

Preliminary Results of Bovine Viral Diarrhea Virus Antibody Response to a Single Dose of Modified Live Vaccine and Associated Factors in Smallholder Dairy Cattle in Meru Kenya. Kenya Veterinary Association Annual Scientific Conference and World Veterinary Day 2022, Naivasha, Kenya. (Oral presentation)

Preliminary Results of a Retrospective Cohort Study of Disease Among Vaccinates and Non-vaccinates After a Single injection of Multivalent Bovine Viral Diarrhoea Virus Modified Live Vaccine on Smallholder Dairy Farms in Meru. Kenya Veterinary Association Annual Scientific Conference and World Veterinary Day 2022, Naivasha, Kenya. (Poster presentation)

Awards

Dr. Douglas W. Ehresmann Graduate Award – for outstanding research in virology, 2022 (AVC GSR and Awards Committees, UPEI)

Dr. Ian Dohoo Travel Award – Scholarship support for graduate students travel for presentation of scholarly work at the International Symposium for Veterinary Epidemiology and Economics conference held at Halifax, Canada. 2022

Queen Elizabeth II Diamond Jubilee Scholarship (QES) – Awarded the QES fully funded Doctoral scholarship at the University of Prince Edward Island, Canada. 2018-2022

USDA Faculty Exchange Program – Sponsored by the United States Department for Agriculture to attend the 4.5 month faculty exchange program in the United States at the College of Veterinary Medicine, Michigan State University. 2017

Association of Commonwealth Universities – To attend an international professional event that would enrich experience outside his country/region and provide a networking opportunity for future collaboration. Attended the OMICS conference in Hyderabad, affiliated with the India Veterinary Conference. 2015

2015 CIMTRADZ Summer School Training – Sponsored to participate in the month-long Capacity building in Integrated Management of Transboundary Animal Diseases and Zoonoses (CIMTRADZ) at Makerere University, Uganda. 2015

Biographical Data

Daniel Muasya is a veterinarian from Kenya. He holds a Bachelor of Veterinary Medicine (BVM) and Master of Veterinary Medicine (MvetMed) from the University of Nairobi. While studying at AVC, he is on a leave of absence from his employment as a veterinary clinician at the Veterinary Teaching Hospital, Faculty of Veterinary Medicine, University of Nairobi. He has a wife and three children.

University of Prince Edward Island

Faculty of Veterinary Medicine
Summary of Dissertation

Submitted in Partial Fulfilment
of the Requirements for the

DEGREE OF DOCTOR OF PHILOSOPHY

Daniel Muasya
Department of Health Management

Supervisory Committee

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Bovine viral diarrhoea testing and vaccination on smallholder dairy farms in Kenya

Smallholder dairy (SHD) farming is a critical sector supporting millions of households' income in rural Kenya. The sector is faced with numerous challenges, among which are diagnosis and prevention of diseases such as Bovine Viral Diarrhoea Virus (BVDV).

In objective 1, we aimed to determine possible antigen (Ag) and antibody (Ab) cross-reactivity between BVDV and classical swine fever virus (CSFV) using enzyme-linked immunosorbent assay (ELISA) among Kenyan SHD cattle. BVDV Ag and Ab were tested on 320 dairy cattle, and CSFV Ag and Ab were tested on a subset of 133 and 74 samples, respectively. The results indicated the potential for substantial Ab cross-reactivity, and limited evidence for antigen cross-reactivity. We recommend that cross-reactivity be considered when interpreting BVDV ELISA results.

Two studies attempted to determine associations between disease occurrence and multivalent vaccination, including 2 BVDV components on Kenyan SHD farms. In a retrospective cohort study, and a randomized controlled trial, one year after vaccination, reported disease outcomes were assessed by mixed multivariable logistic and Poisson regression analyses for the heifers and cows, respectively. In both studies, the vaccine was beneficial in reducing overall reported diseases after follow-up, while controlling for other farm-level and animal-level factors. Good nutrition and feeding, biosecurity practices and body condition score were factors also associated with lower reported disease occurrence.

In objective 4, we evaluated the variability in BVDV antibody response in 128 and 109 non-pregnant cows and heifers, respectively, before and four weeks after BVDV vaccination. Multivariable linear regression was used to determine factors associated with Ab change. Associated with better Ab response were body condition score (BCS), nutrition, regular acaricide use and zero grazing, while poor Ab response was associated with disease conditions, early lactation and positive BVDV Ab test.

The research recommends vaccination against BVDV and other pathogens in the multivalent vaccine on SHD farms, especially when having a BCS of 2 to 2.75.

Publications

Muasya, D., VanLeeuwen, J., Gitau, G., Mckenna, S., Heider, L., & Muraya, J. (2022). Evaluation of antibody and antigen cross-reaction in Kenyan dairy cattle naturally infected with two pestiviruses: bovine viral diarrhoea virus and classical swine fever virus. *Veterinary World*. **15** (May 2022/8) 1290-1296. <https://doi.org/10.14202/vetworld.2022.1290-1296>

D. Muasya, G. Gitau., G. Thaiyah, D. Gakuya, J. VanLeeuwen and P. Mbatha: A comparison between indirect ELISA and tuberculin skin test in the diagnosis of bovine tuberculosis in Kenya. *East African Journal of Science, Technology and Innovation*, **1** (1): 2019, 1-10. <https://www.eajsti.org/index.php/EAJSTI/article/view/35/9>

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Florence Wakoko-Studstill, &, Margaret Loy Khaita, Samuel George Okech, John Baligwamunsi Kaneene, Patrick Pithua, Sherry Blackmon, Haiden Rogers, Gertrude Shepelo, **Muasya Daniel Wambua**, Erick Komba, Richard Samson, Tsegay Tkue Gebrewahde, Richard Habimana, Andrew Kibogo, Viola Kasonev, Augustus Okite, Watson Aijuka, John David Kabasa. (2017). Model African Union: experiential pedagogical approach to teaching one health in veterinary medicine and public health. *The Pan African Medical Journal*.; **27** (Supp 4):18. 2017. <https://www.panafrican-med-journal.com/content/series/27/4/18/full/>

Muasya D. W., Gitau G. K., Thaiyah A. G., Gakuya D. W., VanLeeuwen J. and Mbatha P.: The Prevalence of Bovine Tuberculosis (BTB) Using Antibody ELISA in Seven Counties of Kenya. *Tanzania Veterinary Journal*. **33**. 1, pg 2-9 (2018). <https://www.ajol.info/index.php/tvj/issue/view/17468>

Mwangi W. E, Mogoia E.M, Kimeli P, **Muasya D.W**, Kipyegon A. N, Kirui G, Gitonga P. N, Mande J. D Kariuki E, and Mijele D (2016): Combined Epidural Lidocaine and Medetomidine-Ketamine Isoflurane Anaesthesia for Management of Femoral Fracture in a Cheetah (*Acinonyx jubatus*). *Israel Journal of Veterinary Medicine* **71** (1): 43-47.2016. <http://www.ijvm.org.il/node/470>

W.E. Mwangi, P. Kimeli, L.W. Mathai, **D.W. Muasya** and A. N. Kipyegon Management of Puff Adder (Bitis Arietans) Snake Bite and Envenomation in Dogs: A Case Report. *International Journal of Veterinary Science*. July 13, 2014 P-ISSN: 2304-3075 E-ISSN: 2305-4360

Peter Kimeli, Eddy M. Mogoia, Willy E Mwangi, Ambrose N Kipyegon, Gilbert Kirui, **Daniel W. Muasya**, John D Mande, Edward Kariuki and Dominic Mijele. Use of brachial plexus blockade and medetomidine-ketamine-isoflurane anaesthesia for repair of radio-ulna fracture in an adult cheetah (*Acinonyx jubatus*). *BMC Veterinary Research*. **10**: 249, 2014 <http://www.biomedcentral.com/1746-6148/10/249>

Presentations associated with PhD thesis

Benefits of Multivalent Bovine Viral Diarrhoea Virus Vaccine on Smallholder Dairy Farms in Kenya. UPEI Graduate Studies and Research Conference 2022, UPEI. (Oral presentation given on-line)

Bovine viral diarrhoea virus antibody response to a single dose of modified live vaccine and associated factors in smallholder dairy cattle in Meru Kenya. International Symposium of Veterinary Epidemiology and Economics, 2022, Halifax Canada. (Oral presentation recorded in on-line conference library)

Possible cross-reactivity of antibody and antigen test results for bovine viral diarrhoea virus and classical swine fever virus in dairy cattle in Kenya. International Symposium of Veterinary Epidemiology and Economics, 2022, Halifax Canada. (Poster presentation in on-line conference library)