of them are of the kind we are used to seeing on our dinner tables, some of these animals have been used as food sources for centuries, particularly by rural people. This has unfortunately lead to over-hunting and some of the species are now threatened with extinction. Farming these animals is of course a much better alternative that not only protects the species but also provides a more secure food source.

In South Africa, we are fortunate to have two of the largest rodent species in the world occurring naturally in the wild. These are the "grass-cutter", *Thryonomys swinderianus* and the "cricetoma", *Cricetomys gambianus*. They are widely hunted by the rural people and are regarded as a delicacy. Not only do they provide an excellent source of meat, but are also easy to domesticate. Attempts have been made to breed the grass-cutter on a small scale (particularly in Natal) with the intended purpose of supplying restaurants. However, grass-cutter farming has not yet been very successful, probably in large measure due to our scant knowledge of the species' breeding biology. Farming with the cricetoma does not appear to have been attempted as yet.

Optimal farming of any species requires a basic knowledge of the reproductive biology, social structure, and nutritional and environmental requirements. Information on the species' common diseases and parasites is also important.

Early in 1994, the Department of Theriogenology initiated a microlivestock research project. The grass-cutter and cricetoma were chosen for investigation on account of their size and their popularity as food among rural people. Furthermore, some basic if incomplete, and in some cases incorrect, knowledge on their biology has already been accumulated. The research project's objectives are as follows:

1) Determination of the optimal conditions for breeding the two species in order to improve farming success.

2) Introduction of the concept of farming microlivestock to the public, particularly to people in rural areas.

3) Provision of an extension service (and if possible, breeding animals) to potential breeders and farmers.

It is envisaged that the extension service will include fertility testing of problem animals, especially in large production units.

It is a matter of no small interest that restaurateurs are currently prepared to pay hunters around R30 per kg for grass-cutter meat! It is quite conceivable that breeding of these rodents may well have positive financial implications for both small and large scale farmers in the future.

ATTEMPTS TO IDENTIFY A SMALL PIROPLASM FROM LIONS FROM THE KRUGER NATIONAL PARK *

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A small piroplasm was detected in blood smears prepared from lions (*Panthera leo*) in the Kruger National Park. The parasite was provisionally identified as *Babesia felis*, but sera from these lions tested negatively to *B. felis* antigen in the indirect immunofluorescence antibody test (IFAT).

Blood from an infected lion was subinoculated into a domestic cat in an attempt to identify the parasite. When parasites first appeared in blood smears, blood was collected and antigen slides were prepared for the IFAT.

One lion was infected with *B. felis* (from a cat) and two leopards (*Panthera pardus*) were inoculated with blood stabilate from the unidentified small piroplasm. The three animals were immobilized at monthly intervals and blood was collected for serum and blood smear preparation.

All serum samples were tested against *B. felis*, the unidentified small piroplasm and *Cytauxzoon felis* antigen. The serological test results indicate that the small piroplasm isolated from the Kruger Park lions is probably a different species to both *B. felis* and *C. felis*.

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ULTRASONOGRAPHIC IMAGING OF THE FORESTOMACH AND ABOMASUM IN THE CALF

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The aim of this study was to demonstrate the reticulum, rumen, omasum, abomasum and small intestine by means of ultrasonographic imaging in the calf. In addition, these organs were to be monitored during and after drinking milk.

Two bull calves, four weeks old at the onset of the study, were examined on five consecutive mornings and afternoons in pens that limited their movement, but allowed them to drink from a bottle and teat. The calves were scanned before, during and one hour after being fed 1 ℓ of milk. For each examination, the same transducer location and scanning direction (ventrodorsal or laterolateral) were used. Seven transverse scanning planes were used; relative to the xiphoid process (cranial to caudal) they were: -3 cm; 0 cm; +3 cm; +6 cm; +9 cm (umbilicus); +12 cm (preputial opening) and +15 cm. The rumen was scanned in the same transverse planes with the probe on the left side of the abdomen and the beam directed laterolaterally. The three longitudinal scanning planes chosen were: over the *Linea alba* and 4 cm on either side of the *Linea alba*. Immediately after the last examination, one calf was euthanized and frozen in the upright position. The frozen carcase was then sectioned along the transverse and longitudinal scanning planes. The frozen sections were compared to the ultrasonographic images generated.

Prior to feeding, all the compartments of the forestomach, the abomasum and the small intestine could be visualised. The reticulum was situated slightly to the left of the midline, between the liver and the abomasum in the -3 cm and 0 cm transverse planes. In the contracted state, the atrium of the reticulum could be seen. The rumen was located left of the omasum, caudal to the reticulum and dorsal to the abomasum. The omasum was located in the median plane immediately dorsal to the abomasum. The omasum was always visible in the 0 cm and +3 cm transverse planes, but rarely in the +6 cm plane. The abomasum lay directly adjacent to the abdominal wall and had a maximum ventrodorsal diameter of 3 to 5 cm. It was detectable in all three longitudinal planes, as well as in the 0 cm to +12 cm transverse planes. The pylorus and the duodenum lay next to the liver and were visible in the 0 cm to +9 cm planes. The intestines lay dorsocaudal to the abomasum, and were visible from the +6 cm transverse plane caudally.

During drinking, the abomasum became hyperechoic due to the presence of gas bubbles. Abomasal distension in the craniocaudal and laterolateral directions was reasonably constant. The echogenicity of the rumen, examined from the left side, was not changed by the drinking of milk, although it shifted slightly dorsally and to the left. No milk flowed into the rumen or reticulum. One hour after feeding, the milk in the abomasum was curdled and most of the fluid had emptied into the small bowel. The volume of the abomasum had increased significantly with the ventrodorsal diameter becoming 8 to 10 cm. The intestinal motility appeared to intensify significantly.

Ultrasonography proved to be a useful technique for imaging of the forestomach and abomasum of the calf. As such, it may be useful in diagnosing forestomach disorders like the ruminal intake of milk in calves.

PERIPHERAL DISTRIBUTION OF GENTAMICIN IN ADULT THOROUGHBRED HORSES FOLLOWING INTRAVENOUS AND INTRAMUSCULAR ADMINISTRATION *

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Gentamicin is an aminoglycoside antibiotic frequently used against gram-negative aerobic bacteria, including those responsible for many soft tissue infections in horses. No studies have been performed to examine the drug's distribution into extracelluar fluid. The objective of this study was to compare extracelluar fluid and plasma concentrations of the antibiotic following intravenous and intramuscular treatment at steady state in horses.

A multidose, randomised, two-phase cross-over design was used. Healthy, conditioned, Thoroughbred mares (n=6) were housed individually in ventilation- and temperature-controlled stables. Subcutaneous tissue chambers were previously implanted on the lateral aspect of the neck and validated for protein, electrolyte and cellular content. During each phase, equal numbers of horses were treated with gentamicin, either intravenously or intramuscularly, at 3,3 $mg.kg^{-1}$ at 12 hour intervals for five consecutive administrations. A washout period of seven days was allowed between the two cross-over periods. Blood samples were collected from the jugular vein of each horse immediately before treatment and 2, 5, 10, 20, 30, 45, 60, 90, 120, 180, 240, 300, 360, 480, 600 and 720 minutes following the first and fifth administrations. At doses 2 through 4, blood samples were collected immediately before treatment and at 30 and 60 minutes after administration. Tissue chamber fluid was collected aseptically from each horse 30, 60, 120, 240, 300, 360, 480 and 720 minutes, and 24, 32, 36 and 48 hours after the fifth administration. Gentamicin plasma concentrations were determined by automated, fluorescence polarization immunoassay within 12 to 48 hours of collection. Plasma and tissue fluid concentrations were fitted to a bi- and monoexponential equation, respectively, by nonlinear regression.

The plasma data were best described using a two compartmental model with first order rate constants. Maximum gentamicin plasma concentrations following intramuscular administration were achieved 0,9 $\pm$ 0,12 hours after administration. The kinetics of gentamicin in the tissue chamber fluid were best described by a one-compartment model with first-order rate constants. Maximum gentamicin concentration in chamber fluid following intravenous administration occurred at 3,5 hours. In the case of intramuscular administration, the peak tissue fluid concentration occurred 4 hours after peak plasma concentrations were achieved. The rate constant for distribution into the chambers was longer than the constant for movement out of the chambers. The peak plasma concentrations and terminal half-life of gentamicin following intramuscular administration in conditioned Thoroughbred horses at steady state were similar to those previously reported. Distribution of gentamicin into the tissue chambers was delayed, suggesting that the chambers act as a second peripheral compartment in series. This delayed equilibration was probably responsible for the persistence of gentamicin concentrations within the therapeutic range for an extended time. These results suggest that a 12 hour dosing interval provides adequate concentrations in soft tissue, and that shorter dosing intervals may result in accumulation in the tissues.

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THE ASSAY OF NON-DOMESTIC FELIDS IN BOTSWANA FOR THE PRESENCE OF ANTIBODIES TO VARIOUS FELINE INFECTIOUS AGENTS *

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The aim of this study was to assay non-domestic felids for the presence of antibodies to various feline infectious agents by using a variety of assay techniques. Assays were performed at the Department of Veterinary Tropical Diseases and at the Washington Animal Disease Diagnostic Laboratory, Pullman, Washington State, USA. The animals tested included two cheetahs (*Acinonyx jubatus*), four leopards (*Panthera pardus*) and two lions (*Panthera leo*).

The organisms assayed for were as follows:

- Feline leukemia virus
- Feline immunodeficiency virus
- Feline herpes virus
- Feline calici virus
- Feline panleukopenia virus
- Feline corona virus
- *Toxoplasma gondi*

The following assay techniques were used:

- Standard immunofluorescence
- ELISA
- Serum neutralisation
- Haemagglutination inhibition

Assays were performed according to the standard methodologies currently employed by the respective laboratories.

The two laboratories concurred regarding the results of the leukemia, immunodeficiency and corona virus assays. However, they did not concur on the results of the other assays. The fact that different tests were used to assay for the same organisms was regarded as a possible explanation for the conflicting results.

Only one leopard was positive for immunodeficiency virus and all of the animals were negative for leukemia virus. Four of the eight animals tested had antibodies against corona virus.

This study shows that it is difficult to directly compare results from different laboratories. It also shows that for this type of study to be successful, the collaborating laboratories need to first establish the test parameters using identical standards.

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OUTBREAK OF VIRULENT NEWCASTLE DISEASE IN POULTRY IN SOUTH AFRICA

F.E. le Roux

Department of Poultry Diseases

Newcastle disease (NCD) is a highly infectious and contagious viral disease of birds, most severely affecting domestic poultry. Various strains of NCD virus occur and cause a number of disease syndromes that differ quite distinctly in their clinical presentation and severity, even in the same host species. Based on the differences in clinical presentation, NCD virus strains are conveniently placed in five pathotypes.

The virulent or velogenic form of NCD can cause substantial mortality (up to 100% in susceptible populations) with devastating economic consequences. NCD is endemic to South Africa and in June 1993, an outbreak of severely virulent NCD was diagnosed for the first time in 20 years. The current epidemic is only partially under control and has resulted in very high mortalities in many poultry flocks in all provinces of South Africa.

NCD may affect the respiratory, gastro-intestinal and/or nervous systems. Post mortem findings are characteristic but not pathognomonic for NCD. The diagnosis may be confirmed by serological assay (ELISA and haemagglutination inhibition (HI) tests) demonstrating significantly increased antibody titres, or by virus isolation in embryonated SPF eggs.

The Department of Poultry Diseases investigated the current NCD epidemic. ELISA and HI tests on suspect sera both revealed significant increases in antibody titres, and a paramyxo virus was successfully isolated in embryonated SPF eggs. The isolated virus was sent to the Central Veterinary Laboratory (Weybridge, England) for characterisation. A type specific HI test, a monoclonal antibody test, and the calculation of an intra-cerebral intravenous pathogenicity index confirmed that the virus was a classic example of the virulent type, belonging to group B Paramyxoviridae.

Successful control of any epidemic depends on effective immunization and on optimal hygiene and biosecurity measures. The Department of Poultry Diseases evaluated a number of vaccination programmes by confirming the relative protection in broilers and layers, after exposure to an isolate from the prevailing epidemic. It was concluded that broilers do not immunize completely due to their immature immune systems. Hitchner B1 type of drinking-water vaccination provided insufficient protection and is not recommended. La Sota and Cloned vaccines provided sufficient protection, but unpredictable losses due to vaccination reactions occur with spray application. The efficacy of the vaccination programme should be monitored serologically two weeks post-inoculation.

Optimal hygiene and biosecurity measures include the following:

- Access control to prevent unnecessary contact between birds and humans.
- Decontamination of vehicles and visitors on entering and leaving the premises.
- Provision of suitable clothing and adequate hygiene facilities (including showers) for staff.
- Bird-proofing of houses and stores to prevent any potential spread from feral birds.
- After depopulation of sites, all poultry and poultry products, including faeces, should be correctly disposed of; the premises should be thoroughly cleaned, disinfected and left empty for at least one week.

DISTRIBUTION OF CEFTIOFUR INTO A TISSUE CHAMBER IMPLANTED SUBCUTANEOUSLY IN ADULT THOROUGHBRED HORSES FOLLOWING MULTIPLE DOSE INTRAVENOUS AND INTRAMUSCULAR ADMINISTRATION *

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Ceftiofur is a broad-spectrum, β-lactamase-resistant cephalosporin antibiotic that is registered for use in cattle in South Africa, and the use of which has been described in horses. A few studies have reported the plasma kinetics of ceftiofur in horses. No studies have examined the distribution of the drug into tissue fluid. The objective of this study was to compare tissue fluid and plasma activities of the antibiotic at steady state following multiple intravenous and intramuscular administration in horses. A subcutaneous tissue chamber was used to measure extracelluar fluid activities.

A multidose, randomised two phase cross-over study design was used. Healthy, conditioned Thoroughbred mares (n=6) were housed individually in ventilation- and temperature-controlled stables. Subcutaneous tissue chambers were previously implanted on the lateral aspect of the neck and validated for protein, electrolyte and cellular content. During each phase equal numbers of horses were treated with ceftiofur (*Excenel®*, Upjohn), either intravenously or intramuscularly, at 2 $mg.kg^{-1}$ at 12 hour intervals for five consecutive administrations. A washout period of seven days was allowed between the two cross-over periods. Heparinised blood and tissue chamber fluid samples were collected from each horse immediately before treatment and 6, 20, 40, 60, 120, 180, 240, 360, 480, 720 and 1440 minutes following the fifth administration. Ceftiofur activities were determined using a biological assay system with *Providentia alcalifaciens* (ATCC 9886) (Difco Laboratories) as the indicator organism. The plasma and tissue fluid kinetics of ceftiofur were calculated using *PC-Nonlin®*.

The plasma data following intravenous and intramuscular administration were best described using a one and two compartment open model, respectively, with first order rate constants. The mean maximum plasma activity was significantly greater following intravenous injection of ceftiofur, while the elimination half-life following intramuscular injection was significantly longer. The kinetics of ceftiofur in the tissue chamber fluid was best described by a one compartmental model with first order rate constants. Maximum ceftiofur activity in chamber fluid (2,02 to 2,64 $\mu g.m\ell^{-1}$) occurred three hours after administration. The rate constant for distribution into the chambers was longer than the constant for movement out of the chambers.

The peak plasma activities and terminal half-life of ceftiofur following administration in conditioned Thoroughbred horses at steady state were similar to those previously reported. Distribution of ceftiofur into the tissue chambers was delayed, suggesting that the chambers act as a second peripheral compartment in series. This delayed equilibration was probably responsible for the persistence of ceftiofur activities within the therapeutic range for an extended time. These results suggest that a 12 hour dosing interval provides adequate activities in soft tissue, and that shorter dosing intervals may result in accumulation in the tissues.

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* Research Project No. 36.5.65. Approved by the Faculty Ethics and Research Committees.

FIV TESTS ON NON-DOMESTIC FELIDS FROM BOTSWANA UTILIZING DIFFERENT METHODS OF ASSAY *

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The aim of this study was to assay non-domestic felids from Botswana for the presence of feline immunodeficiency virus (FIV) by using various viral isolates as antigen sources. Assays were performed at the Department of Veterinary Tropical Diseases (VTD) and at the National Veterinary Laboratory, Franklin Lakes, New Jersey, USA (NVL). The animals tested included two cheetahs (*Acinonyx jubatus*), four leopards (*Panthera pardus*) and two lions (*Panthera leo*).

The assay techniques utilized by the two laboratories were as follows:

1. Commercial FIV ELISA test kits (VTD).

2. In-house ELISAs using partially purified bacterially-expressed p24 from a domestic cat (VTD), and Petaluma domestic cat isolates (NVL).

3. Immunofluorescent antibody tests (IFA) using domestic cat and cougar (*Felis concolor*) FIV isolates (NVL).

The results were confirmed by western blotting against domestic cat and cougar viruses (NVL).

The assays showed that one cheetah and one leopard were positive to the cougar isolate but not the domestic cat isolates, one leopard was positive by all techniques except the IFA and the other animals were negative by all methods.

The implications of these results are twofold:

1. Different methods of assay can give varying results for the same sample and it is therefore recommended that more than one assay technique be used.

2. The positive animals have been infected with a virus that is more closely related to the cougar strain of FIV than to the domestic cat strain. As there are no free ranging cougars in Africa, it must be assumed that the infection emanated from another felid species; the high incidence of FIV infection in lions in Southern Africa makes them the most likely source. Work in this field is continuing.

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CONCOMITANT *Serratospiculum amaculata* INFESTATION AND AVIAN TUBERCULOSIS IN A LANNER FALCON

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Department of Poultry Diseases

Wild birds are implicated in the transmission of many pathogens to commercial poultry. However, there is scant knowledge regarding the role of disease as a mortality factor in wild bird populations. The current very severe Newcastle disease epidemic in Southern Africa has refocused attention on wild birds as a potential source of disease for domestic poultry. This long-term study examines certain target groups (such as waterfowl, gamebirds and bird-eating raptors) as indicators of the health status of South African wild birds. Birds of the targeted groups are captured, sampled, ringed and released. In this way information regarding mensural data, toxicological residues, parasites and other infectious agents is gathered.

A first year immature male Lanner falcon (*Falco biarmicus*) captured near Rustenburg was kept for further observation after routine examination detected the presence of unusual abdominal masses. The bird died in captivity after about three months. Necropsy revealed massive hepatosplenomegaly with focal areas of necrosis which were shown to be *Mycobacterium* granulomas on histopathological examination. Large numbers of nematodes occupied the air sacs and body cavities, while both abdominal air sacs were completely filled with caseous material. The morphology of the nematodes conformed to detailed descriptions of *Serratospiculum amaculata*. Although this usually innocuous parasite is apparently common in North America and Europe, this is the first report from sub-Saharan Africa.

Serratospiculum belongs to the family Diplotriaenoidea (air sac parasites of birds). These parasites all require intermediate hosts, usually grasshoppers or locusts. Insects like locusts and termite alates play a crucial dietary role in the survival of young falcons as it takes time for them to perfect the hunting skills required to catch fast, agile quarry like other birds. This is especially the case in arid environments. It seems reasonable to suggest that a balanced host-parasite relationship between *Serratospiculum* and locust-eating falcons has developed in Africa where the probability of the parasite completing its life-cycle is high. It is therefore likely that another factor (mycobacterial infection in this case) is needed as a stressor or immunosuppressor to allow clinical serratospiculiasis to develop.

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