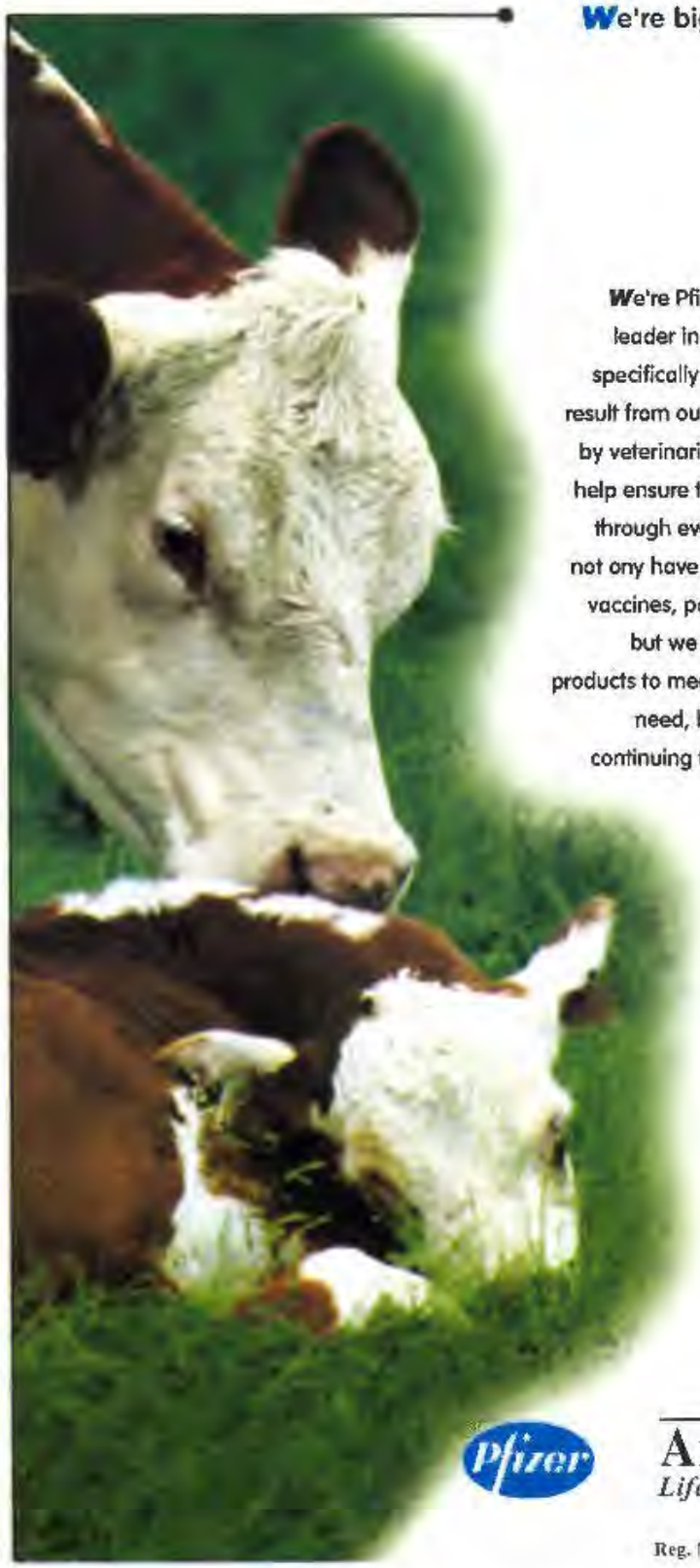
UNIVERSITY OF PRETORIA

FACULTY OF VETERINARY SCIENCE

17th Faculty Day

September 20, 2001

PROGRAMME AND SUMMARIES



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17th FACULTY DAY

20 SEPTEMBER 2001

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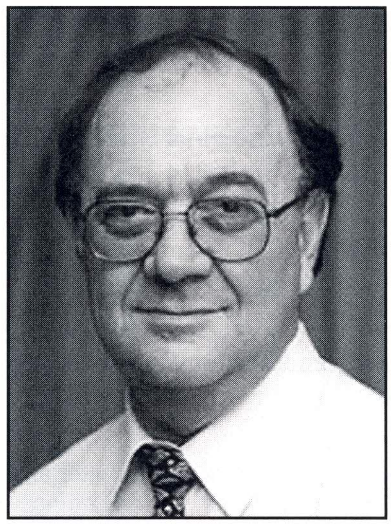
MESSAGE FROM THE DEAN



Prof. NPJ Kriek

FACULTY DAY is intended to create an opportunity for members of Faculty to present to staff and other interested parties, the current trends and development of current research within the Faculty.

The scope of activities and the interest shown to participate in the proceedings of the day are encouraging. Keeping in mind where we come from, and the road that we have to travel to become truly internationally competitive in research, I have great expectations for our future in these fields of academic endeavour, given the increasing interest in research noticeable in the Faculty.

I want to thank the participants in today's activities for the inputs that they are making into the future of the Faculty and of veterinary education in South Africa. And to those who took the trouble to attend this meeting, thank you for your time and support; we need as much of it as is available.

Best wishes to all for an enjoyable day.

PROF N P J KRIEK
DEAN

Prof. Henk Huismans

PROFESSOR HENK HUISMANS

Henk Huismans is the head of the Genetics Department at the University of Pretoria. He was born on the 7th November 1942 in The Netherlands and immigrated with his parents to South Africa in 1952. After matriculating he studied at the University of Stellenbosch where he completed a BSc (Chemistry and Physics) and a MSc (Inorganic Chemistry). In 1966 he was appointed as researcher in the Molecular Biology Section at the Onderstepoort Veterinary Institute (OVI). This appointment stimulated his interest in molecular biology, which was then a very rapidly expanding research specialisation. In 1970 he obtained a DSc from the University of Pretoria with a thesis on the effect of BTV infection on host cell protein and nucleic acid synthesis. After two years at Duke University in the USA in which he identified the first reovirus RNA binding proteins he was appointed as Head of the Biochemistry Section at OVI where he directed and co-ordinated the research programme on BTV. He initiated the first recombinant DNA technology based research programme at Onderstepoort. He was promoted to Assistant Director in 1984. In 1987 he was appointed as Professor and Head of the Genetics Department at the University of Pretoria where he initiated the first molecular biology research programme at the university. He focussed his research almost entirely on African horsesickness virus (AHSV) and Epizootic haemorrhagic disease virus (EHDV). He is the author of about 68 peer-reviewed publications. He has an A rating from the NRF and has received academic achievement awards from the University of Pretoria in 1989, 1992, 1995 and 1998. He was a finalist in the 1999 National Science and Technology Forum awards for the most outstanding contribution to Science, Engineering and Technology and is an elected fellow of both the SA Royal Society and the SA Academy of Sciences. In 2001 he was the recipient of the University of Pretoria's Chancellor's award for research.

FACULTY OF VETERINARY SCIENCE, UNIVERSITY OF PRETORIA

17TH FACULTY DAY

THURSDAY 20TH SEPTEMBER 2001

PROGRAMME

07:45-08:15 **Registration and Coffee**
Master of Ceremonies: *Professor R Coubrough*

08:15-08:30 **Welcome and Opening Address**
Dean: *Professor N P J Kriek*

08:30-09:20 **RESEARCH PROGRAMME: SHORT COMMUNICATIONS SESSION**
CHAIR: *Professor M van Vuuren*

1. **Experimental equine encephalosis virus infection in ponies**
   A D Pardini, J P Nurton, A J Guthrie, P G Howell and E P Lane
2. **A group-specific indirect sandwich enzyme-linked immunosorbent assay for the detection of equine encephalosis virus antigens**
   J E Crafford, A J Guthrie, M van Vuuren, J N Burroughs, P P C Mertens, C Hamblin
3. **The isolation and characterization of bovine viral diarrhoea viruses from cattle and African buffalo in South Africa**
   N Kabongo, C Baule, M van Vuuren
4. **Molecular epidemiology of foot-and-mouth disease virus in West Africa**
   O Sangare, A D S Bastos, W Vosloo, E H Venter

09:20-10:20 **Sir Arnold Theiler Memorial Lecture : "Molecular biology and its impact on the study and control of viral diseases such as bluetongue and African horse sickness"**
Professor H Huismans

10:20-10:30 **Pfizer** "Lecturer of the Year Award"
OPVSC Representative

10:30-11:00 **TEA** and Viewing of Posters and Photographic Exhibition

11:00-12:10 **RESEARCH PROGAMME: SHORT COMMUNICATIONS SESSION**
CHAIR: *Professor G E Swan*

5. **Veterinary drug supply to subsistence and emerging farming communities in the Madikwe district of the North West Province of South Africa**
   R Gehring, G E Swan, R D Sykes
6. **Ethnoveterinary medicine in Madikwe: a new perspective on traditional knowledge**
   D van der Merwe
7. **Acaricide resistance profiles of single and multi-host ticks collected from commercial and communal farming areas in the Eastern Cape and Northwest Provinces of South Africa**
   S Mekonnen, N R Bryson, L J Fourie, R J Peter, I G Horak, A M Spicket, R Taylor, T Strydom
8. **The microbial quality of ostrich carcasses produced in a South African export-approved ostrich abattoir**
   M Karama
9. **Establishment and standardisation of methods for a veterinary antimicrobial resistance surveillance programme in South Africa**
   H Nel, M van Vuuren
10. **Contraception of some wild carnivores in southern Africa using deslorelin down-regulation of LH and FSH**
    H J Bertschinger, T E Trigg, W Jöchle, A Human

12:10-13:00 **RESEARCH PROGRAMME: PRESENTATION OF POSTERS SESSION**
CHAIR: *Professor T Aire*

P1. **A small ruminant research and development network for SADC Region**
   E F Donkin, H C Els
P2. **Basic architecture of the interstitial tissue of the testis of the Sacred Ibis**
   J T Soley, D Josling
P3. **Molecular epidemiology of foot-and-mouth disease virus type SAT-2 in West Africa**
   O Sangare, A D S Bastos, W Vosloo, E H Venter
P4. **Survey of nematophagous fungi in South Africa**
   D T Durand, H M Boshoff, L M Michael, R C Krecek
P5. **Ultrastructural features of erythrocytes and endothelium in dogs suffering from canine babesiosis**
   A Pardini, N P J Kriek
P6. **The effect of an angiotensin-converting enzyme inhibitor on water and electrolyte balance in water restricted sheep**
   R Meintjes, H Engelbrecht
P7. **Extension of the FAMACHA© system: the use of a poster advertisement**
   G F Bath, J A van Wyk
P8. **Why a National Forum for Veterinary Helminthology in South Africa?**
   A Avenant-Oldewage, A du Plessis, A R Haverman, R C Krecek, J S van der Merwe, A F Vatta
P9. **Milk production from goats for households and small-scale farmers in South Africa**
   E F Donkin, P A Boyazoglu

13:00-13:40 **LUNCH**

PROGRAMME

13:40-14:10 **RESEARCH PROGRAMME: SHORT COMMUNICATIONS SESSION**
CHAIR: *Professor R C Krecek*

11. **Validation of the FAMACHA© system for identification of clinical anaemia in goats**
A F Vatta, R C Krecek, B A Letty, M van der Linde, R J Grimbeek, J W Hansen
12. **Pentastomid parasites from Nile crocodile and terrapins from South Africa**
K Junker

14:15-15:30 **RESEARCH PROGRAMME: SHORT COMMUNICATIONS SESSION**
CHAIR: *Professor F Reyers*

13. **Influence of midazolam on the cardiopulmonary responses to carbon dioxide in isoflurane-anaesthetised Boer goats**
G F Stegmann, L Bester
14. **Colour and power Doppler imaging**
L M P K Koma, R M Kirberger
15. **Cardiac tropinins in canine babesiosis**
R G Lobetti, E Dvir, J Pearson
16. **Transcutaneous ultrasonography of the coelomic viscera of the ostrich**
W M Wagner , R M Kirberger
17. **Bacterial colonisation of intra-venous catheters in young dogs**
R G Lobetti, K E Joubert, J Picard
18. **Effect of early enteral nutrition on intestinal permeability, intestinal protein loss and outcome in canine parvoviral enteritis**
A J Mohr, A L Leisewitz, L S Jacobson, J M Steiner, C G Ruaux, D A Williams
19. **The use of positive reinforcement training to facilitate husbandry practices at the de Wildt Cheetah and Wildlife Centre: a pilot study**
H E Zulch, G Harman

15:30-15:45 **REFRESHMENTS**

15:45-16:30 **RESEACH PROGRAMME: SHORT COMMUNICATIONS SESSION**
CHAIR: *Professor B L Penzhorn*

20. **Overview: relevance of pre-harvest programmes in countries with extensive animal husbandry**
C M Veary
21. **Fowl typhoid outbreak in the spring of 2000**
N M Duncan
22. **Suspected adverse reactions reported to the Veterinary Pharmacovigilance Centre (January 1998 to February 2001)**
R Gehring
23. **Some ecological comparisons between mountain reedbuck and grey rhebok and their role in wildlife ranching**
A Taylor, J D Skinner

16:30-16:45 **PRESENTATION OF DEAN'S AWARDS**
CLOSURE

16:45 **COCKTAILS**

THE FOLLOWING EXHIBITIONS ARE ON VIEW IN THE FOYER OF THE SIR ARNOLD THEILER BUILDING THROUGHOUT THE DAY:

1 VETERINARY HISTORY POSTERS
   (1) **Rinderpest in South Africa: 100 years ago**
   S W Vogel, H Heyne
   (2) **Allerton Laboratory: the first South African Veterinary Laboratory**
   S W Vogel, H Heyne
   (3) **Veterinary Surgeons and the Anglo-Boer War**
   S W Vogel, H Heyne, H Zulch, O Knesl

2 PHOTOGRAPHIC EXHIBITION
An exhibition of photographs taken by staff and students
Organiser: Dr E van Dyk

3 THE VETERINARY LIBRARY
"Academic Information and the Internet"

4 SKY INFORMATION SUPPLIERS
The latest veterinary and natural science text books

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ANIMAL HEALTH

SCIENTIFIC COMMITTEE: *Professor Cheryl McCrindle (Convenor)*
Professor T Aire
Professor B L Penzhorn
Professor L Prozesky
Professor A Shakespeare

Experimental equine encephalosis virus infection in ponies

AD Pardini[1], JP Nurton[1], AJ Guthrie[1], PG Howell[2], EPLane[3]

[1]Equine Research Centre,
[2]Department of Veterinary Tropical Diseases and
[3]Department of Paraclinical Sciences, Faculty of Veterinary Science, University of Pretoria, Gauteng

Equine encephalosis virus (EEV) has been incriminated as the cause of various clinical signs, and fatality, in horses. Clinical signs reflecting involvement of many different organ systems have been reported in association with isolates of different viral serotypes. These include central nervous signs, acute heart failure, hepatic injury and abortion. Serological surveys suggest that the vast majority of infections in South African horses are subclinical. Previous experimental infection produced mild pyrexia. In one case of experimental infection, apparent recovery was followed by development of acute neurological involvement and subsequent death.

In 1999, EEV was isolated from 18 horses from the Western Cape with African horse sickness-like symptoms. African horse sickness virus (AHSV) was not isolated from these individuals. This suggested that there is a certain risk of confusing AHSV and EEV infections.

EEV-Bryanston was isolated from the spleen of a horse that died after developing inappetance and fever, followed by ataxia and recumbency. The isolate was passaged twice on baby hamster kidney (BHK-21) cells and a 10ml inoculum was injected intravenously into 3 EEV-seronegative ponies aged approximately 4, 8 and 17 years. A total dose of 10^6 plaque forming units was inoculated per pony. Ponies were monitored twice daily for clinical signs. Blood samples were taken daily for virus isolation, serology and haematology. Blood samples for clinical chemistry were taken at 48 hours, 24 hours and immediately prior to inoculation, and daily following onset of pyrexia.

All ponies developed pyrexia between 48 and 60 hours post-inoculation. All three ponies developed swelling of the lower lip. Two ponies developed mild to moderate swelling of the face, notably the eyelids, lips and chin, which persisted for about 48 hours. One pony had moderate swelling of the supra-orbital fossae. This pony showed the most obvious clinical signs. Ponies were euthanased at 60, 84 and 108 hours after initial rise in temperature. Post mortem findings included moderate pericardial effusion in two ponies, one of which also had mild ascites. There were no specific histological findings.

Virus was recovered from the blood of all three ponies after 3 serial passages on BHK cells. Virus was identified as EEV by group-specific capture ELISA on both passage 1 and passage 2 cultures from all three ponies. Viral isolation from tissues yielded positive cultures from spleen and liver. Viral particles were not detected on electron microscopy.

The findings from this study confirm that clinical signs suggestive of African horse sickness can be caused by EEV infection, but duration of clinical illness is short and recovery is rapid.

A group-specific indirect sandwich enzyme-linked immunosorbent assay for the detection of equine encephalosis virus antigens

JE Crafford[1], AJ Guthrie[2], M van Vuuren[1], JN Burroughs[3], PPC Mertens[3], C Hamblin[3]

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[2]Equine Research Institute, University of Pretoria, Onderstepoort 0110, RSA
[3]Institute for Animal Health, Pirbright, Woking, Surry, GU24 ONF,UK

Equine encephalosis is an acute viral infection of equidae caused by an *Orbivirus* belonging to the family Reoviridae [1]. The virus closely resembles African horse sickness virus with respect to morphology and the cytopathic effects produced in cell culture[2]. In some cases the clinical signs can resemble and may be confused with fever, oedema and heart failure associated with African horse sickness[3]. These factors often create difficulties in distinguishing between the two diseases and in the identification of the viruses in the laboratory.

Cell cultures and inoculation of newborn mice are used for the isolation and amplification of equine encephalosis virus (EEV). Currently, virus identification can be achieved using a group-specific complement fixation test while serotyping can only be achieved with the virus neutralisation test. This paper describes the development and validation of a polyclonal antibody-based serogroup-specific indirect sandwich ELISA (S-ELISA). This assay can be used for the detection of EEV antigens in cell culture and mouse brain suspensions.

The Bryanston serotype of EEV was purified and infectious sub-viral particles were used to prepare hyperimmune rabbit antiserum. These antibodies were used to capture the antigen on the solid phase. Core virus particles were used to prepare guinea pig antiserum that was used as the second antibody. A rabbit anti-guinea pig conjugate was added followed by chromogen and substrate that resulted in a colour change.

Purified EEV particles were titrated in the S-ELISA and the limit of detection was in the order of 0.9 ng/mL (0.45 ng/well). The negative/positive cut-off value was determined by testing 100 specimens each of EEV negative mouse brain suspensions and cell culture cell lysates. All the serotypes of African horsesicknes, bluetonge, epizootic haemorrhagic disease as well as isolates of akabane, palyam, eubenangee, corriparta, warrego and bovine ephemeral fever viruses were tested with the S-ELISA. No cross-reactions were detected with any of these viruses. The S-ELISA detected six of the seven EEV serotypes, but failed to detect the Langeberg serotype.

---

1 Gorman BM. An overview of the orbiviruses. In: Walton TE, Osburn BI, ed. Bluetongue, African horse sickness and related orbiviruses. Boca Raton: CRC Press, 1992; 335-347.
2 Erasmus BJ, Adelaar TF, Smit JD, Lecatsas G, Toms T. The isolation and characterization of equine encephalosis virus. Bull OIE 1970; 74:781-789.
3. Coetzer JAW, Erasmus BJ. Equine encephalosis. In: Coetzer JAW, Thomson GR, Tustin R, ed. Infectious diseases of livestock with special reference to Southern Africa. Cape Town: Oxford University Press, 1994; 476-479.

The isolation and characterization of bovine viral diarrhoea viruses from cattle and African buffalo in South Africa

N Kabongo[1], C Baule[2], M van Vuuren[1]

[1]Dept of Veterinary Tropical Diseases, Faculty of Veterinary Science, University of Pretoria, Onderstepoort 0110, RSA
[2]Dept of Veterinary Microbiology, section of Virology, Swedish University of Agricultural Sciences, Veterinary Faculty, Biomedical Center, S-75007 Uppsala, Sweden

A limited number of scientific publications dealing with aspects of bovine viral diarrhoea virus (BVDV) infection have emanated from southern Africa. This study describes the isolation of BVD viruses, gene sequence analysis of the 5' non-translated region (5' NTR) of the genome, the generation of phylogenetic data of local strains and the recording of clinical signs associated with each isolate.

Specimens (n=352) collected during 1998-1999, from live and dead animals from different farming systems, were obtained from private practitioners, feedlot consultants and abattoirs throughout the country. Specimens from culled buffaloes (*Syncerus caffer*) in the Kruger National Park were also processed. Standard cell culture techniques to isolate virus were followed[2]. Techniques designed to detect BVDV antigen or nucleic acid such as antigen capture enzyme-linked immunosorbent assay and polymerase chain reaction, were used on blood, organs and cell lines [1].

Twenty-five isolates from cattle were confirmed as BVDV with PCR and after analysis of the 5'NTR, the most conserved part of the genome, a phylogenetic tree was constructed. All strains were noncytopathic and were identified as BVDV I, either BVDV Ia (NADL-like) or BVDV Ic or BVDV I* subgroups. BVDV was not detected in 37 lymph nodes obtained from 37 buffaloes in the Kruger National Park.

Of the clinical signs in cattle from which virus was isolated pyrexia and respiratory distress was the most frequent (46,7%), followed by pyrexia and diarrhoea (20%), respiratory disease without pyrexia (20%) and diarrhoea without pyrexia (13,3%). Abortion, congenital malformations, haemorrhagic syndrome and poor growth were not encountered during this project but were included as criteria for selection of animals for specimen collection.

1. Brock KV. Diagnosis of Bovine viral diarrhea infections. Vet Clinics N Am Food Anim Practice 1995; 11:549-561.
2 Renshaw RW, Ray R, Dubovi EJ. Comparison of virus isolation and reverse transcription polymerase chain reaction assay for detection of bovine viral diarrhea virus in bulk milk tank samples. J Vet Diagn Invest 2000; 12:184-186.

Molecular epidemiology of foot-and-mouth disease virus in West Africa

O Sangare [1,2], ADS Bastos[3], W Vosloo[2], EH Venter[1]

[1] Department of Veterinary Tropical Diseases, University of Pretoria, 0110, South Africa
[2] ARC-OVI, Exotic Diseases Division, Onderstepoort 0110, South Africa
[3] Department of Zoology & Entomology, University of Pretoria, 0001, South Africa

Foot-and-mouth disease (FMD) virus has been investigated largely in Europe, the Middle East, Asia, South America and Southern Africa, but little is known about the epidemiology of the disease in West Africa. Since the eradication of rinderpest in West Africa more attention has been given to FMD virus to support livestock development programs and to meet the standards of international trade regulations.

In West Africa farmers commonly use extensive and nomadic livestock systems that facilitate the spread of infectious diseases such as FMD. This system, together with the lack of understanding of the epidemiology of the disease, has made the implementation of FMD control programs in the region very difficult. The recent outbreaks of FMD in Asia, the Middle East, South Africa and in parts of Europe have highlighted the need for strict control measures to combat the disease. Tracing the possible origin of an outbreak is essential in this respect.

In order to study the molecular epidemiology of FMD viruses obtained from outbreaks in West Africa, several FMD viruses (serotypes A, O, SAT-1 and SAT-2) isolated from 1974-1999 were received from the World Reference Laboratory at Pirbright (UK). Partial nucleotide sequences of the C-terminus of the VP1 gene were used to construct a phylogenetic tree. Within the SAT-2 serotype, viruses isolated from West Africa formed three distinct evolutionary genotypes, with isolates clustering according to year of isolation rather than geographical origin. Serotype O strains from West Africa form distinct genotypes consisting of isolates from Burkina Faso (1992), Ghana (1993) and Niger (1988). They were markedly different from other serotype O isolates from elsewhere in the world.

The results presented in this study have shown the need of a collaborative regional control program between countries in West Africa and the use of custom-made vaccines to combat the disease in this region.

Veterinary drug supply to subsistence and emerging farming communities in the Madikwe District of the North West Province of South Africa

R Gehring[1], GE Swan[1], RD Sykes[2]

[1]Department of Paraclinical Sciences, Section of Pharmacology, Faculty of Veterinary Science, University of Pretoria
[2]National Department of Agriculture, Pretoria

Veterinary needs appraisals have indicated that there is a need for improved supply of veterinary medicinal products to subsistence and emerging farmers in South Africa [2, 3]. Currently, scheduled products that are registered under Act 101/63 are distributed to farmers through veterinarians or pharmacists. Unscheduled products or products registered under Act 36/47 can be distributed more widely through farmers' co-operatives or other retail outlets. No studies have been conducted to describe and assess the adequacy of these current routes and methods of supply of veterinary medicinal products to emerging and subsistence farmers[4].

A combination of individual interviews, focus groups, self-administered questionnaires and direct observations was used to collect information for the purpose of describing and understanding the situation regarding the supply of veterinary medicinal products to the farmers of the Madikwe District[1].

There were 5 Frontline Service Units (FSUs) within the Madikwe District that sold veterinary medicinal products directly to the farmers. The majority of products sold by these outlets were ectoparasiticides, followed by tetracycline antibiotics. They were unable to supply vaccines, as they did not have adequate facilities for the storage of these thermolabile products. The annual sales from these outlets were low. Farmers had to travel an average of 70 km if they wished to purchase veterinary medicinal products that were not available at the FSUs, from farmers' co-operatives or pharmacies in larger towns outside the Madikwe District. The supply of veterinary medicinal products through FSUs did not ensure correct storage, and safe and effective use of these products. Several examples of misuse and incorrect storage and handling of veterinary medicinal products were recorded. The reasons for the inadequacy of this route of supply included inadequate information transfer, inaccessibility of the outlets, poor reliability and quality of the outlets and poor service.

Wider distribution of veterinary medicinal products is required but a higher level of control is needed to ensure that products of an acceptable quality are sold. Information and advice must be disseminated together with products.

---

1. Bless C, Higson-Smith C. Fundamentals of social research methods. An African perspective (2nd edn). Juta and Co., 1995.
2. McCrindle CME. Veterinary needs appraisal report: Mamelodi East settlement areas. (Technical report). Published by: CSOU Veterinary Faculty, Medunsa, 0204, Gauteng, 1999.
3. Stewart CG (ed). Resources and needs of animal owners at Jericho. (Technical report). Published by: CSOU Veterinary Faculty, Medunsa, 0204, Gauteng, 1997.
4. Swan GE, Sykes RD and Schlebusch J. Veterinary drug registration and control in South Africa: Current and future perspectives. Proceedings of the Southern and Eastern African veterinary drug regulatory affairs conference. Pretoria, South Africa; 17-20 November 1997: 35-3.

Ethnoveterinary medicine in Madikwe: a new perspective on traditional knowledge

D van der Merwe

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The lack of published information on ethnoveterinary medicine (EVM) in South Africa prompted the study of EVM in the Madikwe area of the North West Province. A Rapid Rural Appraisal (RRA) approach was applied to gain insight into EVM in the area[1]. The project focussed on medicinal plant use in cattle by Setswana-speaking people.

Information was gathered through individual and group interviews, guided field walks and observations. Ethnoveterinary uses in cattle of 46 plant species representing 24 families were recorded. The context of EVM use, preparation methods, dosage forms and storage methods were also recorded. The study indicated a rich heritage of EVM knowledge in the study area, which includes all aspects of this indigenous knowledge system. Apparent lack of transfer to younger generations puts the knowledge at risk.

Rational grounds for the use of plants for some recorded indications could be found through a literature study - highlighting the untapped potential of EVM research in South Africa. RRA was found to be an effective approach for the documentation of EVM due to its adaptability and versatility. A way forward is suggested that include replication of the study in other regions, screening and validation of medicines through bioassay techniques and the return of value-added information to the users of ethnoveterinary medicines.

1. Beebe J. Basic Concepts and Techniques of Rapid Appraisal. Human Organization 1995;54(1):42-51.

Acaricide resistance profiles of single and multi-host ticks collected from commercial and communal farming areas in the Eastern Cape and Northwest Provinces of South Africa

S Mekonnen[1], N R Bryson[1], L J Fourie[2], R J Peter[3], I G Horak[1], A M Spickett[4], R Taylor[5], T Strydom[6]

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[2]Department of Zoology and Entomology, University of the Free State, Bloemfontein, 3600, RSA
[3]Bayer Animal Health (Pty) Ltd, P. O. Box 143, Isando, 1600, RSA
[4]Onderstepoort Veterinary Institute, Private Bag X05, Onderstepoort, 0110, RSA
[5]P.O.Box 2314, Beacon Bay, East London, 5205, RSA
[6]South African Bureau of Standards, Box 5156, Greenfield's, East London, 5208, RSA

A field study (January to April 2001) was carried out on communal and commercial farms in the Eastern Cape and Northwest Provinces of South Africa to detect the levels of tick resistance to acaricides. The larvae obtained from engorged females of *Amblyomma hebraeum, Boophilus decoloratus, Rhipicephalus appendiculatus* and *Rhipicephalus evertsi evertsi* were tested against various concentrations of amitraz, chlorfenvinphos and cypermethrin using the Shaw larval test method[1]. On the communal farms higher levels of tick resistance were shown to cypermethrin and some resistance to chlorfenvinphos whilst no resistance was detected against amitraz. However, on commercial farms ticks were equally resistant to amitraz, cypermethrin and chlorfenvinphos. It was also observed that the *B. decoloratus* population tested was considerably more resistant to all acaricides than *A. hebraeum, R. appendiculatus* and *R. evertsi evertsi*.

Comparative laboratory tests were also carried out on larvae and adults of *B. decoloratus* to determine the susceptibility of this tick species to acaricides on commercial dairy farms around East London, Eastern Cape Province. This was determined using the Shaw larval immersion and adult immersion[2] tests with the latter taking into account factors such as oviposition rate and reproductive ability. The evidence provided in this paper indicates that *B. decoloratus* was more resistant to cypermethrin than to chlorfenvinphos and amitraz. There is good agreement between the high burdens of *B. decoloratus* observed on the farms and the results of the adult laboratory tests providing convincing evidence of resistance of this tick species to some of the acaricides tested. This preliminary result indicates the ability of the egg-laying test method to detect resistance within seven days in preference to the 42 days required for reproductive estimate and 60 days for the Shaw larval test method. In addition the egg laying test method is less costly and does not require sophisticated equipment when compared to the other *in vitro* test methods.

---

1 Shaw RD. Culture of an organophosphorus resistant strain of *Boophilus microplus* (Can.) and an assessment of its resistant spectrum. Bull Ent Res 1966; 56:389-405.

2 Drummond RO, Ernest SE, Trevino JL, Gladney WJ, Graham OH. *Boophilus annulatus* and *Boophilus microplus*: Laboratory tests for insecticides. J Econ Ent 1973; 66:130-133.

The microbial quality of ostrich carcases produced in a South African export-approved ostrich abattoir

M Karama

Department of Paraclinical Sciences, Veterinary Public Health Section, P/B X04, Onderstepoort 0110, South Africa

The aim of this study was to evaluate the microbial quality of ostrich carcases produced in a South African export-approved ostrich abattoir. Ninety surface excision samples were collected on 30 ostrich carcases at three processing points in the abattoir: post-flaying, post-evisceration and post-chilling. Carcase samples were evaluated for the Aerobic Plate Count (APC), *Pseudomonas* spp., Enterobacteriaceae, *Staphylococcus aureus* and for the presence of *Escherichia coli*. One hundred isolates obtained from the APC were identified.

The mean log CFU/cm^2 and standard deviations for surface counts at post-flaying, post-evisceration and post-chilling processing points respectively were: 4.32 ±0.62, 4.21 ±0.63 and 4.57 ±0.48 for the APC; 2.82 ±1.65, 2.86 ±1.53 and 3.75 ±0.94 for *Pseudomonas* spp.; 2.89 ±0.78, 2.90 ±0.53 and 2.38 ±0.67 for *S. aureus* and 2.55 ±1.53, 2.78 ±1.31 and 2.73 ±1.46 for Enterobacteriaceae.

No significant differences were detected between the mean log counts of the post-flaying and post-evisceration processing points for the above-mentioned bacterial counts. However, statistically significant differences were detected between the mean log CFU/cm^2 counts for post-flaying and post-chilling and between the counts for the post-evisceration and the post-chilling processing points for the APC, *Pseudomonas* spp. and *S. aureus*. The trend was towards a marginal increase for the APC, and a negligible decrease for *S. aureus* counts obtained on samples collected post-chilling. However, there was an increase of practical significance for *Pseudomonas* spp. counts obtained post-chilling.

Seventeen out of 90 (18.8%) samples were positive for *E. coli* in terms of samples collected and 13 out of 30 (43%) in terms of carcases sampled. Log CFU/cm^2 counts for *E. coli* positive samples ranged from 1.0 to 3.79, with a mean log count of 2.15. Most of the samples, which were positive for *E. coli* were collected post-evisceration.

The proportional distribution of the 100 bacterial isolates identified was Enterobacteriaceae: 57%, *Acinetobacter* spp.: 24 %, *Pseudomonas* spp.: 11%, *Aeromonas* spp.: 3%, *Micrococcus* spp.: 3%, *Staphylococcus* spp.: 1% and yeasts: 1%. Enterobacteriaceae were the predominant bacteria in terms of the total number of isolates identified per processing point and for the whole study.

In spite of developments in the ostrich industry around the world, there have been few scientific publications concerning the microbial quality of ostrich carcases produced. Due to the financial implications in this highly competitive industry, the studies that have been undertaken in South Africa (and internationally) are mostly of a confidential nature. This study provides preliminary baseline data on the microbiological status of ostrich carcases and should be useful for the ostrich industry and regulatory authorities as they implement quality assurance programmes in order to enhance meat safety.

Establishment and standardization of methods for a veterinary antimicrobial resistance surveillance programme in South Africa

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Testing the susceptibility of bacteria to antimicrobial agents is fundamental to the study of resistance. Sensitivity testing serves two purposes: to provide meaningful results to the prescriber of antimicrobial drugs and to monitor changes in susceptibility of microbial populations. Standardized methods are needed for surveillance in the national and international context and to provide meaningful comparisons to be made between individual centers and countries[1,2].

The main objective of this study was to establish a reproducible, standardized laboratory procedure for monitoring the development of antimicrobial resistance in bacteria isolated from animals and food of animal origin in South Africa.

The bacterial isolates used in this study included zoonotic bacteria (*Salmonella spp),* indicator bacteria that represent normal enteric microflora *(E. coli. Enterococcus faecalis/faecium)* and veterinary pathogens (*Mannheimia haemolytica).* Thirty isolates of each organism were collected. Susceptibility to 10 antimicrobial agents was determined by means of minimum inhibitory concentrations (MIC's) using the micro-dilution method. The standardized method according to the National Committee for Clinical Laboratory Standards was used[3]. Susceptibility tests were repeated twice for each individual organism. Quality control measures were included to ensure that accurate results were obtained.

Reproducibility was satisfactory as results from duplicate tests differed only by one serial two-fold dilution. Multi-well plates prepared in-house for MIC determinations yielded reproducible results after 2 months of storage at -70°C. Within this limited sample of bacteria, MIC results did not indicate meaningful resistance against any of the 10 selected antimicrobials.

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Contraception of some wild carnivores in southern Africa using deslorelin down-regulation of LH and FSH

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Contraception has become a useful tool in population management of wild carnivores in zoos, wildlife sanctuaries and smaller conservancies. The choice of reversible or irreversible methods depends on requirements. The main reason for carnivore contraception in southern Africa is to slow down the rate of breeding rather than permanent sterilisation. This applies particularly to endangered species such as African wild dogs and cheetahs. In Namibia the holding of wild carnivores on private property requires a permit, which stipulates that breeding of any such animals is not allowed (PE Stander, personal communication). The main species involved are cheetahs, lions and leopards. Other than obvious criteria like safety to the animal, safety during pregnancy and within the food chain, the main requirement of a contraceptive for carnivores under southern African conditions is reversibility. Remote delivery, although an advantage, is not essential because animals are usually caught to determine their reproductive status or for other management purposes. Further considerations are hormone-dependent characteristics such as a mane and dominance. For this reason castration or down-regulation of LH-release resulting in basal levels of testosterone and loss of the mane, is not acceptable for male lions. From the results in domestic dogs and cats, the GnRH analogue deslorelin (DRL) acetate released long-term from a biocompatible implant (Peptech Animal Health, North Ryde, Australia), appears to be an ideal agent for the above [2,3]. Bertschinger *et al.* [1] reported on the preliminary results of the use deslorelin in wild carnivores.

DRL was used for contraception in 31 cheetahs (13 females and 18 males), 21 African wild dogs (15 and 6), 10 lionesses and 4 leopards (3 and 1). The dose used for lions was 12 or 15 mg, while 6 mg was used in the other species. Monitoring consisted of observations, quantifying plasma progesterone and testosterone, and evaluation of vaginal cytology, semen and sex organs. Deslorelin contracepted lionesses for 12 to 18 months. Cheetah and leopard females were contracepted for a minimum of 12 months whereas after 21 months two male cheetahs still had no detectable viable sperm or plasma testosterone. Wild dog bitches responded less consistently and one bitch conceived 4 weeks after the implant. In 9 bitches, however, mating could be postponed until the next breeding season. Male dogs responded consistently and were contracepted for approximately 12 months. Although lionesses and cheetahs may become attractive to males for a few days following treatment, mating was not observed. No side effects or behavioural changes were noted making this a safe drug for contraception in the species described. Males remain fertile for the first 6 weeks post-implant and should be separated from cycling females during this period.

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Validation of the FAMACHA© system for identification of clinical anaemia in goats

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A longitudinal study of the faecal nematode egg counts and cultures for third-stage larvae and the haematocrits of indigenous crossbred goats of resource-poor farmers was carried out. During the summer months of November to April 1998/1999 and 1999/2000, *Haemonchus* was found to be an important species at three sites within the summer rainfall area of South Africa. The FAMACHA© system has been developed to identify those sheep suffering from clinical anaemia based on the comparison of the colour of the ocular mucous membranes with a chart of five colour categories. Animals considered to be in danger of dying from anaemia caused by haemonchosis are selectively treated.

Goats were scored according to the FAMACHA© assay and the sensitivity, specificity, and positive and negative predictive values were calculated for the two summer seasons of 1998/1999 and 1999/2000.

Analyses of the FAMACHA© system in goats showed a test sensitivity of 76% and 85% for 1998/1999 and 1999/2000, respectively, meaning that the system may be used to identify correctly 76% to 85% of those animals in need of treatment. However, the test specificity remains low at 52% to 55%.

The FAMACHA© system appears to be suitable for use in goats provided the lower three anaemic categories are treated.

Pentastomid parasites from Nile crocodiles and terrapins from South Africa

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Pentastomes are endoparasites maturing in the respiratory tract of their final hosts, more than 90% of which are reptilians. Two of the existing eight families of pentastomes, namely the Sebekidae and Subtriquetridae, infect crocodilians, using fish as intermediate hosts. Currently, the family Sebekidae comprises the six genera *Sebekia* Sambon, 1922, *Leiperia* Sambon, 1922, *Alofia* Giglioli, 1922, *Selfia* Riley, 1994, *Agema* Riley, Hill & Huchzermeyer, 1997 and *Diesingia* Sambon, 1922. The latter genus is an exception insofar as it has a chelonian definitive host.

Seventeen Nile crocodiles, *Crocodylus niloticus*, were obtained from the Kruger National Park during 1995, 1997 and 1998. Sixteen of these (1.4 to 4.15 m long) harboured pentastomes. No difference in the pentastome fauna was found between sexes and between ages, as determined by length. All pentastomid parasites recovered belonged to the family Sebekidae. Three *Sebekia* spp. were collected, namely *S. cesarisi, S. okavangoensis* and *S. wedli*. Two species of the genus *Alofia, A. nilotici* and *A. simpsoni,* were recovered and the genus *Leiperia* was represented only by *L. cincinnalis*. Subtriquetrids were not found. The species composition at different localities appeared to be fairly homogenous, with a slight dominance of *S. wedli* and *L. cincinnalis* over the other species. *Alofia* was the least numerous and least prevalent of the three genera. All but one crocodile carried multiple infections. The intensity of infection varied from 2 to 239 pentastomes per host, with an average of 40. With the exception of one moribund crocodile, whose condition was attributed to an extremely heavy infection with pentastomes, Nile crocodiles seem to tolerate pentastome infections well.

Terrapins, *Pelomedusa subrufa* and *Pelusios siniatus*, were obtained from the Arabie Dam, Northern Province. Examination of the pentastomes recovered from the lungs of these animals lead to the description of a new species, *Diesingia africana*, which is considered endemic to African terrapins. The genus *Diesingia* Sambon, 1922 was reconfirmed and is reported for the first time in Africa.

Our field studies indicate that pentastomes are common parasites of crocodiles in the Kruger National Park. The host-parasite relationship is well established suggesting a long association between the parasite and its host. However, exceptional environmental conditions can lead to abnormally high pentastome burdens, which severely affect the host's condition. Despite recent studies, much is still to be learned about pentastomes infecting aquatic reptilians in South Africa, especially terrapins.

Influence of midazolam on the cardiopulmonary responses to carbon dioxide in isoflurane-anaesthetised Boer goats

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Midazolam (MDZ) may be used as an anaesthetic adjunct for induction of anaesthesia in goats. Minute ventilation and the cardiopulmonary responses to carbon dioxide (CO_2) are used as indices of ventilatory depression. In man, either isoflurane[2] or MDZ may reduce the ventilatory response to carbon dioxide and decrease minute ventilation. Hypoventilation may occur in conscious goats[1] after MDZ administration. The purpose of this investigation was to examine the influence of MDZ on the duration of apnoea after hypocapnoea, and the changes in mean arterial pressure (MAP) and minute ventilation (V_E) during hypercapnoea in isoflurane-anaesthetised goats.

In a prospective, placebo-controlled, crossover investigation, MDZ was administered IV to isoflurane-anaesthetised goats at a dose of 0.4 mg/kg. Anaesthesia was induced and maintained on isoflurane-oxygen (1.5% end-expired concentration) with a circle rebreathing circuit with CO_2 absorption. Ventilation was spontaneous. Minute ventilation and MAP were monitored at baseline, 5 min after treatment, during hypocapnoea, and during hypercapnoea. Hypocapnoea was obtained by intermittent positive pressure ventilation (IPPV) to 3.5 kPa end-expired CO_2 partial pressure, and hypercapnoea by removal of the soda lime canister from the breathing circuit until end-expired CO_2 partial pressure increased to 9 kPa. Following IPPV, the period of apnoea was recorded. Arterial blood-gas analysis was performed before IPPV and at onset of spontaneous ventilation. ANOVA for repeated measures was used for statistical analysis. Significance was accepted at $P<0.05$.

Variability of data were expressed as mean (± SD). Following hypocapnoea, there was a tendency for the duration of apnoea to increase after MDZ administration, and MAP to increase during hypercapnoea. Minute ventilation increased significantly ($P<0.05$) in both treatments during hypercapnoea. Arterial CO_2 tension was minimally altered at onset of spontaneous ventilation compared to placebo treated goats.

Rx[1]	Baseline[2]		Hypocapnoea[2]		Hypercapnoea[2]	
	V_E (L/min)	MAP (kPa)	Apnoea (sec)	$PaCO_2$ (kPa)	V_E (L/min)	MAP (kPa)
PLC[3]	2.78 ± 0.69	10.6 ± 2.2	148 ± 58	6.8 ± 0.5	4.60 ± 0.99*	12.0 ± 1.6
MDZ[4]	3.20 ± 1.31	8.7 ± 3.5	127 ± 52	7.1 ± 0.5	4.48 ± 4.48*	10.4 ± 3.0

[1]Treatment, [2] mean ± SD, [3] placebo, [4] midazolam, * Statistically significant different from baseline ($P<0.05$)

It is concluded that midazolam administration to isoflurane-anaesthetised goats minimally altered the cardiopulmonary responses to CO_2 as the $PaCO_2$ at the onset of spontaneous ventilation, and MAP and V_E during hypercapnoea were not significantly different from placebo.

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Colour and power Doppler imaging

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Several ultrasound modalities are currently used in diagnostic imaging, including B-mode, M-mode, spectral, colour and power Doppler. All the Doppler modes provide information on blood flow. This information is in a digitised format, and can be stored and reproduced in a variety of formats including video recording.

In spectral Doppler, blood flow is presented in the form of a graphic tracing known as velocity waveforms. The tracing depicts details of flow speed, direction, and profiles at a specific location within a cardiac chamber or blood vessel.

Colour Doppler provides blood flow information in form of a colour map. Codes of the colour map represent average flow direction and speed. Blood flow towards the transducer is coded red and away is blue. Lighter colour indicates faster blood flow and deeper colour slower flow. In addition, blood flow in multiple cardiac chambers or blood vessels can be obtained simultaneously.

Like the colour mode, power Doppler can depict both localised blood flow and flow in a wider area. Unlike the spectral and colour modes, it does not require alignment of the transmitted ultrasound with the blood flow direction in order to accurately depict flow. It is more sensitive than colour Doppler as regards flow in smaller vessels and of lower flow speed. However, power Doppler indicates neither the direction nor the speed of blood flow. The light and deep shades of the single colour code of this mode represents summation of the energy of the blood flow.

Doppler imaging allows us to detect abnormalities such as valvular regurgitation and septal defects in the heart and disorders of blood vessels such as fistulae, thrombosis and stenosis. By depicting multiple blood vessels, abnormalities such as dysplasia, atrophy, necrosis, infarction, inflammation, hypertrophy, neoplasia or obstruction to blood flow can be identified in a variety of organs eg the kidney. Knowledge of the vascular and haemodynamic characteristics of one disorder enables us to distinguish it from another. This leads to improved accuracy of diagnosis and prognosis, and choice of better treatment options. The non-invasive nature of Doppler imaging permits follow-up examinations, facilitating monitoring and evaluation of disease progress and the efficacy of any treatment instituted.

Colour and power Doppler imaging modes have several technical limitations and may give false positive, false negative or ambiguous results. The technology of Doppler imaging, however, is rapidly improving and is expected to significantly reduce most of the obstacles currently being faced. The potential for innovative applications of these imaging modalities in veterinary clinical and research work is promising.

Cardiac troponins in canine babesiosis

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The objective of this study was to investigate the sensitivity of the ECG to detect cardiac injury diagnosed by troponins and to compare the sensitivity of both modalities to predict cardiac histopathological changes in canine babesiosis.

Four groups of babesiosis cases were studied: mild uncomplicated (n=8), severe uncomplicated (n=9), complicated (n=8), and concurrent immune-mediated haemolytic anaemia (IMHA) (n=9). Five dogs that died had full necropsies and cardiac histopathology performed. Lead II ECG was recorded using a standard machine and according to standard protocol. Cardiac troponin I and T concentrations were determined with a microparticle enzyme immunoassay and an electro-chemiluminiscence immunoassay, respectively.

Troponin I concentrations were significantly higher than the control in complicated and concurrent IMHA groups and in the 3 dogs that succumbed to the disease. These 3 non-survivors had the highest troponins (I and T) concentrations and cardiac histopathological changes but no arrhythmia and minimum other ECG changes. Troponin T concentrations were within the normal range in all dogs, but with significantly higher concentrations in the non-survivors.

This study showed that dogs with babesiosis can develop important ECG changes such as heart blocks, VPC's, prolonged QRS, and ST segment changes. Most of the changes were, however, not associated with severity, outcome and cardiac troponin levels. The exception was the presence of VPC's as there was a correlation between troponin concentrations and VPC's. Histopathological changes including pericardial effusion, haemorrhage, necrosis, inflammatory infiltrate and fibrosis were found in 4 of the 5 dogs that died.

This study showed that there was no correlation between ECG abnormalities and histological changes or biochemical evidence of myocardial damage as reflected by troponin I concentrations. From this study, it was concluded that the analysis of serum troponin I is an easily feasible and sensitive test and superior to troponin T and ECG analysis to diagnose cardiac abnormalities and to better classify patients regarding cardiac involvement in dogs with babesiosis.

Transcutaneous ultrasonography of the coelomic viscera of the ostrich (*Struthio camelus*)

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Ultrasonography has been used in ostriches (*Struthio camelus*) as well as in other ratites, but no standard ultrasonographic technique has been described. The object of this paper was to describe and illustrate ultrasonographic windows and the normal ultrasonographic appearance of the major coelomic viscera of the ostrich.

Ultrasonographic examination of the ostriches was performed by using a portable ultrasound machine (Aloka SSD 500, Aloka Company Limited) and convex array transducers ranging from 3.5 - 7.5 MHz (Aloka Company Limited). Two formalin-fixated young ostriches, multiple organs of ostrich cadavers, two ostrich chicks at various ages, as well as two young adult non-breeding females (2.5-3 years), were examined. All living birds were clinically normal.

Nine acoustic windows in four main body regions and the normal ultrasonographic appearance of the coelomic viscera of the ostrich were described. Good images of the heart and its major vessels, proventriculus, ventriculus, intestines, liver and kidneys could be obtained. Ostriches do not posses a gallbladder and thus it could not be used as a landmark or acoustic window. An anechoic structure, believed to function as an urinary bladder, could be imaged in the cloacal region. The pancreas, spleen, thyroid glands, inactive ovary and adrenals could not be seen in this study. General limitations were the size of the ostriches, massive leg and dorsal muscles, large sternum, the extensive air sac system, compact convoluted intestines and varying amounts of gastrointestinal gas. The extensive air sac system and feathers did not limit the use of ultrasonography as much as anticipated. Imaging of air sacs could be considered to detect pathology such as air sacculitis, which may result in consolidation.

This study proved that an ultrasonographic examination is simple, fast, non-invasive, and easily repeatable in the ostrich and could be used to complement radiographic examination. Transintestinal ultrasonography might provide additional information in future studies. Ultrasonography is also a promising tool for the future investigation of anatomic physiologic questions such as the bladder function of the ventral coprodeum.

Bacterial colonisation of intra-venous catheters in young dogs

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The objective of this study was to assess the prevalence of bacterial colonisation of intravenous catheters in the isolation unit of the Onderstepoort Veterinary Academic Hospital.

One hundred young dogs showing acute parvovirus-like clinical signs that had intravenous catheters inserted for fluid therapy were used in this study. Catheters were aseptically removed from the dogs when fluid therapy was discontinued, the catheter was replaced or the dog died. The distal tip of the catheter was cut off, split open and vortexed with a sterile saline solution. The saline solution was then plated out on culture plates, incubated and examined every 24 hours for 72 hours for bacterial growth. All bacteria cultured were identified and antibiograms was performed.

The prevalence of bacterial colonisation in this study was found to be 22%. The predominant bacteria cultured were of the gastrointestinal tract (*Serratia odorifera, S. liquefaciens, S. marcescens, Acinobacter anitratus, Citrobacter freundii, Klebsiella pneumoniae, K. oxytoca, Escherichia coli, Enterobacter* spp.). Only 2 gram-positive bacteria were cultured (*Staphylococcus intermedius* and *Streptococcus* spp.). Antibiogram results showed high resistance to penicillin, lincomycin, cloxacillin, erythromycin and cephalexin. Resistance to amikacin, enrofloxacin, chloramphenicol, potentiated suphonamides and amoxycillin and clavulinic acid was low.

This study showed that bacterial colonisation of intravenous catheters in an isolation unit is not uncommon. Clinically this may lead onto catheter related sepsis. Measures that can be utilised to reduce the incidence of bacterial colonisation of catheters include adequate training of personnel, prevention of contamination of fluids, drip lines and catheters hubs during catheter care procedures, adequate preparation of the skin, and protection of the catheter entry site.

Effect of early enteral nutrition on intestinal permeability, intestinal protein loss, and outcome in canine parvoviral enteritis

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A prospective, randomized clinical trial was performed to investigate the effect of early enteral nutrition (EEN) on intestinal permeability, protein-losing enteropathy (PLE), clinico-pathologic parameters, and clinical outcome in 30 puppies with parvoviral enteritis as confirmed by electron microscopy.

Dogs were randomly assigned to two groups. Fifteen dogs received nil per os until vomiting had ceased for 12 hours, after which a low fat diet was fed (group NPO). Fifteen dogs were fed immediately (Pedigree® Canine Concentration Instant Diet) by naso-esophageal tube (EEN). All other treatments were identical. Intestinal permeability was assessed using urinary lactulose (L) and rhamnose (R) recoveries (%L and %R) and L/R ratio. Fecal ($_1$-proteinase inhibitor concentrations (($_1$-PI) quantified PLE.

Median time to normalization of habitus and appetite, and resolution of vomiting and diarrheoa was one day shorter for the EEN group for each parameter. Body weight remained stable in dogs in the NPO group, while EEN was associated with a mean weight increase of 11.5% by day five. Haematocrit (Hct) decreased significantly for all days in NPO ($P<0.02$), while no significant decreases in Hct occurred in EEN. Compared with reference values, urinary %Ls were elevated, %Rs reduced, and L/R ratios increased throughout the study for both groups. %L behaved significantly differently between groups ($P=0.035$) over time, with a progressive decrease of %L in the EEN group versus a progressive increase in the NPO group. %R progressively decreased, and L/R ratios increased significantly over time in both groups. Fecal ($_1$-PI was increased throughout the study in both groups; significant decreases were seen in the NPO group on days two, four, and six, and on day six with EEN. There was no significant difference of serum albumin, %Rs, L/R ratios, or fecal ($_1$-PI between the two groups over time. Thirteen of 15 NPO dogs (87%) and all of the EEN dogs (100%) survived ($P=0.48$).

In conclusion, EEN in canine parvoviral enteritis was associated with earlier improvement of clinical variables. The significantly decreased lactulose permeation in the EEN versus the NPO group might indicate improved gut-barrier function due to EEN. This could limit gut-origin bacterial and endotoxin translocation and distant organ dysfunction. The more rapid decrease in intestinal protein loss in the NPO group may conflict with this speculation, although there was no significant difference for fecal ($_1$-PI, serum albumin, or Hct between the two groups.

The use of positive reinforcement training to facilitate husbandry practices and veterinary procedures at De Wildt Cheetah and Wildlife Centre: a pilot study

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In marine mammal facilities and zoos worldwide, animals are trained to cooperate with husbandry and veterinary procedures[1]. This reduces the necessity to restrain animals or sedate or anaesthetise them, thus reducing stress and risk of injury to the animals. It also usually reduces the number of staff required to perform a procedure.

The practicality of implementing this system at De Wildt Cheetah and Wildlife Centre was investigated. Two male wild-caught cheetah (*Acinonyx jubatus*), approximately 5 years old, and a pair of African wild dog (*Lycaon pictus*), 3 years old, were selected for training. No alterations to their housing or management were made. The procedure known as "hands off" training[1] was used, in other words at no time were the authors in direct contact with the animals, but always worked behind the fence of the enclosure.

The aim of the training was to teach the animals to calmly enter a crush cage when asked to do so, and remain calmly within the cage until released.

The primary reinforcer (positive)[2] used in training was meat from their normal ration, cubed and presented through the wire by means of tongs. The conditioned reinforcer used was a plastic and metal clicker[2]. Use was made of the principles of successive approximation[2] and targeting[1] to teach the behaviour.

Training occurred on 28 occasions over a period of four months, on average twice a week. Training sessions lasted between five and 15 minutes per animal. Therefore the average training time per animal totaled less than 5 hours.

At the end of this time both cheetah would calmly enter the crush as required. They would also tolerate spraying with water from a spray bottle whilst in the crush.

Although the female wild dog did enter the crush cage on a number of occasions, because of factors relating to enclosure design and the extreme timidity of the male wild dog, the behaviour could not be completed. At the end of training, however, the male was showing a considerable decrease in fear.

Training was considered successful and practical ways of incorporating the technique into the management of the Centre will be considered.

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Overview: relevance of pre-harvest food safety programmes in countries with extensive animal husbandry

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This topic was by invitation of the World Health Organisation for presentation during a consultancy meeting on Food Safety held in Berlin from 26-29 March 2001.

Biomednet was widely searched between 1990 and 2001 and all articles relevant to "pre-harvest (pre-slaughter) factors", "food safety (food of animal origin)" and "animal husbandry (intensive and extensive)" were reviewed. The assumption was made that "extensive animal husbandry" in the context of the rest of the consultancy programme, refers to animals not intended for finishing in a feedlot (intensively) and animals raised in the broader context of developing countries. The Winrock International Institute for Agricultural Development predicts that in the countries of sub-Saharan Africa the population will increase 2.6 times reaching 1,294 million in 2025. This will result in intensification of agriculture and the effect of this on farming systems and food safety will be briefly discussed. Relevance of pre-harvest food safety programmes will cover dedicated progammes within production procedures and the interplay of various elements in integrated Quality Assurance (QA) programmes, with emphasis on surveillance and monitoring. Attention will be given to risk assessment, traceability and bio-circulation in discussing the effects of animal health and environmental health on food safety in the region. Developing countries must consider improved human and animal health surveillance and investigation systems in order to quantify risk data for food-borne diseases. The role of environmental health (bio-circulation) needs attention in understanding the dynamics of crop-livestock farming systems.

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Fowl typhoid outbreak in the spring of 2000

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The history, clinical and necropsy findings as well as the diagnostic, therapeutic and preventative measures associated with the countrywide outbreak of Fowl Typhoid (*Salmonella gallinarum)* in the spring of 2000 is presented.

Fowl typhoid (*S. gallinarum)* was first documented as a disease affecting commercial poultry in 1889 by Klein who named the causative organism *Bacillus gallinarum*. Curtice coined the name "fowl typhoid" in 1902 working at Rhode Island and the organism was classified as *S. enteriditis* serotype Gallinarum.

Fowl typhoid has a worldwide distribution and occurs sporadically in RSA, especially in the region of Kwazulu Natal. In the spring of 2000, a major supplier of point of lay pullets in the country experienced increasing mortalities amongst the birds in rear. Typhoid was diagnosed, treatment implemented and birds were then distributed widely in the country as well as over the borders into Lesotho. With the stress of lay, the birds that had not been sterilised of the infection developed a full blown septicaemia with widespread liver necrosis and then died. A complicating factor was that the birds experiencing the flare up of the disease transmitted the disease horizontally to adjacent healthy birds. Fowl typhoid was re isolated and a large-scale extermination campaign was introduced in certain provinces while treatment and vaccination programmes were introduced in others.

The problem was finally brought under control with the introduction of fowl typhoid vaccination in rear using a rough 9R strain of *S.gallinarum.*

Suspected adverse reactions reported to the Veterinary Pharmacovigilance Centre (January 1998 - February 2001)

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The monitoring of reports of suspected adverse drug reactions has been recognised as an essential part of an adequate regulatory system to ensure the safety and efficacy of veterinary medicinal products[1,2]. In response to this requirement, regulatory authorities in countries throughout the world, including the USA, UK, Canada, Australia, New Zealand, Ireland and Sweden have established national veterinary pharmacovigilance centres. In South Africa, a veterinary pharmacovigilance centre was established within the previous Department of Pharmacology and Toxicology of the Faculty of Veterinary Science, University of Pretoria. Initially, the reports were handled on an *ad hoc* basis within the Department. At the beginning of 2000, a formal system of recording, evaluating and responding to reports was developed.

The number of reports increased after the establishment of a formal procedure for recording and responding to reports. A total of 59 reports of suspected adverse reactions were received over the period January 1998- February 2001. Only 8 of these reports were received during the first two years (January 1998 - December 1999). Thereafter, the number of reports increased significantly and 27 reports were received during the year 2000. The trend of increasing numbers of reports appears to be continuing as 24 reports had already been received by the end of February 2001.

The number of reports received per species was: dogs 19, cats 15, cattle 7, sheep/goats 6, chickens 4, pigs 3, horses 2 and giraffe 1. The majority of reports were received for products registered under Act 35 of 1947. More than half of these reports (62%) stated that non-veterinarians had administered the products.

The types of adverse reactions reported included lack of efficacy, hypersensitivity reactions, inappropriate use of products by non-veterinarians, known adverse effects and adverse effects associated with the extra-label use of products. A number of reports addressed products or situations that are unique to South African conditions, e.g. reports concerning the use of antibabesials such as diminazene and imidocarb; reports involving game species unique to Africa; reports concerning the use of ectoparasiticides, which are used extensively due to climatic conditions and extensive farming systems in South Africa; reports concerning the use of Stock Remedies by animal owners without the supervision of a veterinarian.

The Veterinary Pharmacovigilance Centre within the newly established Section of Pharmacology, Department of Paraclinical Sciences, Faculty of Veterinary Science, has recently gained official recognition from the Medicines Control Council as the national adverse drug reaction monitoring centre for veterinary medicines. This will strengthen the Veterinary Pharmacovigilance Centre in its aim to protect animals and humans by helping to ensure the safety, efficacy and quality of medicinal products used in animals as well as promoting the rational use of these products.

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Some ecological comparisons between mountain reedbuck and grey rhebok and their role in wildlife ranching

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In South Africa mountain reedbuck *Redunca fulvorufula* are more widespread than grey rhebok *Pelea capreolus*, but in many areas the two species are sympatric. This presentation will compare the two species with regard to group structure and dynamics, home range and habitat utilisation. Mountain reedbuck groups are unstable, with female herds continually varying in size and moving between the home ranges of different territorial males. They are grazers and are considered aseasonal breeders. Conversely, grey rhebok form stable family groups in which territorial males maintain a harem. They breed seasonally and are predominantly browsers. In farming areas of the Free State and Northern Cape, mountain reedbuck, and to a lesser extent grey rhebok, occupy a similar habitat that is marginal for domestic livestock, and may be found on steeper slopes adjacent to cattle and sheep. Ecological differences between the two species and livestock will be compared as an indication of how they coexist without competing for the same resources.

A small ruminant research and development network for the SADC Region

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A regional workshop on goat development in Southern Africa was convened by the Bunda College of Agriculture of the University of Malawi from 31st July to 4th August 2000 at Mangochi in Malawi. Delegates attended from the SADC countries and also from countries in East and West Africa. Delegates presented papers on goat production and development in their countries.

The main purpose of the workshop was to develop consensus among scientists and stakeholders in the region, and make strategic plans to improve and sustain goat development in the region through networking and partnership. Although this was originally convened as a goat workshop, the scope was widened to include sheep. The workshop would initiate a process of co-operation that would develop in the years ahead.

Specific objectives included the following:

- To document and disseminate successful initiatives and technologies in small ruminant development in the Region.
- To enhance the exchange of information and communication on goat and sheep development in the Region.
- To strengthen collaboration, co-operation and partnership in goat and sheep development in the Region through effective networking.

Workshop discussions were held to attempt to draw up vision and mission statements, and to identify appropriate strategies.
It was agreed that the network should not be confined to goat production, but should be called "The Southern African Small Ruminant Network" (SADC-SRNET).
It was agreed that nominated persons would establish networks for their own countries, which could then be linked into a network for the SADC countries.
Malawi would provide the secretariat in 2001, and South Africa in 2002.

Basic architecture of the interstitial tissue of the testis of the Sacred Ibis (*Threskiornis aethiopicus*)

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In contrast to the situation in mammals, the structure of the interstitial tissue of the testis of birds has been described in relatively few species[1,2]. The important role that this tissue plays in androgen synthesis and as a supporting structure, a physiological barrier and as a contractile mechanism for sperm transport makes it essential to understand the structure and function of the interstitial tissue in a wider variety of bird species. This paper details the structure of the testicular interstitium in the sacred ibis.

Formalin-fixed testes were obtained from two adult male birds culled during the breeding season. Small blocks of testicular material were further immersion-fixed in 3% glutaraldehyde in Millonig's phosphate buffer and processed for transmission electron microscopy (TEM) using standard procedures. Toluidine blue-stained semi-thin sections were utilised for light microscopy (LM).

On LM the testis presented a compact appearance and revealed tightly packed seminiferous tubules separated by a thin layer of peritubular connective tissue. The interstices between neighbouring tubules was more substantial and housed blood vessels and small groups of Leydig cells. On TEM the peritubular tissue consisted of 6 to 8 alternating cellular and acellular lamellae. The cellular lamellae were formed by stellate cells with long tapering processes. These cells exhibited features of both fibroblasts and smooth muscle cells and were identified as myofibroblasts. The acellular lamellae contained variably oriented collagen fibres, patches of homogeneous material and small bundles of fibrils resembling intracytoplasmic filaments. The peritubular tissue was separated from the seminiferous epithelium by a well-developed basal lamina.

The Leydig cells were large and generally round in shape. The large vesicular nucleus displayed a prominent, dense nucleolus. Cytoplasmic features included large, round mitochondria with tubular cristae, a prominent Golgi apparatus, extensive arrays of smooth endoplasmic reticulum (occasionally arranged in whorls), short, scattered profiles of RER, a few dense, membrane bound bodies resembling lysosomes, and occasional lipofuscin granules.

This study revealed that the interstitial tissue of the sacred ibis testis is similar in basic structure and arrangement to that described in other birds. Although certain variations in ultracytology have been reported in previous studies[1], it would appear as if the avian interstitial tissue, at least in non-passerine birds, shares similar structural characteristics.

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Molecular epidemiology of foot-and-mouth disease virus type SAT-2 in West Africa

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Foot-and-mouth disease (FMD) is a highly contagious disease that affects cloven-hoofed animals. The most susceptible animals are pigs, cattle, sheep and goats but the virus can affect up to 70 domestic and wildlife species. Due to the control and eradication costs of the disease, it is one of the most devastating socio-economic diseases of livestock in non-endemic areas. In endemic areas the disease often does not receive sufficient attention due to the low mortality rate, which compounds the eradication of the disease.

Six of the seven serotypes of FMD virus occur on the African continent. SAT-2 causes regular outbreaks of the disease in West Africa and the molecular epidemiology of this serotype was investigated by determining the relationships between various isolates using partial sequencing of the VP1 gene, the main antigenic determinant of the virus. A homologous region of 480 nucleotides was aligned, and compared to SAT-2 viruses from Saudi Arabia as well as East and Central Africa. Three distinct genetypes could be identified in West Africa by phylogenetic analysis, *viz*. Genotype A: consisting of viruses isolated in 1974-1975 from five countries (Ghana, Liberia, Nigeria, Senegal and Ivory Coast); Genotype B: containing isolates from 1990-1991 from Mali, Ghana, Ivory Coast and Nigeria and Genotype C which were represented by viruses isolated between 1979-1983 from Gambia and Senegal. These three genotypes formed a distinct lineage (I) from viruses from East and Central Africa. Lineages (II-III) consisted of viruses from Central-East Africa and East Africa-Saudi Arabia, respectively. Overall variation for the West African lineage was 13% and 10% on nucleotide and amino acid levels, respectively. The data further indicates that the viruses isolated in Senegal 1979 and 1983 are part of the same epizootic.

Survey of nematophagous fungi in South Africa

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European[1,2], Australian[3] and Mexican strains of the nematophagous fungus, *Duddingtonia flagrans*, have been shown to be effective in reducing pasture contamination with the larvae of various nematodes, including *Haemonchus contortus* from sheep[4]. The resistance of *H. contortus* to anthelmintics in South Africa necessitates the formulation of alternative strategies for control. Among these is the possibility of isolating a local strain of *D. flagrans* and testing it for efficacy in reducing pasture contamination with the infective larvae of *H. contortus*.

The modified sprinkling technique was used for the isolation of nematophagous fungi from soil, faeces and compost samples. The plates were incubated at 26°C, baited with *H. contortus* larvae at least twice a week for three weeks and examined for signs of nematophagous activity every two to three days. Conidia and chlamydospores associated with trapped larvae were sketched, measured and photographed for identification purposes.

Duddingtonia flagrans was isolated from 2 samples of a total of 384 and 68 samples were positive for other nematophagous fungi. The samples were collected from five provinces in South Africa and included leaf litter, soil, faeces from domestic animals, compost and aqueous suspensions of infective nematode larvae.

Eighteen percent of the samples cultured were positive for nematophagous fungi. *D. flagrans* has for the first time been isolated in Africa. The isolation of a South African strain of *D. flagrans* provides the opportunity to compare it with strains from elsewhere in the world, for efficacy in the reduction of infective larvae in the environment as well as molecular characterisation. The fungus might then be used as part of an integrated worm control programme in grazing animals.

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Ultrastructural features of erythrocytes and endothelium in dogs suffering from canine babesiosis

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In cerebral babesiosis of cattle, and falciparum malaria in man, structural alterations in the morphology of erythrocyte membranes occur in parasitised cells. These structural alterations are distinctive for the particular disease in the respective hosts[1]. Preliminary attempts to identify equivalent structural changes on the plasmalemma of erythrocytes in canine babesiosis (*Babesia canis*) were disappointing. Margination of parasitised erythrocytes is discernable histologically in some cases, suggesting that sequestration does occur in this disease[2,3].

Cerebral tissue from five cases of canine babesiosis selected on the basis of suggestive histopathology, was processed for electron microscopy from formalin-fixed, paraffin-wax embedded samples. Two additional cases were sampled directly following euthanasia and cerebral tissue was immersion-fixed in glutaraldehyde. Samples were examined under a Phillips CM10 transmission electron microscope.

Erythrocyte membranes were observed in close apposition to endothelial cell membranes. Electron-dense foci suggestive of adhesion were present at these sites. The foci of contact varied in appearance and size and were not present in all cases, nor in all cells examined. Sites of contact were characterised at high magnification, by layers of superimposed membranes termed membranous stacks. Reversible and irreversible changes were observed in endothelial cells.

The electron-dense foci between erythrocytes and endothelial cells suggest a possible mechanism for adhesive contact between these cells during *B. canis* infection in dogs. The morphological features of these sites of contact are distinct from those described for other haemoprotozoan infections known to cause sequestration of parasitised erythrocytes.

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The effect of an angiotensin-converting enzyme inhibitor on water and electrolyte balance in water restricted sheep

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Investigation of the importance of angiotensin II in the regulation of water and sodium balance in sheep has yielded contradictory results [1,2,3]. In this trial the effects of an angiotensin -converting enzyme (ACE) inhibitor were quantified in sheep on a restricted drinking water intake. During the test phase each sheep received 25 mg of Captopril (Bristol-Myers Squibb (Pty) Limited, USA), an ACE inhibitor, twice daily at 12 hourly intervals by intravenous injection.

Comparing the phase of water restriction only with that of water restriction plus ACE inhibition, significant increases were observed during the latter phase in urine volume, sodium and potassium excretion *via* the urine and osmolar clearance. Urine osmolarity decreased with inhibition of angiotensin II formation, as did also urine potassium concentration. Variables such as water, sodium and potassium loss via the faeces were unaffected.

Most of the renal effects of ACE inhibition except the increase in urinary potassium excretion were explicable in terms of established functions of angiotensin II [4]. However, in contrast to the reported effect of angiotensin II in stimulating sodium and water reabsorption from the intestine[5], there was no evidence of this in this trial. It is possible that in sheep the intestine is refractory to the effects of angiotensin II.

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Extension of the FAMACHA© system: The use of a poster as advertisement

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The technical and scientific aspects of the development of the FAMACHA© system have been reported, amongst others, in the Proceedings of the 5th International Sheep Veterinary Congress (Stellenbosch, 2001). All too often, scientists are (quite rightly) criticised for only making their findings known in scientific circles, and not ensuring that they reach the supposed final beneficiary, in this case the farmer. The poster forms part of a series of actions intended to rectify this deficiency.

The purpose of the poster is to inform farmers briefly of the existence of the FAMACHA© system, its implementation, its benefits, and to encourage them to investigate its adoption on their farms. To achieve success, such a poster should be eye-catching, attractive, and unusual but professional. It should be farmer-oriented, anticipating probable questions while supplying the answers. Brevity, readability and presentation of information in point form are essential. Local contact details and credit to supporters and sponsors are valuable to build credibility and acceptance.

The background is of a sheep farming scene, in outline and with tone gradations in bottle green. The word FAMACHA© stands out in largest font at the top, followed by a play on words "with an eye to the future", which refers to the system's main feature, which is to help gauge the severity of *Haemonchus* worm infection through examination of ovine ocular mucous membranes for anaemia. A large eye with bright red membranes contrasts with green elsewhere, to attract attention.

Under five headings, the farmers' anticipated questions are answered in point form and they are directed to the local veterinarian for further information. The poster serves as an example of how the results of research can be transmitted very effectively to the beneficiaries for implementation.

Why a National Forum for Veterinary Helminthology in South Africa ?

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In response to a dynamic environment, workers and stakeholders in the field of veterinary helminthology in South Africa chose to co-ordinate efforts within research, training, technology transfer and marketing. This occurred in a series of workshops during 1999-2000. Priority areas were identified and specific objectives set to be achieved in addressing these constraints and a framework of action plans developed. Two themes running through these activities are the resource-poor and commercial agricultural systems. A report summarizing the proposed framework/process was circulated widely before the end of 1999 to more than 200 stakeholder organizations and identified persons. During April 2000 a two-day major workshop, a National Forum, was held which was attended by 46 individuals from 30 organizations (academic, government at all levels, industry, international donors, non-governmental organizations). This workshop developed a structure to coordinate efforts leading up to the present stage of the process. A continuation committee drafted a Working Document, which is available at www.worms.org.za

Milk production from goats for households and small-scale farmers in South Africa

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Milk production is important as a component of primary health care, in the prevention of protein malnutrition in South Africa. The Milk Goat Project at the Faculty of Veterinary Science at the Medical University of Southern Africa (Medunsa) was established in 1987. The objective was to develop goat management systems for milk production for households and small-scale farmers in South Africa. This involved crossbreeding Saanen milk goats with South African Indigenous goats, measuring productivity and disease resistance, and developing appropriate management systems.

Milk can be produced efficiently and economically by goats.
Indigenous goats give barely enough milk to provide for the needs of their kids.
Crossbred goats give less milk than Saanens, but of a much richer quality.
The yield of Crossbred goats is nevertheless sufficient for subsistence purposes.[1,2]

Goat kids at eight months were given virulent Ball 3 strain of heartwater blood.
All goats showed the same temperature reaction (peak 41(C on Day 10 or 11).
Saanen goats showed more severe clinical signs.
All Saanens died, but only some of the Crossbred goats, and only one Indigenous goat.
Indigenous goats have been shown to have a genetic resistance to heartwater;
and a proportion of Crossbred goats inherited this resistance.[1,4]

Conception rates were high except for young Indigenous goats.
Kidding percentages varied up to 200%.[1,3]

Coccidiosis (accompanied by pneumonia) caused the death of 30% of goat kids.
Mastitis caused deaths from peracute cases.
Squamous cell carcinoma on the udders of mature Saanen goats. [1,2]

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