Zoonoses in Emerging Livestock Systems

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INSIDE THIS ISSUE:

ZooLinK Newsletter

The Quarterly Newsletter of the Zoonoses in Livestock in Kenya Programme

LETTER FROM CO-PI

Dr. Phil Toye

This newsletter comes at a time when things are well underway in the diagnostics component of the ZooLinK Project. Broadly speaking there are two main aspects to the diagnostics component.

The first has involved equipping the field diagnostic laboratory in Busia with currently available diagnostic technologies for the zoonotic diseases which are being targeted. Not only will this enable us to undertake the assessment of the prevalence of these diseases in the region, it is expected that the equipping of the laboratory will underpin the long-term sustainability of an integrated surveillance system in the region, as the laboratory will be available for use by the Government of Kenya after the conclusion of the ZooLinK programme. The laboratory will be staffed and used in a real time fashion to support the integrated surveillance system, a main output of the project.

The initial focus is on a panel of 14 zoonotic infections: brucellosis, trypanosomiasis, echinococcosis, Rift Valley Fever, anthrax and leptospirosis in all species (humans, pigs, and ruminants), Q fever (Coxiella burnetti) in humans, cattle and small ruminants, T. solium/T. saginata cysticercosis in humans, pigs and cattle, fascioliasis in humans and ruminants and TB in ruminants and humans. The technologies underlying the diagnostic tests run the spectrum from routine microbiological culture and serological tests for antibodies and antigens (e.g. ELISA) and to more advanced DNA-based assays (e.g. real-time PCR, LAMP).

The initial step in equipping the laboratory was the completion of a thorough review of the range of tests available for each of the diseases. This was undertaken by two graduate fellows, Maureen Chepkwony and Robert Rono, veterinary and medical graduates respectively. Their excellent review covered all aspects of the tests, from performance (sensitivity and specificity), intended use of the test (surveillance versus clinical diagnosis), sample type (whole blood, serum, tissue etc.), availability and importantly cost. The review provided us with the basis for deciding on which assays to implement in the Busia laboratory. In Nairobi, we started this activity with the establishment in the ILRI laboratories of an antigen-detection ELISA for cysticerscosis. The reagents used in the assay were kindly provided by Drs. Pierre Dorny and Sarah Gabriël of the Institute of Tropical Medicine, Antwerp, and the assay was set up at ILRI by Velma Kivali. Velma travelled to Busia to establish the assay in the field laboratory. Other assays followed a similar path.

The second aspect of the diagnostics component is to adapt some of the routine diagnostic assays into more useful platforms. One of these will be high-throughput, multiplexed laboratory assays, based on a fluorescent bead-based diagnostic platform. Such assays allow the identification of several infectious agents simultaneously from a single sample, thereby reducing the time and sample volume required to obtain several results. We shall also transfer some of the tests to 'point-of-decision' assays for use in the field or clinic, such as lateral flow assays. The advantages traditionally associated with these assays are that they are simple, rapid and with no need for water, electricity or complex equipment.

I am very much looking forward to continuing to work with the other members of the Zoolink project. The aims of the project and the diverse skills of those involved will ensure a very exciting time ahead.

Introducing Students and Staff

Caption describing picture or graphic.

"To catch the reader's attention, place an interesting sentence or quote from the story here."

Dr. Josephat Mbai

FELTP Resident

Mbai graduated with Bachelor of Veterinary Medicine, University of Nairobi in 1996. He joined the Department of Veterinary services in 1997 serving in several counties in Kenya. Mbai is pursuing a Masters in Field Epidemiology at Moi University under the auspices Kenya Field Epidemiology and Laboratory Training Programme (FELTP). He is also a graduate fellow on the ZooLinK project pursuing his research thesis on campylobacteriosis in chicken, to determine its prevalence in village and periurban chicken in Bungoma County.

Dr. Erick Orimbo

FELTP Resident

Erick is a Veterinarian and holds a Bachelor of Veterinary Medicine from the University of Nairobi, 2006. He is a Senior Veterinary Officer seconded to Migori County. Erick is currently pursuing a Masters in Field Epidemiology (Moi University) under the FELTP program and is also a Graduate Fellow at under the ZoolinK Project, where he will work on seroprevalence and factors associated with Q fever (Coxiella burnetii) in sheep and goats in Bungoma County.

Dr. Jeremiah Ngugi

FELTP Resident

Jeremiah is a Veterinarian working with the County Department in Taita Taveta County. He holds a Bachelor's Degree in Veterinary Medicine from the University of Nairobi. He is currently pursuing a Masters in Field Epidemiology at Moi University under the Kenya Field Epidemiology and Laboratory training program (FELTP) and is a graduate fellow with the ZooLinK project. His interest is in Leptospirosis, a re-emerging neglected zoonotic disease and wishes to understand the factors associated with the leptospirosis infection in pigs in Western Kenya and the its correlation to human infections.

Hannah Waruguru Kamau

Busia Laboratory Technician

Before joining ZooLinK, Hannah worked in the Urban Zoonosis project at KEMRI, Nairobi. Her main role will be receiving and processing samples, typing and antimicrobial susceptibility testing, and quality assurance for the systems in the lab.

Hannah holds Bachelors in Medical Microbiology from Jomo Kenyatta University of Agriculture and Technology.

Benson Chege Kiiru

Busia Laboratory Technician

Benson worked in Urban Zoonosis project at KEMRI, Nairobi before joining ZooLink project as a lab technician. His main role will be receiving and processing samples, typing and antimicrobial susceptibility testing, and Quality assurance and Quality control.

Benson holds a Diploma in Applied Biology.

Zoonoses in Livestock in Kenya – The Beginnings of Surveillance

By Steven Kemp

PhD student, University of Liverpool

After a period of intense lab work at both KEMRI and the UK, investigating the patterns of antimicrobial resistance in faecal bacteria isolated from slaughterhouse workers in Busia county and the surrounding

Typical small-holder farm in Funyula, Busia. Most farmers manage between 5-25 cattle.

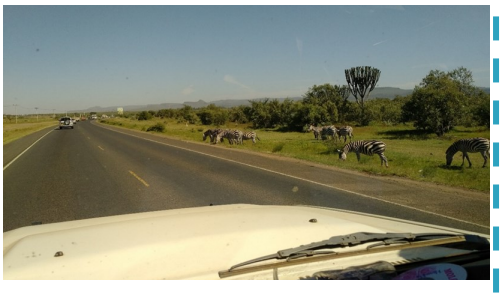
areas, I have returned to Kenya to begin the next phase of my PhD project.

ZooLinK is a cyclical programme which aims to set up surveillance systems of both human and animal health sectors over a long period of time. Surveillance of disease is particularly important, as the more information we have, the better we can treat diseases in both human and animal sectors. Recent research by colleagues indicates that the incidence of several zoonotic diseases, including E. coli, Salmonella spp. and others are vastly underestimated.

In recent times, we often hear about how we should now look to conform to the 'One Health' approach; this is where, in order to combat issues surrounding antimicrobial resistance and associated issues effectively, intersectoral approaches which share the cost and responsibility evenly between environmental, human & veterinary health professionals is required. In theory, this would be a perfect way to help educate and better promote antimicrobial stewardship.

Currently I have large amounts of data on access to, use of, and perceptions of antimicrobials from a variety of parties, including animal healthcare workers, district veterinary offices, farmers and agrovet shops. Over the last three months, I have added to this repository by investigating the amounts of antibiotic resistance found in E. coli, which have been isolated from the faeces of workers in 142 slaughterhouses which were selected in western Kenya. These included slaughterhouses in Busia county and the surrounding Kakamega and Bungoma counties.

For the next portion of this study, I am attempting to collect four different sets of samples – to complete the 'picture'. I will attempt to collect both human and animal faecal samples, from farmers and farm animals, water samples (to determine if there are patterns of resistance in animals which share common grazing grounds) and environmental samples (from the inside of homesteads, where animals are allowed to roam). By covering all of these bases, we will be able to eventually determine not only if there is transfer of antimicrobial resistance between animals and humans and the environment, but also which direction it is going in.



Example of environment which may also be a good idea to sample in the future. If antimicrobial resistance can be found in the environment, then why not in wild animals such as these Zebra?

A Pilot Study to Investigate the potential for developing syndromic surveillance system based on meat inspection records in Western Kenya.

By Joseph Ogola, ZooLinK Consultant

Training of meat inspectors on how to use hand held device for syndromic surveillance

During our field visits in preparation for the ZooLink research project, we selected Kimilili and Webuye slaughterhouses in Bungoma County to participate in the syndromic surveillance pilot study. The two facilities within the study area were identified based on infrastructure and the willingness of the two meat inspectors to participate in the project. The rationale of this pilot project is to assess the feasibility of using slaughterhouse data to enhance the coverage and efficiency of the surveillance system in the study area alongside the routine laboratory based surveillance system. We developed a data collection form from the monthly reports from meat inspection records which was installed on a hand- held device. The form captures information related to the carcass inspection together with animal location and movement data. The two meat inspectors after a short training season were then provided with two mobile phones to use daily to record data (including any relevant photos) of animals slaughtered over a 6 month period. The data collected are sent directly to our data management platform.

We look forward to share the outcomes in subsequent editions of the newsletter!

Partner Logos

ZooLinK Ahoy!!

By Dr. Laura Cristina Falzon

Post Doc, ZooLinK project

After many months of careful planning and preparation, the main ZooLinK surveillance project has set sail! We have been sampling in the twelve selected livestock markets, four each in the counties of Busia, Bungoma and Kakamega. At each market we are collecting data on, and biological samples from, up to ten randomly selected cattle and small ruminants. Sampling in livestock markets can be challenging as traders are busy people who want to sell their animals. Moreover, some shared with us the perception that having their animal sampled may send the wrong message to future buyers. We are reminded once again of the importance of engaging local stakeholders at an early stage to help explain the study purpose and facilitate study participation.

We then expanded our sampling by including cattle, small ruminants and pigs that are taken for slaughter at selected slaughterhouses and slaughter slabs in the surroundings of the included livestock markets. Concurrently, we are also sampling outpatients at the three County referral hospitals and other selected health centres in the study area. All collected biological samples are processed and tested for fifteen selected zoonotic diseases at our field lab in Busia. Some of the animal samples shall also be used for genetic studies to identify changes in breeds as farming systems intensify over time.

Collecting data with many onlookers in Lubao Market

We are all looking forward to working and learning together during our ZooLinK journey!

Publications tagged with ZooLinK

de Glanville W.A., Conde-Álvarez R., Moriyón I., Díaz R., Njeru, J., Cook E.A., Brink M., Bronsvoort B.M.de C., Thomas L.F., Kariuki, S. & Fèvre E.M. (2017). Serologic evidence for the overdiagnosis of brucellosis in health facilities in western Kenya. *PLoS Neglected Tropical Diseases*.

NEWS IN BRIEF

http://dx.doi.org/10.1371/journal.pntd.0005508

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ZELS ZooLinK Project

International Livestock Research Institute

P.O Box 30709, Nairobi, 00100, Kenya

Tel - +254 (0) 710 8134 58

www.zoonotic-diseases.org

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