

WOAH Collaborative Centre Reports Activities 2023

Activities in 2023

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Centre Information

Title of WOA Collaborating Centre	Training in Integrated Livestock and Wildlife Health and Management
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Name Director of Institute (Responsible Official):	Prof Vinny Naidoo
Name (including Title and Position) of Head of the Collaborating Centre (WOAH Contact Point):	Prof Anita Luise Michel
Name of the writer:	Anita Luise Michel

TOR1 AND 2: SERVICES PROVIDED

1. Activities as a centre of research, expertise, standardisation and dissemination of techniques within the remit of the mandate given by WOA

Category	Title of activity	Scope
Training, capacity building (true)	Wildlife dentistry	Dentistry service and training (provided by Prof G Steenkamp) for elephants in Schonbrunn Zoo, Austria and Jacksonville Zoo, USA
Wildlife (true)	1. Serological and bacteriological diagnostic services 2. Health checks and clinical pathology services 3. Pathology services 4. Wildlife Clinical services	1. A total of 82 wildlife samples were tested serologically from live and dead animals including mammals, birds and reptiles from captive and free-ranging populations presenting with various disease signs in South Africa. 2. Health checks and clinical pathology services were rendered for 142 cases mostly comprising wild carnivores and elephants. Health checks provided to chimpanzees in Jane Goodall Rehabilitation center 3. Post mortem and histopathology examinations were conducted on a wide range of free-ranging and captive wildlife species in South Africa, Namibia, Botswana, Rwanda 4. A total of 471 mostly live TOPS listed species were handled in the wildlife hospital including White backed vulture (n=66); Cape vulture (n=16); Southern ground hornbill (n=16); white rhino (n=11); serval (n=2); springbok (n=3); black footed cat

TOR3: HARMONISATION OF STANDARDS

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the main focus area for which you were designated

Proposal title	Scope/Content	Applicable area

3. In exercising your activities, have you identified any regulatory research needs* relevant for WOA?H?

No

4. Did your Collaborating Centre maintain a network with other WOA?H Collaborating Centres (CC), Reference Laboratories (RL), or organisations designated for the same speciality, to coordinate scientific and technical studies?

Yes

Name of WOA?H CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
Division of Comparative Pathology Department of Pathology & Laboratory Medicine University of Miami Miller School of Medicine	Miami, Florida, USA	Americas	Scientific and technical studies in clinical pathology of wildlife species
Department of Large Animal Clinical Sciences, College of Veterinary Medicine, University of Florida	Florida, USA	Americas	Scientific and technical studies in clinical pathology of wildlife species
Leibnitz Institute for Zoo and Wildlife Research Schonbrunn Zoo,	Germany and Austria	Europe	Elephant tusk extraction
Egerton University	Kenya	Africa	Research in bovine theileriosis
College of Veterinary Medicine, Cornell University	USA	Americas	Research in wildlife anesthesia
University of Veterinary Medicine (Vetmeduni Wien) Vienna	Austria	Europe	Research in wildlife anaesthesia

TOR4 AND 5: NETWORKING AND COLLABORATION

5. Did your Collaborating Centre maintain a network with other WOA?H Collaborating Centres, Reference laboratories, or organisations in other disciplines, to coordinate scientific and technical studies?

Yes

Name of WOAHC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
ARC - Onderstepoort Veterinary Research (Rabies Reference Laboratory)	Onderstepoort, South Africa	Africa	Rabies research in wildlife Foot-and-mouth disease scientific studies African swine fever epidemiological studies Collaborative scientific studies on animal trypanosomiasis Epidemiological investigations on bovine tuberculosis
Animal and Plant Health Agency	Weybridge, United Kingdom	Europe	Assessing neutralization capability of the pre-pandemic bat-sera to both Omicron variant BA.1 and the original SARS-CoV-2 isolate & evaluating the efficacy of locally produced rabies vaccine in local dog breeds
National Veterinary Research Institute	Plateau State, Nigeria	Africa	Evaluating the efficacy of locally produced rabies vaccine in local dog breeds
Federal University of Agriculture	Makurdi, Nigeria	Africa	Assessing neutralization capability of the pre-pandemic bat-sera to both Omicron variant BA.1 and the original SARS-CoV-2 isolate.
Instituto Zooprofilattico Sperimentale (Anthrax Reference Laboratory)	Italy	Europe	Virulence and AMR genes of Bacillus anthracis using whole genome sequencing
Instituto Zooprofilattico Sperimentale (Brucellosis Reference Laboratory)	Italy	Europe	Whole genome sequencing of Brucella isolates of wildlife
Utrecht University, Netherlands	Netherlands	Europe	Scientific studies on equid immunocontraceptives
American Wild Horse Campaign	Nevada, USA	Americas	Delivery of equid immunocontraceptives
Ross University	St Kitts & Nevis	Americas	Studies on equid immunocontraceptives

South African National Parks	South Africa	Africa	Studies on elephant immunocontraceptives
University of Castilla- La Mancha (Christian Gortazar) and Neiker Tecnalia (Ramon Juste)	Spain	Europe	Vaccination of African buffalo against Mycobacterium bovis.
ERFAN (Enhancing Research for Africa Network)	Italy and Tanzania	Europe	Scientific study on CBPP in cattle and antimicrobial use by farmers in Tanzania
National Bio and Agro-Defense Facility (William Wilson) USDA Agricultural Research Service (ARS)	United States of America	Americas	Molecular Characterisation of Arboviruses in South African Livestock
Department of Ecology and Evolutionary Biology, Yale University	United States of America	Americas	Coupled Macroparasite-Microparasite Interactions: Ecological and Evolutionary Consequences of Coinfection - Study on bovine TB in buffalo in the Kruger National Park
Smithsonian Conservation Biology Institute, Global Health Program	United States of America	Americas	Studies in rhinoceros medicine
San Diego Wildlife Alliance	United States of America	Americas	Wildlife artificial reproduction and IVF
Copenhagen Zoo and Aarhus University	Denmark	Europe	Zoological medicine and ecophysiology

TOR6: EXPERT CONSULTANTS

6. Did your Collaborating Centre place expert consultants at the disposal of WOA?H?

Yes

NAME OF EXPERT	KIND OF CONSULTANCY	SUBJECT
Martin Schulman and Alan Guthrie	WOAH Expert Group: Equine Metritis and Piroplasmosis	
Anita Michel	Inaugural meeting of the Wildlife Collaborating Center Network	

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

7. Did your Collaborating Centre provide advice/services to requests from Members in your main focus area?

Yes

Pathology consultations were requested regularly from wildlife authorities and veterinarians in Botswana, Namibia and Rwanda.

Treatment of 1200 elephant cows with immunocontraceptives in 47 South African conservation areas.

Treatment of 1500 wild horses (mares) with immunocontraceptives in Nevada, USA.

8. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by WOA, to personnel from WOA Members?

Yes

a) Technical visit : 1

b) Seminars : 10

c) Hands-on training courses: 2

d) Internships (>1 month) : 11

TYPE OF TECHNICAL TRAINING PROVIDED (A, B, C OR D)	CONTENT	COUNTRY OF ORIGIN OF THE EXPERT(S) PROVIDED WITH TRAINING	NO. PARTICIPANTS FROM THE CORRESPONDING COUNTRY
B	A Review of Wildlife Rabies in Southern Africa	International	50
B	Molecular characterization of lyssaviruses identified in domestic and wild cats in RSA, 2010-2020	International	50
B	New science-based approaches to managing African swine fever in the smallholder pig farming sector. 5 May 2023	Philippines	30
B	African swine fever prevention and control in resource-limited settings. Series of four interactive virtual sessions. (M Penrith) May and June 2023	East Africa	41
B	Farm biosecurity and One Health, Western Africa. Two interactive online sessions. (M Penrith) September & October 2023	West Africa	190
B	Webinar on Managing ASF in resource-limited settings for Portuguese-speaking countries in Africa. (M Penrith) 1 November 2023	International	50
B	Webinar on "How can we measure acute phase reactants in zoo and wildlife species?"	International	70
C	The development of the national atlas of animal trypanosomosis and tsetse and harmonization of the national strategy with the PCP for trypanosomosis in Mozambique. 17-21 April 2023.	Mozambique	20
B	The Community of Practice on acaricide resistance management of livestock ticks (Frans Jongejan)	International	40
	Webinar in two sessions on "Tickborne	Multiple countries in sub-Saharan Africa	25

B	diseases of cattle in southern Africa"		
B	Webinar on "Rabies in wildlife in South Africa" and on New Laboratory approaches for rabies"	Mulriple countries in southern Africa	21
A	Elephant tusk extraction at the Leibnitz Institute for Zoo and Wildlife Research Schonbrunn Zoo,	Germany and Austria	10
D	Internship in veterinary specialist clinical training (Equine)	New Zealand, Namibia, Norway	7
D	Internship in veterinary specialist clinical training (Wildlife and exotic species)	Slovakia and Spain	4

TOR8: SCIENTIFIC MEETINGS

9. Did your Collaborating Centre organise or participate in the organisation of scientific meetings related to your main focus area on behalf of WOA?H

Yes

NATIONAL/INTERNATIONAL	TITLE OF EVENT	CO-ORGANISER	DATE (MM/YY)	LOCATION	NO. PARTICIPANTS
National	SAVA Wildlife Group Congress 2023	South African Veterinary Association - Wildlife Group	2023-03-11	Mpumalanga, South Africa	78
National	Buffalo Testing CPD course	The Buffalo Company	2023-04-01	Zwartkloof Game Farm, South Africa	28
National	Buffalo Testing CPD course	The Buffalo Company	2023-11-11	Zwartkloof Game Farm, South Africa	24

TOR9: DATA AND INFORMATION DISSEMINATION

10. Publication and dissemination of any information within the remit of the mandate given by WOA?H that may be useful to Members of WOA?H

a) Articles published in peer-reviewed journals:

67

- Cantoni, D., Mayora-Neto, M., Auld, B., Da Costa, K., Del Rosario, J., Ameh, V.O., Sabeta, C.T., Derveni, M., Hamlet, M., Wright, E., Scott, S., Giotis, E.S., Banyard, A. and Temperton, N. (2023). Serological evidence of virus infection in *Eidolon helvum* fruit bats: Implications for Bushmeat Consumption in Nigeria. *Frontiers in Public Health*. DOI: 10.3389/fpubh.2023.1283113.
- Ngoepe, C.E.; Shumba, W. and Sabeta, C. (2023). Evidence for a host-switch in the maintenance of canid rabies variant in the Northern Cape Province, South Africa. in the *Journal of the South African Veterinary Association*; 94:123-129. <https://doi.org/10.36303/JSAVA.527>.
- Tsie K., Phahladira, B., Ngoepe, E., Khumalo, N., Sabeta, C.T. (2023) Molecular Characterization of Lyssaviruses Originating from Domestic and Wild Cats Provides an Insight on the Diversity of Lyssaviruses and a Risk of Rabies Transmission to Other Susceptible Mammals and Humans in South Africa. *Pathogens* 2023, 12, 1212. <https://doi.org/10.3390>.
- Mohale, K.D., Ngoepe, E., Mparamoto, M., Blumberg, L. and Sabeta, C.T. (2023). A case report of human bite-contact with a rabid honey badger *Mellivora capensis* (Kromdraai area, Cradle of Humankind, South Africa). *Trop. Med. Infect. Dis.* 8, 186. <https://doi.org/10.3390/tropicalmed8040186>.
- Claassen, D.D., Sabeta, C.T., Fosgate, G.T., Mohale, D., Williams, J.W., Odendaal, L. and Sarah J. Clift. (2023). Diagnostic sensitivity and specificity of immunohistochemistry for the detection of lyssaviruses in domestic animals and wildlife in South Africa. *Journal of Veterinary Diagnostic Investigation*. 13: 10406387231154537. doi: 10.1177/10406387231154537.
- POHLIN F, FREI C, MEYER LCR, ROCH F-F, QUIJADA NM, CONRADY B, NEUBAUER V, HOFMEYR M, COOPER D, STALDER G, WETZELS SU. Capture and transport of white rhinoceroses (*Ceratotherium simum*) cause shifts in their fecal microbiota composition towards dysbiosis, *Conservation Physiology*, 11(1): coad089, DOI:10.1093/conphys/coad089, 2023
- ROUG A, SMITH C, RAATH JP, MEYER LCR, LAUBSCHER LL. Efficacy and safety of three different opioid-based immobilisation combinations in blesbok (*Damaliscus pygargus phillipsi*), *Journal of the South African Veterinary Association*, 94:145-152. DOI: 10.36303/JSAVA.567, 2023
- MTETWA TK, SNELLING EP, DONALDSON A, BUSS PE, MEYER LCR. Reliability of the Enterprise Point-Of-Care (EPOC) blood analyzer's calculated arterial oxygen hemoglobin saturation, in immobilized white rhinoceros (*Ceratotherium simum*), *Veterinary Clinical Pathology*, 52: 417-421. DOI:10.1111/vcp.13236, 2023

9. PANAINO W, PARRINI F, KAMERMAN PR, HETEM RS, MEYER LCR, SMITH D, VAN DYK G, FULLER A. Temminck pangolins relax the precision of body temperature regulation when resources are scarce in a semi-arid environment, *Conservation Physiology*, 11(1): coad068, DOI: 10.1093/conphys/coad068, 2023
10. DONALDSON AC, BUSS PE, FULLER A, MEYER LCR. Effects of three immobilising drug combinations on ventilation, gas exchange and metabolism in free-living African lions (*Panthera leo*), *Conservation Physiology*, 11(1): coad059, DOI: 10.1093/conphys/coad059, 2023
11. LEIBERICH M, FITTE A, BURROUGHS R, STEYL J, GODDARD A, HAW A, BOESCH JM, KOHN TA, MEYER LCR. Cooling by dousing with cold water does not alter the pathophysiological biochemical changes induced by capture in blesbok (*Damaliscus pygargus phillipsi*), *Journal of Wildlife Diseases*, 59(2): 288-298, DOI: 10.7589/JWD-D-22-00059, 2023
12. TORDIFFE ASW, YADVENDRADEV VJ, BOITANI I, CRISTESCU B, KOCK RA, MEYER LCR, NAYLOR S, O'BREIN SJ, SCHMIDT-KUNTZEL A, STANLEY PRICE MR, VAN DER MERWE V, MARKER L. The case for the reintroduction of cheetahs to India, *Nature Ecology and Evolution*, 7, 480-481, DOI: 10.1038/s41559-023-02002-2, 2023
13. DONALDSON A, MEYER LCR, FULLER A, BUSS PE. Chemical immobilisation of lions: weighing up drug effectiveness versus clinical effects, *Journal of the South African Veterinary Association*, 94, 23-34, DOI: 10.36303/JSAVA.544, 2023
14. DONALDSON AS, MEYER LCR, FULLER A, BUSS PE. Comparison of the cardiovascular effects of immobilization with three different drug combinations in free-ranging African lions, *Conservation Physiology*, 11(1), coac077, DOI: 10.1093/conphys/coac077, 2023.
15. Palencia, P, Blome, S., Brook, R.K., Ferroglio, E., Jo, Y.-S., Linden, A, Montoro, V, Penrith, M.-L., Plač, R., Vivente, V, Viltrop, A., Gortázar, C. 2023. Tools and opportunities for African swine fever control in wild boar and feral pigs: a review. *European Journal of Wildlife Research*, 69, 69 doi: 10.1007/s10344-023-01696-w.
16. Jori, F., Bastos, A., Boinas, F., van Heerden, J., Heath, L., Jourdan-Pineau, H., Martinez Lopez, B., Pereira de Oliveira, R., Pollet, Y., Quembo, C., Rea, K., Simulundu, E., Taraveau, F., Penrith, M.-L. 2023. An updated review of *Ornithodoros* ticks as reservoirs of African swine fever in Sub-Saharan Africa and Madagascar. *Pathogens*, 12, 469. doi: 10.3390/pathogens.12030469.
17. Penrith, M.-L., van Heerden, J, Pfeiffer, D.U., Oļševskis, E., Depner, K., Chenais, E. 2023. Innovative research offers new hope for managing African swine fever better in resource-limited smallholder farming settings: a timely update. *Pathogens*, 12, 355. doi: 10.3390/pathogens12020355.
18. Lubisi, B.A., Mutowembwe, P.B., Ndouvhada, P.N., Odendaal, L., Bastos, A.D.S., Penrith, M.-L. 2023. Experimental infection of domestic pigs (*Sus scrofa*) with Rift Valley fever virus. *Viruses*, 15, 545. doi: 10.3390/v15020545.
19. Emily P. Mitchell, Lucy Kemp, Katja Koepfel, Alfredo Pérez Guiot 2023. A retrospective review of the histopathology of captive hornbill chicks. *JSAVA* 94: 113-122. <https://doi.org/10.36303/JSAVA.506>
20. Chenet, Marion Mosca, Didier Pin, Daniela Denk. 2023 Cutaneous apocrine gland neoplasia in 16 captive African wild dogs (*Lycaon pictus*). *Journal of Comparative Pathology* 207:59-65. <https://doi.org/10.1016/j.jcpa.2023.10.005>
21. Gazendam BA, Avenant A, Kitshoff A, Blignaut CJ, Tordiffe ASW, Hoepner SN, Hooijberg EH, Schulman ML. The first report of the clinical diagnosis and surgical management of pyometria in two cheetahs (*Acinonyx jubatus*). *Ther Wild*. 2023. 100046.
22. Steyrer, C, Miller, M, Hewlett, J, Buss, P, Hooijberg, EH. Markers of inflammation in free-living African elephants (*Loxodonta africana*): Reference intervals and diagnostic performance of acute phase reactants. *Vet Clin Pathol*. 2023; 52(Suppl. 1): 75- 86.
23. Hooijberg, EH, Cray, C. Acute phase reactants in nondomesticated mammals—A veterinary clinical pathology perspective. *Vet Clin Pathol*. 2023; 52(Suppl. 1): 19- 36.
24. Parsons SDC, Becks D, Vermeulen A, Hobson M, Warren RM, Hooijberg EH. Poikilocytosis of Angora goats is associated with erythrocyte density and reticulocytosis. [published online May 3] *J S Afr Vet Assoc*. 2023; doi:10.36303/JSAVA.547
25. Leiberich M, Fitte A, Burroughs R, et al. Cooling by dousing with cold water does not alter the pathophysiological biochemical changes induced by capture in blesbok (*Damaliscus pygargus phillipsi*). *J Wildl Dis*. 2023;59(2):288-298. doi:10.7589/JWD-D-22-00059
26. Piketh G, Williams A, Schlievert EC. Application of the Alivacor KardiaMobile smartphone modulated ECG device for use in horses. *J S Afr Vet Assoc*. Published online June 22, 2023. doi:10.36303/JSAVA.540
27. Brown KL, Ganswindt A, Steenkamp G, Tordiffe ASW. Responses to Reduced Feeding Frequency in Captive-Born Cheetahs (*Acinonyx jubatus*): Implications for Behavioural and Physiological Stress and Gastrointestinal Health. *Animals (Basel)*. 2023 Aug 31;13(17):2783. doi: 10.3390/ani13172783.
28. Steenkamp G, Hoogendijk CF, Ruiz JCA, Koepfel K. Orthognathic surgery to improve malocclusion in a chimpanzee (*Pan troglodytes*). *Vet Rec Case Rep*. 2023;e766
29. Parker, I. S., Theleste, E., & Steenkamp, G. (2023). Speculating on transverse grooves in African elephant tusks. *Pachyderm*, 64, 130–133.
30. Madzingira O, Byaruhanga C, Fasina FO, van Heerden H. Assessment of knowledge, attitudes and practices relating to brucellosis among cattle farmers, meat handlers and medical professionals in Namibia. *Vet Med Sci*. 2023 Jan;9(1):535-547. doi: 10.1002/vms3.937. Epub 2022 Nov 15. PMID: 36382350; PMCID: PMC9857002.
31. Dogonyaro, B.B.; van Heerden, H.; Potts, A.D.; Fasina, F.O.; Casanovas-Massana, A.; Kolo, F.B.; Lötter, C.; Byaruhanga, C.; Ko, A.I.; Wunder, E.A., Jr.; et al. Molecular Characterization of *Leptospira* Species Detected in the Kidneys of Slaughtered Livestock in Abattoirs in Gauteng Province, South Africa. *Pathogens* 2023, 12, 666. <https://doi.org/10.3390/pathogens12050666>.
32. Madzingira O, Aikukutu G, Kandongo F, Kolo FB, Khaiseb S, Tjipura-Zaire G, Kabajani JN, Musilika-Shilongo A, van Heerden H. Seroprevalence, and molecular detection of *Brucella abortus* in cattle tissues from an abattoir in Namibia. *Infect Ecol Epidemiol*. 2023 Jun 28;13(1):2229589. doi: 10.1080/20008686.2023.2229589. PMID: 37398877; PMCID: PMC10308871.
33. Ochai SO, Crafford JE, Kamath PL, Turner WC, van Heerden H. Development of conjugated secondary antibodies for wildlife disease surveillance. *Front Immunol*. 2023 Jul 11;14:1221071. doi: 10.3389/fimmu.2023.1221071. PMID: 37503338; PMCID: PMC10368751.
34. Huang YH, Owen-Smith N, Henley MD, Kilian JW, Kamath PL, Ochai SO, van Heerden H, Mfune JKE, Getz WM, Turner WC. Variation in herbivore space use: comparing two savanna ecosystems with different anthrax outbreak patterns in southern Africa. *Mov Ecol*. 2023 Jul 31;11(1):46. doi: 10.1186/s40462-023-00385-2. PMID: 37525286; PMCID: PMC10392021.
35. Barandongo ZR, Dolfi AC, Bruce SA, Rysava K, Huang YH, Joel H, Hassim A, Kamath PL, van Heerden H, Turner WC. The persistence of time: the lifespan of *Bacillus anthracis* spores in environmental reservoirs. *Res Microbiol*. 2023 Jul-Aug;174(6):104029. doi: 10.1016/j.resmic.2023.104029. Epub 2023 Jan 28. PMID: 36720294.
36. Gazendam BA, Avenant A, Kitshoff A, Blignaut CJ, Tordiffe ASW, Hoepner SN, Hooijberg EH and Schulman ML (2023) The first report of the clinical diagnosis and surgical management of pyometria in two cheetahs (*Acinonyx jubatus*) *Therio. Wild* (3) 100046
37. Delsink AK, van Altena JJ, Schulman ML and H. J. Bertschinger (2023) Immunocontraception of the female African savanna elephant (*Loxodonta africana*) in South Africa: from pipe dream to policy *Wild. Res* doi:10.1071/WR22165
38. Schulman ML, Grewar JD, Wilson T, Hou M, Hayes, N (2023) Establishing feasibility for porcine zona pellucida immunocontraception in a large population of free-roaming horses inhabiting the Virginia Range of Nevada, USA. 13th International Symposium on Equine Reproduction. Iguacu, Brazil 9-14 July, 2023 *Int J Eq Vet Sci* 125: 104742
39. Declan R. Morris¹, Todd J. McWhorter, Wayne S. J. Boardman, Greg Simpson, Jeanette Wentzel, Jannie Coetzee, Ferreira Du Plessis, Yoshan Moodley. 2023 Gene flow

- connects key leopard (*Panthera pardus*) populations despite habitat fragmentation and persecution. *Biodiversity and Conservation*.
40. Heylen, D.J.A., Kumsa, B., Kimbita, E. et al. Tick communities of cattle in smallholder rural livestock production systems in sub-Saharan Africa. *Parasites Vectors* 16, 206 (2023). <https://doi.org/10.1186/s13071-023-05801-5>
41. A. Jonker, P. Thompson, A. Michel. 2023. Approaches to increase recovery of diagnostically significant bacterial and fungal agents of abortions in domestic ruminants. *Onderstepoort J Vet Res*. VOL 90, NO 1 (2023).
42. Jonker, A.; Michel, A.L. Optimization and Application of Real-Time qPCR Assays in Detection and Identification of Chlamydiales in Products of Domestic Ruminant Abortion. *Pathogens* 2023, 12, 290. <https://doi.org/10.3390/pathogens12020290>
43. Samkange A, Chitanga S, Neves L, Matjila T. Evaluation of knowledge, attitudes and practices regarding neosporosis and toxoplasmosis among farmers and animal health practitioners in Namibia. *Trop Anim Health Prod*. 2022 Dec 27;55(1):28. doi: 10.1007/s11250-022-03441-y. PMID: 36574053.
44. Brown, Michael Butler; Fennessy, Julian T, Crego, Ramiro D., Fleming, Christen H., Alves, Joel, Brandlová, Karolina, Fennessy, Stephanie, Ferguson, Sara, Hauptfleisch, Morgan, Hejzmanova, Pavla, Hoffman, Rigardt, Leimgruber, Peter, Masiaine, Symon, McQualter, Kylie, Mueller, Thomas, Muller, Ben, Muneza, Arthur, O'Connor, David, Olivier, Adriaan Jacobus, Rabeil, Thomas, Seager, Steven, Stacy-Dawes, Jenna, van Schalkwyk, Louis, and Stabach, Jared. 2023. "Ranging behaviours across ecological and anthropogenic disturbance gradients: a pan-African perspective of giraffe (*Giraffa spp.*) space use." *Proceedings of the Royal Society B: Biological Sciences*, 290, (2001). <https://doi.org/10.1098/rspb.2023.0912>
45. Tufts Danielle M., Adams Ben and Diuk-Wasser Maria A. 2023 Ecological interactions driving population dynamics of two tick-borne pathogens, *Borrelia burgdorferi* and *Babesia microti* Proc. R. Soc. B.29020230642 <http://doi.org/10.1098/rspb.2023.0642>
46. Airs, P.M., Ventura-Cordero, J., Mvula, W. et al. Low-cost molecular methods to characterise gastrointestinal nematode co-infections of goats in Africa. *Parasites Vectors* 16, 216 (2023). <https://doi.org/10.1186/s13071-023-05816-y>
47. Wild, T.A., van Schalkwyk, L., Viljoen, P. et al. A multi-species evaluation of digital wildlife monitoring using the Sigfox IoT network. *Anim Biotelemetry* 11, 13 (2023). <https://doi.org/10.1186/s40317-023-00326-1>
48. Banda F, Ludi AB, Wilsden G, Browning C, Kangwa HL, Mooya L, Ngoma M, Muuka GM, Mundia C, Fandamu P, Paton DJ, King DP, Quan M. The Immunogenicity of a Foot-and-Mouth Disease Virus Serotype O Vaccine in Commercial and Subsistence Cattle Herds in Zambia. *Vaccines (Basel)*. 2023 Dec 5;11(12):1818. doi: 10.3390/vaccines11121818. PMID: 38140222; PMCID: PMC10747988.
49. Heylen, D.J.A., Kumsa, B., Kimbita, E. et al. Tick-borne pathogens and body condition of cattle in smallholder rural livestock production systems in East and West Africa. *Parasites Vectors* 16, 117 (2023). <https://doi.org/10.1186/s13071-023-05709-0>
50. Ndlovu I. S., Silas Ekuyikeno, Tshilwane S. I., Chaisi M., Vosloo A., Mukaratirwa S. Preliminary insights on the metabolomics of *Trichinella zimbabwensis* infection in Sprague Dawley rats using GCxGC-TOF-MS (untargeted approach). *Frontiers in Molecular Biosciences*. 10. <https://www.frontiersin.org/articles/10.3389/fmolb.2023.1128542> DOI=10.3389/fmolb.2023.1128542
51. Olaogun, S.C., Fosgate, G.T., Byaruhanga, C. et al. The knowledge, attitudes, and practices of smallholder cattle farmers concerning the epidemiology of bovine fasciolosis in the North West Province, South Africa. *Trop Anim Health Prod* 55, 97 (2023). <https://doi.org/10.1007/s11250-023-03478-7>
52. Hoogesteyn AL, Rivas AL, Smith SD, Fasina FO, Fair JM, Kosoy M. Assessing complexity and dynamics in epidemics: geographical barriers and facilitators of foot-and-mouth disease dissemination. *Front Vet Sci*. 2023 May 12;10:1149460. doi: 10.3389/fvets.2023.1149460. PMID: 37252396; PMCID: PMC10213354.
53. ML Genis I, JE Crafford J, CT Weyer2, D Pollard3, JD Grewar2 and AJ Guthrie. 2023. African horse sickness vaccination status correlated with disease outcome in South Africa. https://doi.org/10.36303/JSAVA.573https://hdl.handle.net/10520/ejc-savet_v94_n1_a11
54. G Horak1, K Junker2 and GJ Gallivan. 2023. Helminth parasites of impalas, *Aepyceros melampus* (Lichtenstein) (Ruminantia: Bovidae), in the Kruger National Park, South Africa: infection patterns from birth to adulthood. https://doi.org/10.36303/JSAVA.553https://hdl.handle.net/10520/ejc-savet_v94_n1_a10
55. Ali Mazloum, Antoinette Van Schalkwyk, Shawn Babiuk, Estelle Venter, David B. Wallace, Alexander Sprygin. 2023. Lumpy skin disease: history, current understanding and research gaps in the context of recent geographic expansion. *Front. Microbiol.*, 02 November 2023. *Infectious Agents and Disease*. Volume 14 - 2023 | <https://doi.org/10.3389/fmicb.2023.1266759>
56. A Samkange, S Chitanga234, GN Tjipura-Zaire5, VG Mutjavikua2, JW Smith2, L Neves16 and T Matjila. 2023 Seroprevalence and associated risk factors for *Toxoplasma gondii* infection of goats and sheep in the Khomas region of Namibia. https://doi.org/10.36303/JSAVA.548https://hdl.handle.net/10520/ejc-savet_v94_n1_a14
57. Penrith ML, Okoth E, Livio Heath. Special Issue "African Swine Fever and Other Swine Viral Diseases in Africa". *Viruses*. 2023 Jun 26;15(7):1438. doi: 10.3390/v15071438. PMID: 37515126; PMCID: PMC10386646.
58. CRAY C, HOOIJBERG E, BASSOLS A, JACOBSON S, SACO Y. 2023. DOI: 10.1111/vcp.13247 Introducing the special issue on acute phase proteins in veterinary medicine. *Veterinary Clinical Pathology*. 52, 5-7
59. HARING R, BEVERLEY G, THOMPSON PN, TAYLOR A, O'DELL JH Journal article DOI:10.1071/WR22084 Evaluation of lion (*Panthera leo*) scat as a wild dog (*Lycaon pictus*) deterrent on game farms. *Wildlife Research* 50(12), 1021-1030
60. ROBERTS LC, MOLINI U, COETZEE LM, KHAISEB S, ROUX JP, KEMPER J, ROBERTS DG, LUDYNIA K, DOHERR M, ABERNETHY D, FRANZO G Journal article DOI:10.3390/ani13091449 Is Penguin Circovirus Circulating Only in the Antarctic Circle? Lack of Viral Detection in Namibia. *Animals* 13(9), 1449
61. GAZENDAM BAṬ, MONAKALI OH, LANDMAN N, KOEPEL KN. 2023. DOI:10.36303/JSAVA.541 A new approach to the vasectomy of African lions (*Panthera leo*). *Journal of the South African Veterinary Association* 94 (1), 54-58
62. MANGENA ML, GCEBE N, THOMPSON PN, ADESIYUN AA. 2023. DOI:10.1186/s12917-023-03645-w Q fever and toxoplasmosis in South African livestock and wildlife: a retrospective study on seropositivity, sporadic abortion, and stillbirth cases in livestock caused by *Coxiella burnetii*. *BMC veterinary research* 19 (1), 168
63. MAKGABO SM, BRAYTON KA, OOSTHUIZEN MC, COLLINS NE Journal article DOI:10.1016/j.crmicr.2023.100198 Unravelling the diversity of *Anaplasma* species circulating in selected African wildlife hosts by targeted 16S microbiome analysis. *Current Research in Microbial Sciences* 5, 100198
64. MITCHELL EP, KEMP L, KOEPEL K, GULOT AP Journal article DOI:10.36303/JSAVA.506 A retrospective review of the histopathology of captive hornbill chicks. *Journal of the South African Veterinary Association* 94 (1), 113-122
65. ROBERTS LC, ABERNETHY D, ROBERTS DG, LUDYNIA K, O'KENNEDY MM, ABOLNIK C Journal article DOI:10.1002/vetr.3616 Vaccination of African penguins (*Spheniscus demersus*) against high-pathogenicity avian influenza. *Veterinary Record* e3616, 1-5
66. STEENKAMP, G., HOOGENDIJK, C.F., RUIZ, J.C.A., KOEPEL, K.. 2023. Journal article DOI:10.1002/vrc2.766 Orthognathic surgery to improve malocclusion in a chimpanzee (*Pan troglodytes*). *Veterinary Record Case Reports* 12:e766, 1-6
67. VAN BOOM KM, KOHN TA, TORDIFFE ASW Journal article DOI:10.1002/zoo.21803 A cross-over dietary intervention in captive cheetahs (*Acinonyx jubatus*): Investigating the effects of glycine supplementation on blood parameters. *Zoo Biology* 43, 32-41

b) International conferences:

17

1. Evidence for a host-switch in the maintenance of canid rabies variant in the Northern Cape province of South Africa. Oral presentation at Southern African Society for Veterinary Epidemiology and Preventive Medicine (23-25 August 2023), Gaborone (Botswana).
2. Goharriz, H., McElhinney, L.M., Wu, G., Sabeta, C.T., Ameh, O.A. and Tang, G. Sera from Straw-Colored Fruit Bats (*Eidolon helvum*) in Nigeria are capable of neutralizing SARS-CoV-2 isolates. XVth International Nidovirus Symposium May 14-18, 2023.
3. Current research in immobilization of African ungulates: Using science to improve the safety and success of chemical capture of free-living white rhinoceros (invited oral presentation), 38th Annual WAAM/AEMC Wildlife and Exotic Animal Symposium, UC Davis, online, USA, February 2023
4. Current research in immobilization of African ungulates: Misconceptions about capture-induced hyperthermia (invited oral presentation), 38th Annual WAAM/AEMC Wildlife and Exotic Animal Symposium, UC Davis, online, USA, February 2023.
5. Managing African swine fever in resource-limited settings: How do we balance eliminating the infection and preserving livelihoods? USAID Research Seminar, 26 January 2023 (virtual meeting, Washington DC, USA)
6. Reflections on research gaps in African swine fever one century after it was discovered in Africa, University of Illinois Academic Seminar, 9 March 2023 (virtual meeting, Urbana, Illinois. USA)
7. Biosecurity along the value chain, Third Meeting of the Standing Group of Experts (SGE) on African swine fever (ASF) of the GF-TADs for Africa, Abidjan, Côte d'Ivoire, 1-3 August 2023
8. African swine fever control: a collaborative approach in long-time endemic areas, International African Swine Fever Workshop, Beijing, China, 17-20 September 2023
9. ASF Gap Analysis and its implication for Africa, Global African swine fever Research Alliance (GARA) Africa Chapter Workshop, 30 November 2023 (virtual meeting, Nigeria)
10. African swine fever – from humble beginnings to pandemic (plenary lecture), GARA GAP Analysis, Manila, Philippines, 5-7 December 2023
11. African swine fever epidemiology – drivers of infection in different production systems and value chains: focus on Africa, Global Consultations on African swine fever control, Food & Agriculture Organization of the United Nations, Rome, 12-14 December 2023
12. Transcriptomic variations between mild and severe reactions due to *Theileria parva* infection. Gloria Patsanza, Nicola Collins, Darshana Morar-Leather, Kgomotso Sibeko-Matjila. 29th International Conference of the World Association for the Advancement of Veterinary Parasitology (WAAVP). 20-24 August 2023. Chennai, India
13. J Hewlett, E Mitchell, V Rutten, A Michel. Vaccination of African buffalo against bovine tuberculosis. WILDLIFE GROUP of the South African Veterinary Association CONGRESS 2023, 9 – 11 March 2023.
14. M Engelbrecht, A Jonker, J Wentzel, Anita L Michel. The hippopotamus and One Health – What is the link? 20th Southern African Society for Veterinary Epidemiology and Preventive Medicine Congress, 23 – 25 August 2023, Gaborone, Botswana.
15. J. Hewlett, LM de Klerk, R Juste, C Gortazar, A. Michel. Vaccination of African buffalo against bovine tuberculosis. 20th Southern African Society for Veterinary Epidemiology and Preventive Medicine Congress, 23 – 25 August 2023, Gaborone, Botswana
16. P.N. Thompson. Investigating the epidemiology, ecology, and socio-economic impact of Rift Valley fever in southern Africa. 20th Southern African Society for Veterinary Epidemiology and Preventive Medicine Congress, 23 – 25 August 2023, Gaborone, Botswana
17. Dikeledi C. Sebola. Hospital-acquired and zoonotic bacterial organisms and their associated antimicrobial-susceptibility profile in veterinary hospitals: A Systematic Review. 20th Southern African Society for Veterinary Epidemiology and Preventive Medicine Congress, 23 – 25 August 2023, Gaborone, Botswana.

c) National conferences:

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1. *Wildlife Conservation Physiology and Disease workshop. Kruger National Park. 13-17 March 2023.*
2. *Pushing the innovative boundaries with care when developing novel immobilisation drug combinations (oral presentation) Wildlife Group of the SAVA Congress, RSA, March 2023*
3. *Capture-induced stress in wildlife: deficiencies in its current assessment and treatment (oral presentation) Wildlife Group of the SAVA Congress, RSA, March 2023*
4. *EP Mitchell, A. Tordiffe, P. Caldwell. 2023 Ovarian transdifferentiation in lions. South African Veterinary Association Wildlife Group Congress, Onderstepoort, 11th March*
5. *LS Michaelides, LCR Meyer, M Leiberich, P Buss, GT Fosgate, FP Viljoen, BH Harvey, EH Hooijberg. Comparison of the acute stress response in southern white rhinoceros (Ceratotherium simum simum) immobilized with four different drug protocols. Wildlife Group of the South African Veterinary Association Annual Congress, Muldersdrift, South Africa, March 2023.*
6. *LL Borchers, MA Tjale, KP Sibeko-Matjila. Identification and gene expression profiling of subunit vaccine candidates in cattle- and buffalo-derived Theileria parva isolates. 51st Annual Congress for the Parasitology Society of Southern Africa (PARSA). 17-20 September 2023. Muldersdrift, South Africa*
7. *Mpendulo Mtimunye, Tshifhiwa Nefefe, Selaelo Tshilwane, Kgomotso Sibeko-Matjila. Host immune response to FMDV SAT 1, 2 and 3 infections: Defining mechanisms of persistent infection in cattle. 13th International Veterinary Immunology Symposium (IVIS). 17-21 November 2023. Kruger National Park, South Africa*
8. *Sunday Ochai. The role of host and environment in the transmission of anthrax: An agent-based modelling approach Savanna Science Networking Meeting. Kruger National Park.*
9. *H van Heerden. Soil ecosystem diversity: the elusive piece of the puzzle in anthrax enzootics in Kruger National Park? Savanna Science Network Meeting. Kruger National Park.*
10. *Carlo Cossu. Isolation of brucella abortus from African buffalo after 50 years in Kruger National Park, South Africa. Savanna Science Network Meeting. Kruger National Park.*
11. *Anita Michel. The World Organisation for Animal Health: Perspectives on Wildlife. WILDLIFE GROUP of the South African Veterinary Association CONGRESS 2023, 9 – 11 March 2023.*

d) Other (Provide website address or link to appropriate information):

10

MSc dissertations:

1. *Thembeke Mtetwa (PhD Pharmacology/Physiology – UP supervisor, RSA): Reliability of methods to determine arterial oxygen-haemoglobin saturation in immobilized southern white rhinoceros (Ceratotherium simum simum), 2023*
2. *Ashleigh Donaldson (PhD Pharmacology – UP supervisor, RSA): Evaluation of the efficacy and safety of ketamine-medetomidine and ketamine-butorphanol-medetomidine for the immobilization of free-living lions, 2023*
3. *Luke Michaelides (MSc Veterinary Science – UP co-supervisor, RSA): Acute stress response in southern white rhinoceros (Ceratotherium simum simum) immobilized with four different drug combinations, 2023.*
4. *M.Sc Carlo Cossu: Detection of selected pathogens in wildlife from Kruger National Park, South Africa, and Etosha National Park, Namibia*
5. *Kamini Govender: Investigation of Bacillus anthracis spore survival in soils from Kruger National Park 6. in South Africa and Etosha National Park in Namibia*
6. *Brighton Gorjena: Knowledge, attitudes and practices analysis of farmers on the risk of introducing peste des petits ruminants from Angola into northern communal areas of Namibia.*

Popular article:

A. *Jonker. Histophilus somni: A bacterium that demands attention. Published in StockFarm. June 2023. Vol13. No.6. https://journals.co.za/doi/abs/10.10520/ejc-vp_stock_v13_n6_a29*

Book:

KREEGER TJ, ARNEMO JM, CAULKETT NA, HAMPTON JO, MEYER LCR. 2023. Handbook of Wildlife Chemical Immobilization, 6th ed. Published by authors, Bovey, Minnesota, USA. 504 pp. 2023

TAYLOR R, BENNIIT E, FYNN R, KORTE L, NAIDOO R, ROUG A, CORNELIS D Book chapter DOI:10.1017/9781009006828.009 Habitat, Space Use and Feeding Ecology of the African Buffalo Published online by Cambridge University Press 5, 133-152

PARKER ISC, THELESTE E, STEENKAMP G. Book chapter. Speculating on transverse grooves in African elephant tusks Pachyderm64, 130-133

11. What have you done in the past year to advance your area of focus, e.g. updated technology?

12. Additional comments regarding your report: