



UNIVERSITEIT VAN PRETORIA

FAKULTEIT VEEARTSENYKUNDE FACULTY OF VETERINARY SCIENCE

6th Faculty Day de Fakulteitsdag

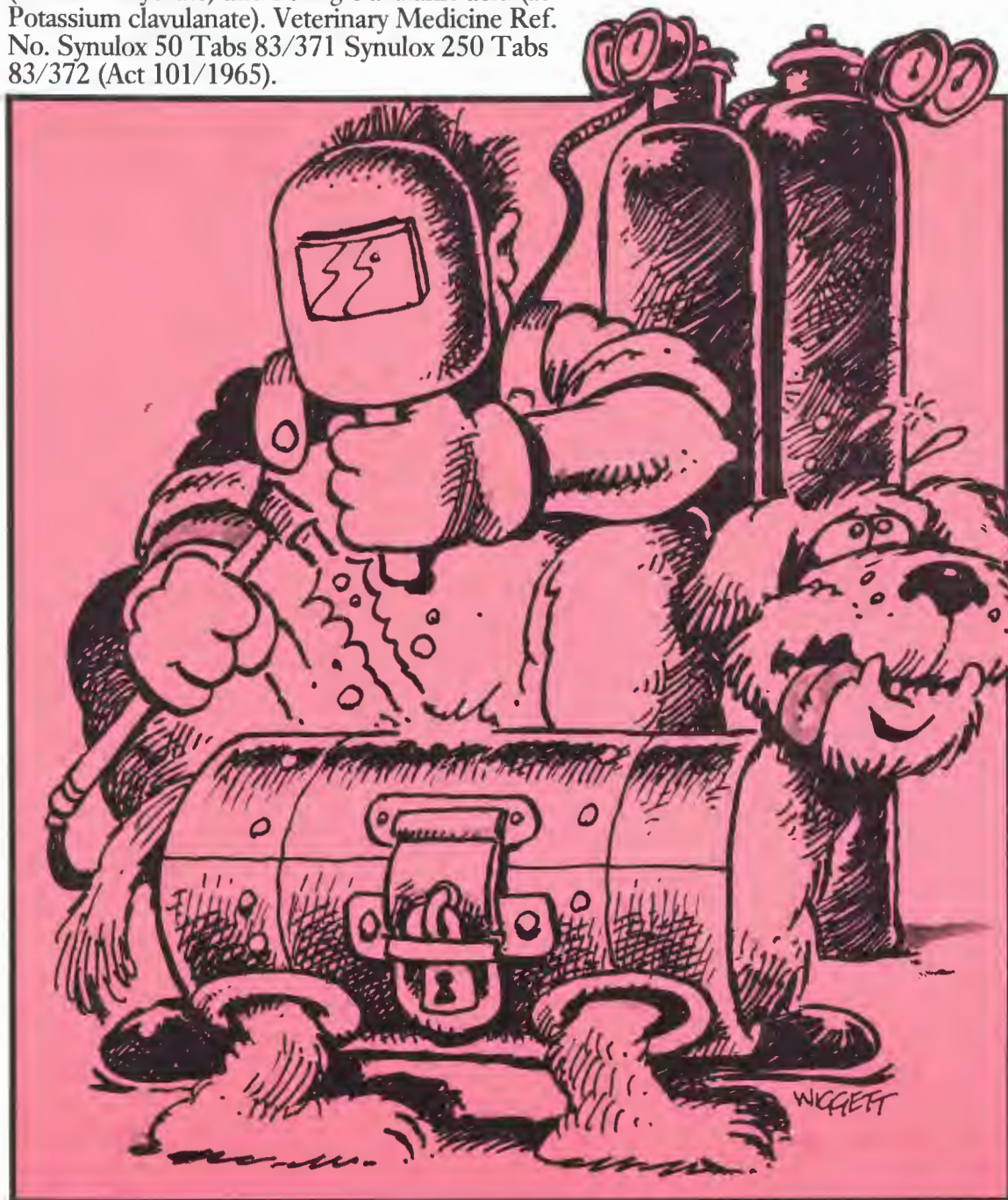
September 27, 1989

PROGRAM EN OPSOMMINGS
PROGRAMME AND SUMMARIES



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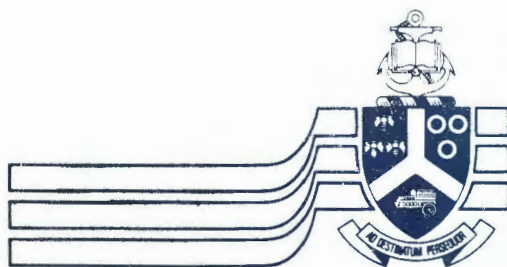


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SESDE FAKULTEITSDAG

SIXTH FACULTY DAY

27 September 1989

Sponsored by/Geborg deur: Beecham Animal Health Division,
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Reëlingskomitee / Organizing Committee

Proff R.I. Coubrough, J.G. van der Walt, B.L. Penzhorn,
F.J.M. Verstraete, M.M.S. Smuts, I.B.J. van Rensburg;
Dr W.L. Berry, Mev. C. van Vuren, Mnr N. Vermeulen
en / and Mej B. Bailie

PROGRAM / PROGRAMME

FAKULTEITSDAG 27 SEPTEMBER 1989 FACULTY DAY

- 07:30-08:15 REGISTRASIE EN KOFFIE / REGISTRATION AND COFFEE
- 08:15-17:00 BESIGTIGING VAN KUNSUITSTALLING
VIEWING OF ART EXHIBITION
- 08:15-08:30 VERWELKOMING DEUR DEKAAN / WELCOME BY THE DEAN
- 08:30-09:15 SIR ARNOLD THEILER MEMORIAL LECTURE / GEDENKLESING
– Dr R. Swanepoel
- 09:15-09:45 FOKUS OP: DEPARTEMENT GENEESKUNDE
FOCUS ON: DEPARTMENT OF MEDICINE
- 09:45-10:15 SCIENTIFIC PROGRAMME / WETENSKAPLIKE PROGRAM

Session I / Sessie I

Chairman: Professor R.I. Coubrough

1. Ultrastructural characteristics of normal ostrich (*Struthio camelus*) sperm.
J.T. Soley.
2. Effect of three slaughter methods and ambient temperature on pH and temperature in Springbuck (*Antidorcas marsupialis*) meat.
C.M. Veary, T.J. van der Schans & P. Heinze.

10:15-10:30 TOEKENNING AAN "DOSENT VAN DIE JAAR"
"LECTURER OF THE YEAR" AWARD

10:30-12:00 BRUNCH

12:00-13:30 WETENSKAPLIKE PROGRAM/SCIENTIFIC PROGRAMME

Sessie II/Session II

Voorsitter: Professor J.F.W. Grosskopf

3. Ileorectal anastomosis in sheep: Effect on feed intake, and on digestive tract anatomy and blood flow patterns.
J.G. van der Walt, J.H.F. Meyer & I.B.J. van Rensburg.
4. Effect of sodium chloride loading on electrolyte excretion, water and feed intake, and total body water in sheep.
R.A. Meintjes & R. Olivier.

5. Pulmonary hypertension syndrome in broilers: A pilot trial on physiological indices.

J.C. Sneddon, J.G. van der Walt, J. Soley,
F.W. Huchzermeyer, R.S. Verster & P. Guinane.

Session III / Sessie III

Chairman: Professor P.G. Howell

6. Sero-epidemiology of bovine leptospirosis in the Natal midlands.
G.V. Turner, C. Kruger & S. van der Merwe.
7. A nucleic acid probe for the detection of bluetongue virus.
Estelle H. Venter, H. Huismans & A.A. van Dijk.
8. The scrub hare, an important host of ixodid ticks.
I.G. Horak, L.J. Fourie, L.E.O. Braack & A.M. Spickett.

13.30-14:30 REFRESHMENTS AND VIEWING OF POSTERS

VERVERSINGS EN BESIGTING VAN PLAKKATE

Voorsitter: Professor A.J. Bezuidenhout

14:30-15:30 WETENSKAPLIKE PROGRAM / SCIENTIFIC PROGRAMME

Sessie IV / Session IV

Chairman: Professor D.R. Osterhoff

9. Validity of a triple stain method for evaluating functional integrity of stallion spermatozoa.
M.L. Schulman & D.H. Volkmann.
10. Progesterone profiles in *post-partum* Nooitgedacht pony mares.
H.J. Bertschinger, D.H. Volkmann, L.M. Westlin-van Aarde, L. Janse van Vuuren & V.M. Killeen.
11. Mechanism and significance of early equine embryonic mobility.
M.D. Loomes, & R.O. Gilbert.
12. Prostaglandin E₂ as an adjunct to the induction of abortion in mares.
D.H. Volkmann & K.G.M. De Cramer.

15:30-16:30 KLINIESE SESSIE / CLINICAL SESSION

Voorsitter: Professor P. Bland van den Berg

1. Döppler Echocardiography.
R.M. Kirberger

2. Arthroscopy in the horse.

Ann Olivier & R.D. Gottschalk

3. A review of colic cases at Onderstepoort over the last three years.

J.S. van den Berg

4. Problem solving instruction and "open-book" examinations in small animal clinical neurology.

W.L. Berry

16:30-16:45 OPENING VAN KUNSUITSTALLING

OPENING OF ART EXHIBITION

Professor H.P.A. de Boom

16:45-16:55 DEAN'S AWARD FOR BEST PAPER AND POSTER

DEKAANSTOEKENNING VIR BESTE REFERAAT EN PLAKKAAT

16:55-17:00 AFSLUITING / CONCLUSION

– Professor J.G. van der Walt

17:00-19:00 COCKTAIL PARTY / SKEMERPARTYTJIE

ULTRASTRUCTURAL CHARACTERISTICS OF NORMAL OSTRICH (*Struthio camelus*) SPERM**J.T. Soley**

Department of Anatomy

In view of the important role played by the ostrich industry in South Africa, a thorough knowledge of all aspects of ostrich breeding is essential. Current lack of information regarding the structure of the male germ cell of the ostrich prompted this paper which describes the morphology of normal ostrich sperm.

Semen samples were obtained from three ostriches by digital manipulation and prepared for transmission electron microscopy using standard techniques.

Sperm cells were found to be 75-80 μm in length and consisted of a gently curved, cylindrical head capped by a small anterior acrosome, and a relatively short tail divided into a middle-piece, principal-piece and end-piece. The acrosome fitted over the finely tapered, anterior part of the nucleus. Centrally positioned within this part of the karyoplasm, and extending roughly half-way into the main body of the nucleus, was a tube-like structure which appeared to represent a deep nuclear invagination. A typical perforatorium was not observed. A centriolar complex was situated beneath the head and consisted of a short, proximal centriole and a long, distal centriole, extending the complete length of the middle-piece. Both centrioles were embedded in dense, amorphous material, while the lumen of the distal centriole contained two dense rods running the length of the organelle. The middle-piece displayed a mitochondrial sheath, the junction between the middle-piece and the principal-piece being demarcated by a distinct annulus. The principal-piece revealed a typical axoneme enclosed by a ribbed, fibrous sheath. Rudimentary coarse fibres were observed. The end-piece contained a disorganised array of axonemal micro-tubules.

The study revealed that, while ostrich sperm differ markedly from other simple avian sperm (the absence of a typical perforatorium and the presence of a fibrous sheath surrounding the principal-piece of the tail), they show a close similarity to sperm of the crested tinamou, a representative of a primitive avian family, the Tinamidae.

EFFECT OF THREE SLAUGHTER METHODS AND AMBIENT TEMPERATURE ON pH AND TEMPERATURE IN SPRINGBUCK (*Antidorcas marsupialis*) MEAT

C.M. Veary¹, T.J. van der Schans¹ & P. Heinze²

¹Department of Veterinary Public Health

²Meat Science Research Centre, Irene

Springbuck are harvested in the wild and form 96% of South African venison exports - essentially to West Germany. To compete with farmed deer, practical cost-effective marketing is needed, but product quality and safety must be maintained. Chilling methods are compared to see whether European Economic Community temperature specifications, which are stringent for small antelope carcasses, are met. Ambient temperature for carcass chilling has been found to be the most economical method.

There were three experimental categories: helicopter, night shooting by ground vehicle and daylight shooting by ground teams. In each category, 15 Springbuck were randomly selected in each of three experimental groups. The control group was handled as prescribed in the export control regulations while group 2 carcasses were hung at ambient temperatures for 24 hours prior to mechanical refrigeration. Group 3 carcasses were hung outside for 48 hours. Ambient and meat temperatures (four sites) were measured two-hourly and pH in longissimus, psoas and intercostal muscles four-hourly to 12h and then to 24 and 48h. A three-way statistical data analysis correlated the findings. Ultimate pH was higher in daylight ground cropping. A more favourable temperature-drop gradient was found at ambient temperatures. Under mechanical refrigeration, meat temperatures fall too rapidly to below 10 °C.

ILEORECTAL ANASTOMOSIS IN SHEEP: EFFECT ON FEED INTAKE, AND ON DIGESTIVE TRACT ANATOMY AND BLOOD FLOW PATTERNSJ.G. van der Walt¹, J.H.F. Meyer² & I.B.J. van Rensburg³¹Department of Physiology²Animal Nutrition, ADSRI, Irene³Department of Pathology

The lack of precision associated with many protein digestibility trials in ruminants is due in large measure to the variability of fermentation in the large intestine. By creating an ileorectal anastomosis (IRA), the large intestine may be bypassed, thereby allowing ileal digesta to be directly and easily sampled. As part of validating the model, changes in the anatomy and blood flow of the digestive tract were monitored after surgery.

SA Mutton Merino sheep, (n = 10), half with an IRA, were kept in individual pens, fed chopped lucerne hay *ad libitum* and were offered free access to water and a salt lick. Intake of feed and water, and the output of faeces and urine was monitored for 8 weeks, after which indwelling catheters were inserted into the left ventricle and posterior aorta. Blood flow patterns through the digestive tract were determined on both normal and IRA sheep using a radiolabelled microspheres technique (¹⁴¹Ce), after which sheep were killed and autopsies performed in order to measure the mass and length of each component of the digestive tract and to obtain samples for radiolabel determination.

Values obtained for feed intake, and digestibilities of organic matter and nitrogen, did not change significantly after surgery. Post-mortem examination revealed a marked disuse atrophy of the bypassed caecum and colon in IRA sheep, in conjunction with a compensatory hypertrophy of the distal 50cm of the colon and rectum. No significant differences, either macro- or microscopic, were found in the small intestine. Blood flow through the entire digestive tract in IRA sheep was similar to that measured in normal animals. About 45%, 39% and 16% of normal flow passed through the reticulo-rumen, and small and large intestines respectively. Compared to control values, flow through the large intestine decreased by about 50% in IRA sheep, with the notable exception of the rectum, in which flow increased by 100%. With the exception of the proximal colon, these differences were significant ($P < 0,5$). Blood flow through the small intestine was the same in both groups.

The decreased flow through the bypassed large intestine closely follows the pattern of tissue atrophy, reflecting the diminished metabolic requirements of this region. Increased blood flow through the rectum and the lower colon suggests that this region has assumed some of the absorptive functions of the bypassed large intestine. From the above results, the function of the small intestine, with respect to size, anatomy and blood flow, would appear to be unimpaired in IRA sheep, and would allow protein digestion to be studied in this model.

EFFECT OF SODIUM CHLORIDE LOADING ON ELECTROLYTE EXCRETION, WATER AND FEED INTAKE, AND TOTAL BODY WATER IN SHEEP.

R.A. Meintjes & R. Olivier

Department of Physiology

The aim of this experiment was to investigate the effects of salt loading via drinking water and via direct, intraruminal addition on selected physiological parameters in sheep.

S.A. Mutton Merino sheep (n = 6) with rumen cannulae were individually housed in metabolic crates. Chopped lucerne hay was available *ad libitum* throughout the trial, which was divided into three phases, each lasting about 1 week. Fresh drinking water was available *ad libitum*, except during phase 2.

- * Phase 1 - No additional NaCl given (Control).
- * Phase 2 - Isotonic NaCl solution (*ad libitum*) replaced the drinking water.
- * Phase 3 - 10% NaCl solution was infused into the rumen over a 24h period: similar to the amount taken in per day during phase 2.

Fractional turnover rate of body water was measured by the tritiated-water dilution method. Feed and water intake and urine output were recorded daily. Concentrations of Na⁺ and K⁺, and osmolalities of plasma and urine samples were determined daily. Several derived parameters were calculated from the above information.

Feed intake remained unchanged throughout all 3 phases. Water intake and urine output increased markedly with salt loading. Plasma Na⁺ concentrations remained remarkably constant during all phases, while K⁺ concentrations were higher during salt loading. Urine Na⁺ rose abruptly with salt administration and was significantly higher in phase 3 than in phase 2. Concurrently, K⁺ decreased significantly in concentration from phase 1 through phase 2 to phase 3. Fractional turnover of body water increased significantly with salt loading.

Salt loading reportedly has a negative effect on feed intake. No such effect occurred during this trial, presumably because the ratios of water-to-salt taken in during phases 2 and 3 were no higher than that in isotonic saline. Fractional turnover rates of body water during phases 2 and 3 were similar, because of the similar salt intakes during these phases. During phase 2, the obligatory water-to-salt intake ratio (isotonic drinking water; 104 ml.g⁻¹ salt) was similar to the same ratio in phase 3 where the animals could regulate their own water-to-salt intake (110 ml.g⁻¹ salt.) The fall in urine osmolality with a concurrent increase in total osmolar excretion during salt loading is a common finding. The reciprocal trends in urine K⁺ and Na⁺ concentrations with salt loading are indicative of reduced aldosterone levels over the latter periods. The ratio of urine volume-to-solute reabsorbed was significantly higher during phases 2 and 3, suggesting that serum ADH levels were lower during these phases.

**PULMONARY HYPERTENSION SYNDROME IN BROILERS: A PILOT TRIAL ON
PHYSIOLOGICAL INDICES**

**J. Sneddon¹, J.G. van der Walt¹, J.T. Soley², F. Huchzermeyer³,
R. Verster³ & P. Guinane³.**

¹Department of Physiology

²Department of Anatomy

³Department of Poultry Science, VRI, Onderstepoort

Pulmonary hypertension syndrome (PHS) in South African broilers costs the industry an estimated R50 million per year in lost production. The condition is precipitated by cold, hypoxic environments which initiate a pulmonary, hypoxic, pressor response leading to right-heart insufficiency and ascites in the body cavities and lung tissues. Death ensues through suffocation. This trial was a pilot study to test selected physiological parameters as possible indices of systemic hypoxia and right-heart overload, commonly seen in birds suffering from PHS, in a batch of 12 birds (White Plymouth Rock x Cornish Game strain) with unknown susceptibility to the condition.

Each bird was catheterised in the femoral artery, to facilitate collection of arterial samples. Venous samples were drawn from the brachial vein. An endotracheal tube was inserted to allow tidal volume and breathing frequency to be monitored and to collect expired gas samples.

The mean values of parameters PvO₂, PvCO₂, O₂ saturation, Pexp.O₂, Pexp.CO₂, a-vCO₂ and respiration rate of normal birds did not differ from PHS-susceptible birds. Relative lung volume did not significantly differ between the PHS-susceptible and normal birds

The parameters PaO₂, PaCO₂, VO₂, API (right ventricular mass/mass of right plus left ventricles), minute volume, tidal volume and a-VO₂ measured in normal birds were significantly ($p < 0.1$) different from PHS birds, and suggested that the PHS birds were more hypoxic as a result of inadequate ventilation. Right-heart hypertrophy was also evident in PHS birds.

These results suggest that differences in lung size are not responsible for the hypoxia seen in PHS-susceptible birds. However, the fact that ventilation was inadequate in these susceptible birds may have led to the systemic hypoxia, the right-heart hypertrophy and the greater arteriovenous oxygen difference associated with this syndrome. Further studies on greater numbers of birds are needed, using the parameters described above, in order to further describe susceptibility to PHS.

SERO-EPIDEMIOLOGY OF BOVINE LEPTOSPIROSIS IN THE NATAL MIDLANDS

C. Kruger¹, G.V. Turner¹ & S. van der Merwe²

¹Department of Veterinary Public Health

²Veterinary Research Institute

Leptospirosis is a common and economically important disease of cattle in most parts of the world. Clinical manifestations vary in severity from severe to mild signs. Because of this variation, it is difficult to diagnose leptospirosis purely on clinical signs. Since leptospire are fastidious, slow-growing organisms, most practical diagnostic attempts concentrate on serological methods. Cattle are known to be susceptible to a number of leptospiral serovars, of which *hardjo* and *pomona* are considered to be internationally significant.

Highly productive and semi-intensive cattle farming operations occur in the Natal Midlands. Idiopathic abortions and other reproductive disorders in cattle have been reported from this region. In some cases, abortions in the area have been attributed to leptospirosis. While the disease appears to be of economic importance, the actual prevalence and significance of the disease in the region is not known. A sero-epidemiological survey was therefore conducted so as to determine the prevalence of specific leptospiral serovars in cattle in the Natal Midlands.

Cattle herds that had not been vaccinated against leptospirosis were chosen for this survey. One hundred and fifty herds were included in the study. Thirty serum samples, randomly selected from each herd, were analysed for the presence of leptospiral antibodies by means of the microscopic agglutination test. The majority of the herds were found to be serologically positive to leptospiral serovars. The following serovars were identified: *hardjo*, *canicola*, *tarassovi*, *pyrogenes*, *pomona* and *copenhageni*.

Based on these serological findings, leptospirosis appears to be widely spread within the cattle population of the Natal Midlands and may be related to some of the idiopathic reproductive disorders of the region. In addition, the multivalent bacterins used for vaccinating cattle against leptospirosis do not contain some of the serovars identified in the survey. This study highlights the importance of determining the prevalence of specific leptospiral serovars in a region and a country by means of epidemiological surveys.

USE OF A NUCLEIC ACID PROBE FOR DETECTION OF BLUETONGUE VIRUS

E.H. Venter¹, H.Huismans² & A.A. van Dijk³

¹Department of Infectious Diseases

²Department of Genetics, Faculty of Agriculture

³Biochemistry Section, Veterinary Research Institute

Genome probes are destined to become a very important tool in diagnostic virology. The existence of 24 serotypes of Bluetongue virus (BTV) complicates the epidemiology and diagnosis of the disease. The objective of this study was to use genome segment 5 of BTV serotype 4 as a probe for the detection of BTV infections irrespective of serotype.

In the first experiment tissue cultures were infected with BTV and cells were harvested at different times post-infection, blotted and probed with segments 3, 4, 5, 8 and 10. The next experiment evaluated the sensitivity of segment 5 as a probe by infecting tissue cultures with varying concentrations of virus. The cells were harvested at different times post-infection and probed with segment 5. The specificity of segment 5 was then tested by infecting tissue cultures with BTV, African Horse-sickness virus (AHS) and Equine Encephalitis virus (EEV). At different times post-infection, the cultures were harvested and probed.

In the first experiment, all the probes were found to be BTV-specific, but segment 5 reacted with the highest sensitivity and detected the virus in as few as 625 infected cells. In the next experiment, the probe detected an initial inoculation of one plaque-forming unit per 10^5 cells 48h post-infection. In the third experiment, each probe detected its homologous virus in cross-hybridisation between the different viruses. BTV did not cross-hybridise with the other viruses.

Further studies will test the polymerase chain-reaction technique which should increase sensitivity even further. Trace amounts of BTV in blood and tissues of infected animals should then be easily detectable.

THE SCRUB HARE, AN IMPORTANT HOST OF IXODID TICKS

I.G. Horak¹, L.J. Fourie², L.E.O. Braack³ & A.M. Spickett⁴¹Department of Parasitology²University of the Orange Free State³National Parks Board⁴Veterinary Research Institute

This survey was carried out to determine which ticks normally found on domestic animals also utilize scrub hares as hosts. At the same time, the survey would also yield data on the seasonal abundance of these ticks and their geographic distribution.

A total of 266 hares were shot at night in the southwestern, northwestern and eastern Cape Province and eastern Karroo, the southwestern and central Orange Free State, and northwestern and eastern Transvaal Lowveld. The hares were immersed overnight in a tick-detaching agent and thereafter thoroughly scrubbed with steel-bristled brushes. The resultant mass of hair was examined for ticks under a stereoscopic microscope.

Altogether, 23 ixodid tick species were recovered from the hares. With the exception of *Boophilus decoloratus* and *Margaropus winthemi*, of which there were very few, and *Rhipicephalus sanguineus* of which there were none, the hares were fair-to-excellent hosts of the immature stages, and sometimes adults, of all the important tick species infesting domestic animals in South Africa. The numbers of ticks recovered made it possible to determine the seasonal abundance of *Amblyomma marmoreum*, *Hyalomma marginatum rufipes*, *Hyalomma marginatum turanicum*, *Hyalomma truncatum*, *Ixodes pilosus*, *Rhipicephalus appendiculatus*, *Rhipicephalus glabroscutatum*, *Rhipicephalus nitens*, *Rhipicephalus oculatus*, *Rhipicephalus sp.* (near *R. punctatus*) and *Rhipicephalus zambeziensis* on the hares. Although large numbers of immature *Amblyomma hebraeum* and *Rhipicephalus evertsi evertsi* also were present, no pattern of seasonal abundance was evident for these ticks.

Scrub hares obviously play a significant role as alternate or preferred hosts for the immature stages of a large number of important ticks found on domestic stock. The question remains, what role do they play as reservoirs of tick-borne disease?

VALIDITY OF A TRIPLE STAIN METHOD FOR EVALUATING FUNCTIONAL INTEGRITY OF STALLION SPERMATOZOA

M.L. Schulman & D.H. Volkmann

Department of Theriogenology

Any evaluation of the fertilising ability of either fresh or frozen-thawed semen requires the establishment of a set of parameters to describe those properties of the spermatozoon essential to fertilisation. The most commonly used method is a subjective evaluation of progressive motility. Although acrosomal integrity has been shown to be related to fertilisation, it is independent from the parameter of progressive motility. A triple stain method for human sperm was recently developed. The method is unique in that it simultaneously indicates not only the age of a sperm, but also its vitality and acrosomal integrity.

To establish its validity for equine spermatozoa, the triple stain method was used in a comparative trial with other established methods embracing all aspects of the triple stain. The methods selected were estimates of progressive motility, 'Spermac' staining for acrosome morphology, and the supravital stain, eosin-nigrosin.

Fresh, post-centrifugation and frozen-thawed semen was evaluated. Five ejaculates were collected from each of two stallions. Each ejaculate was then split into two fractions and diluted to 50×10^6 and 100×10^6 sperm.ml⁻¹, respectively. These fractions were then each split into two subfractions, which were centrifuged at room temperature and in a temperature-controlled centrifuge at 20 °C, respectively. Each of the 4 subfractions were then frozen in 0,5 ml straws, using an established freezing method. The straws were later thawed at a pre-determined date.

Results obtained were analysed by Pearson product-moment correlation. Significant correlations for the triple stain method with both 'Spermac' staining and estimates of progressive motility were obtained ('r' ranging from - 0,42 to 0,46 for 'Spermac' and - 0,63 to 0,66 for progressive motility at $p < 0,05$). One-way Anova testing between eosin-nigrosin, progressive motility estimates and the triple stain method for sperm viability revealed that these parameters did not differ significantly.

The results suggest that the triple stain method may be used for evaluating both fresh and frozen-thawed stallion semen. The complex nature of the method will, however, restrict its application to research.

PROGESTERONE PROFILES IN POST-PARTUM NOOITGEDACHT PONY MARES

H.J. Bertschinger, D.H. Volkmann, L.M. Westlin-van Aarde, L. Janse van Vuuren & V.M. Killeen

Department of Theriogenology

In the dairy cow, determining the progesterone profile is extremely useful for establishing cyclicity, diagnosing pregnancy and functional infertility. It is also valuable for establishing and even predicting cyclicity during the first 40 days *post-partum*. In the mare, little work has been carried out on *post-partum* endocrine cycles. The aim of this project was to study the *post-partum* progesterone profiles of pony mares and to evaluate their clinical potential.

Eleven Nooitgedacht-type pony mares foaling from August to January were available for the trial. The mares were teased daily from Day 3 *post-partum* up to the end of the trial. Blood was collected for progesterone assay on Days 0, 1, 2 and 3 after foaling and 2-3 times per week thereafter, until the mare had passed through 3 consecutive oestrus cycles or, in those mares that did not show regular cycles, for 10 weeks.

Three of the 11 mares cycled normally with overt oestrus. Three mares showed overt *post-partum* oestrus, followed by clinical anoestrus. The progesterone profiles indicated a persistent corpus luteum in each of these mares. The remaining 5 mares did not develop overt *post-partum* oestrus and remained in anoestrus for the first 50-70 days *post-partum*. The progesterone profiles showed that one mare was in true anoestrus for 40 days followed by silent oestrus; 3 mares displayed 2 consecutive silent oestrus cycles, while one mare had a silent *post-partum* oestrus followed by a persistent corpus luteum.

The results of this trial show that determining the progesterone profiles of mares may be extremely valuable in establishing cyclicity and, in the case of functional infertility, making an accurate diagnosis. This will enable the clinician to apply treatment specific to the circumstances of each case, rather than a generalized empirical treatment. Clinical evaluation on its own often does not allow for an accurate diagnosis. We therefore advocate determining the progesterone profile combined with rectal palpation of the reproductive tract in order to optimize *post-partum* management of the reproductive cycle in the mare.

MECHANISM AND SIGNIFICANCE OF EARLY EQUINE EMBRYONIC MOBILITY

M.D. Loomes & R.O. Gilbert

Department of Theriogenology

There is a good temporal correlation between the period of maximum mobility of the equine embryo and the critical period for maternal recognition of pregnancy. Equine embryos 9- to 10-days old are relatively immobile, spending 60% of the time within the uterine body. At 12 to 14 days, embryos become highly mobile, rapidly traversing both uterine horns.

The aim of this study was to determine whether the intra-uterine insertion of simulated latex/Silastic embryonic vesicles, the size of 12- to 14-day old equine embryos, plain or impregnated with physiological amounts of known embryonal secretory products (progesterone, oestradiol-17 or prostaglandin-E₂ (PGE₂)), would mimic mobility patterns of real embryos and thereby prevent luteolysis.

Five mature, non-pregnant cycling pony mares were randomly exposed in consecutive cycles to all 4 categories of vesicles on day 12 post-ovulation. The intra-uterine location of the vesicles was determined by ultrasonography every 5 min for 2 h on days 12, 13 and 14. Uterine tone was determined by daily rectal palpation. Oestrus duration and ovulation dates were recorded for all cycles. Plasma progesterone was assayed on all non-oestrus days for all cycles.

All vesicles were mobile within the equine uterus. Treatment, horse and day all significantly influenced the time spent in the uterine horns. Horse differences indicate that the pattern of embryonic mobility is dictated to some extent by the dam. Day is a variable suggested as significant by the experimental data and was not a variable originally investigated. Maximum movement occurred on days 12 and 14, with little movement on day 13. This observation cannot, at this stage, be explained. PGE₂-impregnated vesicles significantly increased uterine tone, comparable to that of early pregnancy, and spent significantly more time fixed in the uterine horns than any other type of vesicle. Time of luteolysis, and thus of interovulatory periods was not lengthened by any treatment. This suggests that equine embryos exert an influence before day 12 or 13 post-ovulation and that embryonal secretory products are probably involved. Synthetic vesicle expulsion only occurred at onset of oestrus. This is significant, considering that embryos can be retained in the uterus for several days after death and that expulsion of remnants occurs concurrently with the onset of oestrus.

PROSTAGLANDIN E₂ AS AN ADJUNCT TO THE INDUCTION OF ABORTION IN MARES

D.H. Volkmann & K.G.M. De Cramer

Department of Theriogenology

Therapeutic, research and managemental reasons are often given as indications for the induction of abortion in mares. Traditionally, repeated doses of prostaglandin F_{2α} (PgF_{2α}) over many hours or days are used as abortifacients in mares 90 days pregnant. This study was designed to investigate the value of PgE₂ as a cervical dilator prior to the induction of abortion in mares.

Fourteen pregnancies in 11 Nooitgedacht pony mares were aborted in this study. These were divided into 4 groups according to their stage of development: **Group 1:** 80-120d (n=4), **Group 2:** 121-160d (n=3), **Group 3:** 161-240d (n=3) and **Group 4:** 240-300d (n=4). The protocol, that was developed recently for the induction of parturition, was used to abort each pregnancy and is summarized as follows: (time intervals in minutes):

- * **T₀** : 0,5 mg PgE₂ intracervically;
- * **T₃₀** : 1,5 mg PgE₂ intracervically;
- * **T₆₀** : 10 IU oxytocin intravenously; if foetal presentation was normal, but delivery failed to progress, this was followed by a further 10-20 IU 30 min later (T₉₀).
- * **T₁₂₀** : In cases of persistent failure to deliver, the allantochorion was ruptured through the dilated cervix and the foetus delivered by traction.

All foetuses were euthanized within seconds of delivery.

While PgE₂ treatment resulted in cervical dilation in all mares sufficient to allow passage of a hand at T₉₀, it failed to cause rupture of the allantochorion in spite of considerable abdominal straining after oxytocin therapy. All foetuses were thus removed manually after rupturing the allantochorion at T₉₀₋₁₂₀.

Placental retention for 6h occurred in all mares. Spontaneous release occurred at 36h post-abortion and mares remained healthy and uterine involution was normal.

Six mares were aborted during summer and resumed cyclic activity comparable to lactating mares. They were bred and reconceived by 60d (range 21-121d) post-abortion.

Humane, rapid equine abortions can therefore be performed with great ease at any stage of pregnancy by the induction of cervical relaxation with PgE₂ followed by the manual removal of the foetus.

SUSCEPTIBILITY OF DOMESTIC PIGS TO INFESTATION WITH THE KRUGER NATIONAL PARK STRAIN OF *TRICHINELLA SPIRALIS*

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Trichinella spiralis is a parasitic nematode with a wide range of hosts, including man. While this species occurs in most parts of the world, it has been reported only from the Kruger National Park in the Republic of South Africa, where it is present in spotted hyaena, lion, leopard, jackal, warthog and multimammate mice. The strain of *Trichinella spiralis* that was isolated from a spotted hyaena in the Kruger National Park in 1967 has since been maintained in the laboratory in multimammate mice. The present study was undertaken to determine the infectivity of this strain to domestic pigs.

Six pigs were infested with *T. spiralis* obtained directly from multimammate mice and 4 after passage through pigs. Two months after infestation the pigs were killed; certain muscles were removed from 1 side of the carcass and digested in a 3% pepsin/HCl solution so that the number of larvae could be estimated.

Of the 6 pigs infested with larvae derived from multimammate mice, 2 developed severe intestinal trichinellosis and 1 died as a result, the muscles of 2 other pigs were heavily infested with larvae while the remaining 2 had 2 larvae each in 4 kg of tissue. The other 4 pigs, infested with larvae from 3 of the heavily infested and from 1 of the lightly infested pigs, acquired very light infestation only. The susceptibility of 4 of the animals infested with larvae from multimammate mice was probably increased by the stress of being moved from the piggery.

The fact that 4 pigs were susceptible to infestation with this strain of *T. spiralis*, indicates that this parasite could possibly establish itself in domestic pigs kept under certain systems of husbandry in areas adjoining the Kruger National Park.

**FORMATION AND DEVELOPMENT OF CORPORA LUTEA IN THE POUCHED
MOUSE, *SACCOSTOMUS CAMPESTRIS***

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Department of Theriogenology

The mechanisms and the hormonal events involved in formation and development of corpora lutea are complex and show a wide inter-species diversity in mammals. While luteinizing hormone (LH) is luteotrophic in some species, in others prolactin or combinations of prolactin and LH or follicle stimulating hormone (FHS) will be of major significance. Further, in many species, vaginal stimulation is required in order to activate the luteotrophic complex.

Aspects of the luteotrophic complex were studied in pouched mice housed under controlled conditions optimal for breeding. Cycling and recently-mated females were treated with hormones and/or artificial vaginal stimulation.

Prolactin in daily doses of up to 16 i.u. did not promote luteal or uterine development in cycling females, although 16 i.u. caused a rise in progesterone levels. A dopamine antagonist induced pseudo-pregnancy in 6/11 cycling females, with raised levels of progesterone. Pseudopregnancy was also induced by artificial vaginal stimulation of cycling females. A GnRH antagonist given to ovariectomized females significantly suppressed LH levels, but did not prevent ovulation or change the oestrous cycle pattern in intact normally-cycling females. Nor did it prohibit or prolong pseudopregnancy induced by artificial vaginal stimulation. A dopamine antagonist given to recently-mated females did not raise the progesterone levels above those of mated females treated with vehicle only. A dopamine antagonist prohibited pregnancy in newly-mated females, and interrupted it when given on Day 6 of pregnancy.

Prolactin is involved in the luteotrophic support of pouched mice, and it is regulated by dopamine. A role for LH during the oestrus cycle or pseudopregnancy was not established in the present study. Vaginal stimulation is essential for activation of the luteotrophic complex, and it is likely that a specific amount is required for establishment of pregnancy.

**ILEORECTAL ANASTOMOSIS IN SHEEP: LONG-TERM CHANGES
TO DIGESTIVE TRACT ANATOMY, WATER INTAKE AND BLOOD ACID-BASE
BALANCE**

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The large intestine may be bypassed to study, *inter alia*, partial digestion in the small intestine. Since the resulting increase in water loss may lead to an imbalance in blood gases and/or electrolytes, changes in these parameters were followed after surgery. Macro- and microscopic changes in the digestive tract were examined on autopsy 12 months later.

SA Mutton Merino wethers (n = 10) were kept in metabolism cages, fed lucerne hay *ad libitum* and had free access to water. Intakes of feed and water and production of faeces and urine were determined daily. Mixed venous blood samples were obtained weekly from 4 sheep for 5 weeks prior to surgery. Thereafter, blood samples were drawn daily for the first 5 days, and twice weekly for the remaining 5 weeks. All samples were analyzed for pH, pO₂, pCO₂, haematocrit, haemoglobin, osmolality, urea, Na⁺, K⁺, Ca⁺ and Cl⁻. Mean blood gas and electrolyte parameters were calculated for pre-operative (n = 5) and post-operative (n = 5, 3-5 weeks) periods. All sheep were killed after 12 months, the digestive tract weighed, measured and examined histologically.

Despite an increased loss of water (2500 ml/day) via the faeces, values obtained for blood haematocrit, osmolality, pH, urea, and Na⁺ did not change. Blood Ca⁺ and Cl⁻ values and the Bicarb/Carb ratio increased slightly, but insignificantly (P > 0.05). Concentrations of K⁺ and O₂ in blood decreased significantly, concomitant with significant increase in blood bicarbonate concentration. In general, while the masses of the reticulo-rumen complex and the small intestine did not differ from control values, those of the caecum and the upper and spiral sections of the colon showed considerable regression. Masses of the lower colon and, in particular, the rectum of the experimental group were significantly larger than control values.

These results suggest that loss of HCl led to bicarbonate accumulation in the blood, and caused a metabolic alkalosis, compensated by a respiratory acidosis. Apart from regression of a major portion of the large intestine, no gross or microscopic changes were noted in the reticulo-rumen complex or small intestine, suggesting that these sheep may be used for studies on protein uptake. Furthermore, these sheep were stable and healthy over the 12 months experimental period, provided that water and a salt lick was available *ad libitum*.

CANINE PANCREATITIS: DIAGNOSTIC USEFULNESS OF SERUM AMYLASE AND LIPASE ACTIVITY

F. Reyers

Department of Medicine

Canine pancreatitis (excluding chronic fibrosis and atrophy) presents clinically as one (or a combination of) the following syndromes: vomiting, anorexia, acute abdomen, diarrhoea. Many other serious (sometimes life-threatening) conditions may be associated with such syndromes or combination of syndromes. It is imperative, therefore, that the clinician should be able to confirm or eliminate the presence of pancreatitis rapidly and with confidence. To this end, the determination of serum amylase and or lipase has been employed for several decades. Clinical experience has shown that these enzymes are not invariably reliable indicators. This investigation was therefore conducted to quantitate the degree of reliability.

Records were drawn on all 189 cases presented to the Department from 1985-88 where pancreatitis was considered as a differential diagnosis. The specific diagnosis was established at autopsy, or on the basis of laboratory data or clinical course. These cases were classified into pancreatitis (N = 25), diabetes mellitus (without pancreatitis) (N = 14), renal disease (N = 23), gastro-intestinal disease (N = 63) and other (including abdominal trauma, Addison's disease, arthritis/disc disease, cardiac conditions, toxicosis, infectious diseases, hepatoses, peritonitis, and splenic lesions) (N = 64). Serum amylase and lipase activity was then evaluated for sensitivity and specificity at various cut-off levels and the resulting predictive-value curves were plotted.

Using traditional, "normal range" cut-off points at 2 000 U/l for amylase and 200 U/l for lipase, it was found that the sensitivity for pancreatitis was 88% and 96%, but the specificity was only 65% and 61% respectively, with a predictive value for a positive result of a mere 27% in both cases.

Optimisation of sensitivity and specificity by the Youden index suggested that, for amylase, a cut-off point at 3 000 U/l should be used. This yields a sensitivity of 80% and a specificity of 89%. For lipase, Youden index optimisation suggested a cut-off point at 600 U/l, yielding a sensitivity of 92% and specificity of 88%. Optimisation of predictive value by the efficiency rating suggested two cut-off points for amylase; one at 4 500 U/l (PV + = 76% and PV- = 95%) and the other at 6 000 U/l (PV + = 93% and PV- = 93%). For lipase, the efficiency rating suggested a cut-off point at 650 U/l (PV + = 61% and PV- = 98%).

Serum amylase and lipase, using cut-off points at 3 000 U/l and 600 U/l respectively, are reasonably reliable diagnostic tests for pancreatitis. When used in serial combination, the specificity approaches 97% and the predictive value 76%. Renal and hepatic disease, as well as non-pancreatitis diabetes mellitus, were the main cause for the poor specificity of lipase when used as sole index.

RABIES IMMUNE STATUS AMONG VETERINARIANS

J.A. Spencer & P.G. Howell

Department of Infectious Diseases

In a previous study, it was shown that antibody levels among 5th year students at the Veterinary Science Faculty of the University of Pretoria increased with each year of inoculation up to the 5th year, when these levels began to show a decrease.

It was, therefore, decided to compare these results to those obtained from an analysis of blood samples taken from veterinarians in private practice. Blood samples were collected from 105 participants and antibody levels were measured by means of an ELISA test.

Antibody levels were seen to increase with consecutive booster inoculations. This increased titre reached a plateau after the 4th booster and tended to decline thereafter. Antibody levels appeared to decrease with time, following each inoculation.

A recent search of the literature revealed that the 0,1ml ID route of inoculation is controversial. Current thinking proposes that this route may be inefficient in inducing a long-lasting, protective immunity. Alternative vaccination regimes are discussed.

**A RAPID METHOD FOR THE DETECTION OF ANTIBODIES TO FELINE
INFECTIOUS PERITONITIS**

J.A. Spencer & H.M. Snyman

Department of Infectious Diseases

The paradox of Feline infectious Peritonitis (FIP) lies in the assistance given by the immune system of the affected cat to the inflammatory process that results in the death of the animal. Cats with pre-existing serum *Coronavirus* antibodies experience a more rapid, fulminating disease after exposure. Therefore, the main purpose of an antibody test may lie in the ability to predict which cats are more at risk to fulminating disease, to establish whether or not cats have been exposed and to exclude FIP in a differential diagnosis.

The aim of this study was to establish a rapid, fluorescent test for the presence of antibodies to the FIP strain of Corona-virus. An English strain of the virus was grown in *Felis catus* whole-foetus (FCWF) cells and fixed onto microscope slides.

Test sera were applied to these infected cells and incubated for an hour at 37 °C, after which anti-cat, fluorescent, conjugated serum was added. After a further one hour of incubation, the slides were examined under a fluorescence microscope.

Positive sera could easily be distinguished from negative sera and antibody levels could be quantified by serial dilution. As the incubation periods are relatively short, this method would appear to save time while remaining reliable.

**ANTIBODY RESPONSE TO MODIFIED LIVE VIRUS (MLV) VACCINES IN
CHEETAHS**

J.A. Spencer

Department of Infectious Diseases

Feline panleucopaenia virus (FPV) and feline herpes virus (FHV) cause important diseases in domestic and wild felids. Serious losses may occur if susceptible zoo populations are infected through contact with feral domestic cats. Animals at the De Wildt Cheetah Research Station are vaccinated annually with Felocell MLV vaccine. It was decided to test the antibody response to this vaccine as controversy still exists in relation to which type of vaccine to use, how often to vaccinate etc.

A group of Cheetahs from the De Wildt Cheetah Research Station were bled prior to being vaccinated and were bled again one month later. Their antibody responses were measured by means of an ELISA test.

Of the animals tested, 58% and 48% seroconverted to FPV and FHV respectively. The remainder of the animals either showed a decrease in antibody levels or no response at all.

It is possible that antibody levels may take longer than one month to increase, or it could be that the animals are unable to respond at the cellular level. This report deals only with the humoral response to the vaccine as the cellular functions are still under investigation.

ATTEMPTS TO ESTABLISH *STRONGYLUS EQUINUS* IN IMMUNOSUPPRESSED LABORATORY ANIMALSR.C. Krecek¹, D.B. Petty², A. Verster¹ & A.L. Lange³¹Department of Parasitology²Department of General Physiology, Faculty of Dentistry, Witwatersrand University³Department of Pathology

Alternative hosts provide important models for the study of host-parasite interactions and are also a source of regular parasitic material. This pilot study was designed to find an alternative host of *Strongylus equinus*, a pathogenic nematode in horses.

Twenty nude mice and the same number of guinea pigs were infected with 200 *S. equinus* third-stage larvae (L₃) with a stomach tube and divided into five groups. Group 1 received cyclosporine (10mg/kg) every second day. Group 2 received cyclophosphamide (50mg/kg) every fourth day. Group 3 received dexamethasone (6mg/kg) and azothioprine (25mg/kg) on alternate days. Group 4 received methylprednisolone acetate 40mg/kg every three days. Group 5 were untreated controls. The immunosuppressants used were selected according to their route and frequency of administration and their ability to suppress immunity of their host to other organisms in the environment.

The animals were killed on days 9 and 21 post-infection. The viscera were opened and placed in Baermann filters to facilitate larval recovery. Despite this, no *S. equinus* were recovered. Subacute parasitic granulomas were found in one guinea pig from group 1. The immunosuppressive drugs and the doses at which they were used, did not reduce the innate resistance of guinea pigs to *S. equinus*.

**ULTRASTRUCTURE OF FILAMENTOUS MICROBES ON ZEBRA
CYATHOSTOMES**

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¹Department of Parasitology

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Comprehensive studies on the parasites of zebras in southern Africa date from 1978. A microbial community associated with several species of cyathostome nematodes from the hindguts of these zebras has been reported. Previous studies on this community recognized one filamentous organism only and have attempted to characterize some of the anaerobic components from this hindgut environment.

With the aid of scanning and transmission electron microscopy, the present study reveals that there are actually three types of filamentous organisms: segmented, multi-cellular-continuous and helical. These three types are considered to be filaments formed by bacteria and the most typical stage in development will be presented.

An understanding of the ultrastructure of these organisms is essential to further research into the ecology and association between these microbes and their nematode hosts.

CHANGES IN SERUM ENZYME LEVELS ASSOCIATED WITH *STRONGYLUS EQUINUS* INFECTION

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²Department of Parasitology

Strongylus equinus, a large blood-sucking strongyle of equids occurs in 30% of horses in South Africa. The larval stages migrate through the pancreas and liver. This study was undertaken to determine whether damage to the liver may be reflected in increases of gamma glutamyl transferase (GGT), aspartate transaminase (AST) and lactate dehydrogenase (LDH) serum levels.

Eight young horses were infected with twenty or thirty thousand third stage *S. equinus* larvae. Serum AST, GGT, LDH, amylase and lipase were monitored regularly for twenty-eight weeks post-infection, and compared with values obtained from four control horses. From thirty weeks post-infection, the horses were killed and examined at post-mortem. The pathology findings have been reported elsewhere.

In this study, despite the presence of mild liver damage, these enzyme levels fell or remained low in comparison to those of the control group. High amylase and lipase levels have been previously associated with acute pancreatitis. Despite the fact that there were approximately 200 fifth-stage larvae present in the pancreas of one of the horses, changes in the amylase and lipase levels were minimal.

These findings suggest that serum enzyme levels are not suitable for monitoring the course of an infection caused by *S. equinus*.

DÖPPLER ECHOCARDIOGRAPHY

R.M. Kirberger

Department of Surgery

Döppler echocardiography has been extensively applied in human clinical medicine for the past ten years. While much of this experimental work has been done in open-chest dogs, clinical diagnostic Döppler echocardiography has only recently been applied to domestic animals.

When a transmitted ultrasound beam encounters an object moving towards or away from it, the frequency of the reflected beam changes. This is known as the Döppler frequency shift, and is directly proportional to the velocity of the moving object. When the Döppler effect is applied to moving red blood cells, the frequency shift occurs in the audible range, providing the discerning listener with valuable information about blood flow. The frequency shift may also be graphically displayed to allow for further analysis. The above information may be used in the Döppler equation to determine blood flow velocity.

Echocardiography allows the two dimensional display of the beating heart. By combining this display mode with a Döppler facility, blood flow can be determined at a particular point in the heart. If the graphic display of blood flow is coupled to an electrocardiogram and phonocardiogram the following conditions may be diagnosed:

- * Valvular insufficiency and/or stenosis
- * Atrial and ventricular septal defects
- * Patent *ductus arteriosus*
- * Assessment of systolic and diastolic ventricular functions, including cardiac output
- * Pulmonary hypertension

Döppler echocardiography provides the clinician, physiologist, and research worker with an easily-performed diagnostic tool which has cheap running costs, is safe and is totally non-invasive.

ARTHROSCOPY IN THE HORSE

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Large Animal Surgery Section,
Department of Surgery

Arthroscopy is the visualization of a joint using an endoscope. It was practised as early as 1918 in man and is currently the preferred method, above arthrotomy, in many types of joint surgery both in man and the horse.

Arthroscopy has both diagnostic and surgical uses. Visualization of the joint surface using arthroscopy can confirm suspected cartilage damage, which may not be visible on radiographic image. Furthermore, this technique enables detailed examination of a joint relatively atraumatically, particularly when compared to arthrotomy. Arthroscopic surgery entails the use of instruments, manually or electrically driven, to remove devitalized cartilage and bone.

The arthroscope consists of a rigid fibre-optic endoscope (which can be connected to a camera and monitor), a light source, a fluid line, and various instruments for probing and for curettage of devitalized tissue. The procedure is always conducted under general anaesthesia and aseptic conditions.

Most carpal chip fractures, tarsal osteochondritis dessicans lesions and subchondral bone cysts in the stifle have been treated surgically using the arthroscope. Surgery performed using arthroscopy is successful, looks good cosmetically, and has the advantage of a short convalescent time, enabling the patient to return to work earlier than in the case of an arthrotomy.

The decision to do arthroscopy must be made with the knowledge that some areas of joints are inaccessible, or do not allow adequate visualization. In these cases arthrotomy may be preferred. Post-surgical infection may also be a complication if asepsis is not maintained during arthroscopy.

REVIEW OF COLIC CASES AT ONDERSTEPSPOORT, 1986-1988

J.S. van den Berg

Department of Medicine

This retrospective study examined the records of all horses that were hospitalized with colic between January 1986 and October 1988, 88 in total. Of these, 25 were seen in 1986, 18 in 1987 and 45 during 1988.

Of the 25 horses seen in 1986, 3 were euthanized on admission due to poor prognosis or for financial reasons, 4 underwent surgery and 18 were treated medically. While none of the surgical group recovered, 14 of those treated medically did recover. The number of horses seen in 1987 declined to 18 of which 6 were euthanized on admission, 8 were treated medically and 4 underwent surgery. One of the four horses that was operated on recovered, whilst 7 of the medically treated horses recovered. Although the period evaluated in 1988 was shorter (9 months), the number of colic admissions increased to 45. Of these, 11 were euthanized on admission due to poor prognosis or for financial considerations, 12 underwent surgery of which 5 recovered, while, of the 22 that were treated medically, 20 recovered.

When plotting case numbers against seasonal incidence, two distinct peaks were seen every year, the larger occurring in late autumn, while the smaller peak occurred in spring. The reason for this seasonal distribution was found by examining the diagnostic profile of the cases. The most commonly diagnosed cause was impaction of the colon (26/88), reflecting a possible dietary or parasitically based aetiology.

The above cases were sorted into groups reflecting the site of the cause of the colic. This analysis revealed that 6.8% of cases were associated with pathology of the stomach, 19.3% with the small intestine, 2.3% with the caecum, 45.5% with the colon and the remaining 22.7% were grouped as non-specific causes. Only 3.4% false (non-GIT) colic incidents were diagnosed.

The most startling fact was the very high incidence (second most common) of anterior enteritis. A possible explanation may lie in the time taken to refer the case. The average time before referral declined from 60 hours in 1986 to 40 hours in 1987 and finally to an average of 29 hours in 1988. The cases with anterior enteritis probably survived long enough to be referred, while those with torsion and volvulus did not.

Often one of the most important considerations to the owners was the cost involved. During 1988, the average total cost for a surgical case was R878.00. Contrary to the quoted inflation rate this figure increased in 1987 by 18% to R1 035.00 and by another 44% in 1988 to R1 498.00.

This survey has highlighted the relative importance of the different types of colic pertaining to the Onderstepoort area and pointed out those aspects which may still be improved.

**PROBLEM-SOLVING INSTRUCTION AND "OPEN-BOOK" EXAMINATIONS IN
SMALL ANIMAL CLINICAL NEUROLOGY**

W.L. Berry

Department of Medicine

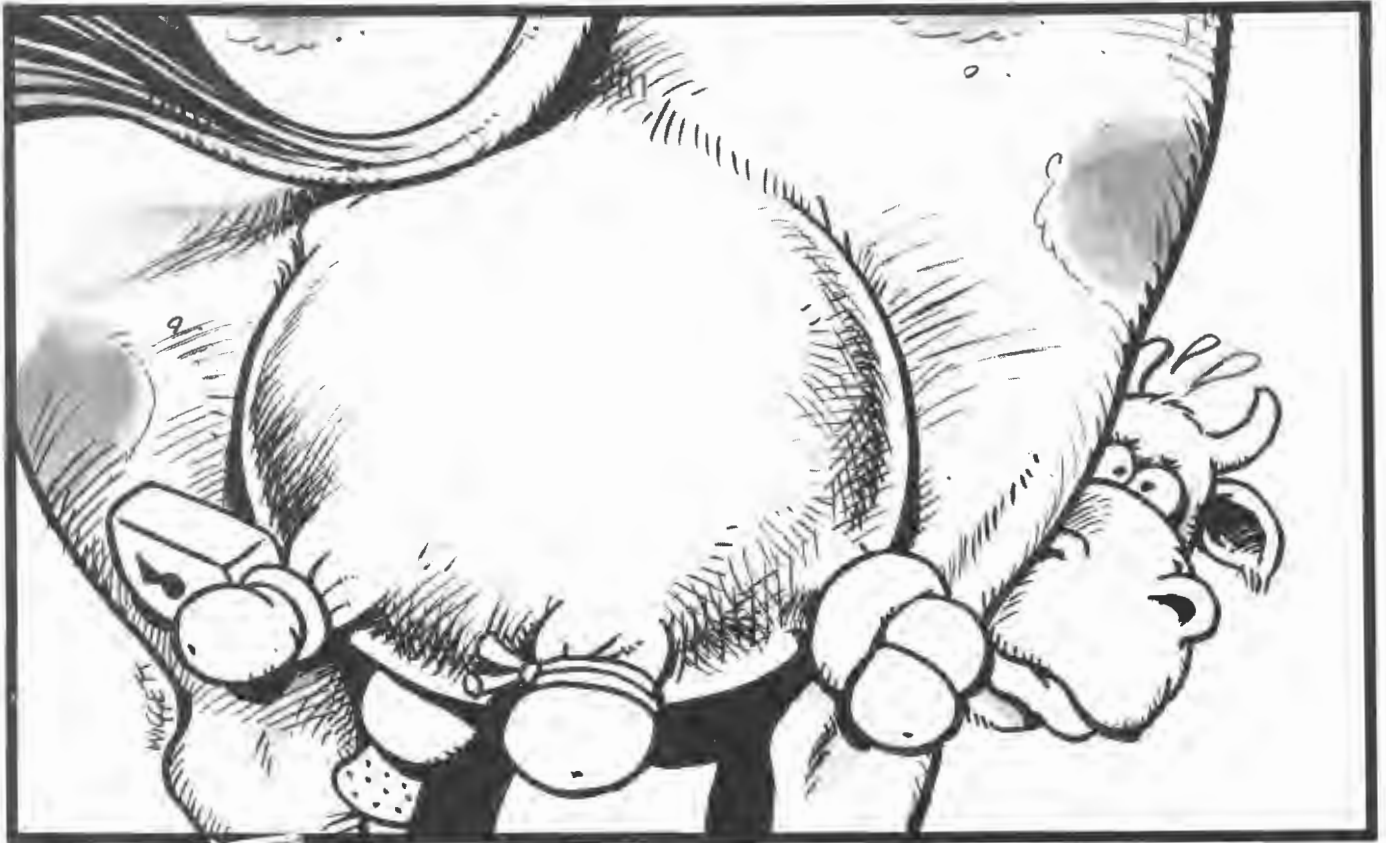
Veterinary students experience difficulty in the logical application of concepts to the diagnosis and management of disease. This is primarily a result of not being taught problem-solving, but rather being expected to passively absorb facts disseminated during lectures. For these reasons, in addition to the vast range of clinical signs which occur in small animal neurology, it was decided to introduce problem-solving instruction and "open-book" examinations in small animal clinical neurology.

The course on small animal neurology is divided into two components, namely Diagnostic Neurology (Clinical Diagnostics, BVSc III) and Clinical Neurology (Medicine 400, BVSc IV). Diagnostic Neurology is presented over 8 contact-hours of formal class tuition, and 2 hours of hands-on instruction. Clinical Neurology (Medicine 400, BVSc IV) is presented over 12 periods (8 contact-hours), the first half of each lecture being formal in presentation, while the second half is utilized for problem-solving case-studies. By using knowledge acquired in Diagnostic Neurology given the previous year, the students are required to interpret neurological signs and classify the case into a syndrome. Thereafter, the student is required to solve the problem, making use of the comprehensive reference supplied (or any other references), in addition to the assessment of an expanded data-base. Video-recordings and photographic slides are utilized for the illustration of cases and radiographs. This exercise is done in class, ensuring the student access to the reference material in solving problems. During the discussion of the case study, misunderstandings and difficulties in problem-solving are often discovered, and may be rectified. Certain conditions are identified in the student objectives as being "non-open-book" written and oral examination subjects. These are, in particular, emergency conditions, and the management thereof, for which the student will not have time to consult reference material in a clinical situation.

Critics of the open-book system argue that only the student's ability to read and use an index, will be evaluated. However, access to reference material does not eliminate the need for knowledge of the concepts of the discipline. If the student is unable to localize the lesion or categorize the neurological syndrome, references will be of little use. As a time limit is imposed in answering the open-book problem, the student must be competent in analyzing clinical data, have a working knowledge of the reference material, and have practised the problem-solving method outlined in class.

As the faculty is currently involved in curriculum, problem-solving instruction and open-book examinations are options worth considering, particularly as self-directed study and co-operative teaching appear to be the aims of most teaching institutions. In addition, it is important that students learn to use references, as no professional activity - practice, research or teaching - should be carried out without access to reference material.

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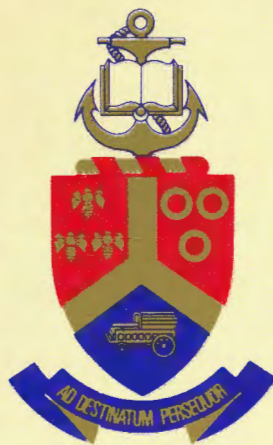
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