The "URBAN ZOO"

Newsletter



FEBRUARY, 2015

Quarterly Newsletter on "Epidemiology, Ecology and Socio-Economics of Disease Emergence in Nairobi"

Co Pl's Letter: Microbiology as a key pillar in the Urban Zoo project



Prof. Sam Kariuki

Welcome to the 6th edition of the Urban Zoo Newsletter and hopefully you all have ushered in New Year 2015 with renewed enthusiasm and energies to drive Urban Zoo to new heights of success.

Although any

medical research project has many components, no doubt in aspects of Urban Zoo the microbiological analyses play a central role in providing answers to questions that we face in the field during interrogation of study environments and populations. This applies to both cases and control populations as well as interaction with their environment. We are keen to ensure that the results from our laboratories will be of high quality and will provide the required component to health solutions for the populations that we seek to help.

In summary to-date, from one part of the study alone, we have processed a total of **683** faecal swabs for enteric bacterial and viral pathogens and including **411** from Korogocho and **272** from Viwandani. From these samples, a total of **537**, (315 from Korogocho and 222 from Viwandani.) *E. coli* isolates were obtained and archived so far. Other enteric pathogens which were isolated were; Salmonella isolates **20**, Shigella isolates **8**, *V. cholerae* isolates **3**, Campylobacter isolates **9**, *E. fergusonii* **1**, Enterobacter agglomerans **1** and Aeromonas hydophilla **1**. In parasitology a total of 683 faecal samples was processed parasites detected; *E. histolytica* **77**, *G. lamblia* **130**, *A. lumbri*

coides **20** *H. nana* **5**, *T. trichiura* **9**, *Fasciola spp* **1**. Hookworm **4**.

Antimicrobial sensitivity testing (AST) was performed on **537** *E. coli* isolates using **13** antimicrobials including kanamycin, nalidixic acid, chloramphenicol, trimethoprim/sulfamethoxazole, ciprofloxacin, gentamicin, streptomycin, amoxicillin/clavulanic acid, ceftazidime, tetracycline, ceftriaxone, ampicillin and cefuroxime. **33** (6%)

E. coli isolates were found to be resistant to ciprofloxacin (CIP) and 25 (5%) E. coli isolates were resistant to ceftriaxone (CRO), which form a few of the last line of defense for severe Gram negative bacterial infections. These are critically important and rare antimicrobial resistant phenotypes especially as these bacteria were that were also resistant to several other commonly available drugs.

In 2014, Antimicrobial Resistance (AMR) was declared a global emergency by the World Health Organization. As we seek answers on ways to minimize emergence and spread of AMR in our study populations, we are reminded that certain sections of the populations overuse antimicrobials while others have no access to these life-saving agents. Further microbiological and genomics analysis will provide answers as we seek to understand the population dynamics and genetic basis/ transmission potential of this phenotype.

My commendations to the KEMRI and UoN lab teams for a job well done so far!

Sam Kariuki is Director of the Centre for Microbiology Research at the Kenya Medical Research Institute (KEMRI) and coordinator of the postgraduate Medical Microbiology Course hosted by the Institute in Nairobi.

INSIDE THIS ISSUE:

Co-Pi's Letter 1

A Time spent with 2 camels

Students 2
Profiles

Cysticerocosis 3

Whole genome 4 sequencing

Upcoming Events 4



A TIME SPENT WITH CAMELS By Dishon Muloi

Season of the se

Page 2

At dawn as the sun rose above the jagged peaks of Nyambene hills, Fred Amanya and I would trudge our way out to Isiolo town towards Mlango area or Kachuru or Gotu. The journey along the dusty roads would be occasioned by chats concerning the security situation and the serious drought in the county as "taarab music" played mellifluously in the stereo.



The team heading to Isiolo

Brucellosis is a zoonotic disease transmitted to humans mainly by consumption of raw milk and physical contact. Unfortunately, there is lack of quantitative understanding of the scale of the disease in camels in Kenya. This is further exacerbated by consumption of raw camel milk owing to the presumed associated health benefits and other social cultural believes. In this regard we undertook a study to explain this phenomena.



By the time we arrive the camel workers are up preparing the camels for milking, we set up our temporary station under a dry acacia tree. We collect milk, blood, nasal swabs and fecal sam-

ples randomly from the camels. Restraint of camels proved to be quite grueling especially for the big bulls and some young ones who tend to be wild. This however proves to be an easy challenge for the camel herders who have been born and raised in camel keeping families. We finish our work by 10:00 am and our journey back to Isiolo was a quiet one courtesy of the hot sun.



Dishon sampling a camel

Upon arrival at the laboratory in Isiolo town the milk samples were analyzed for brucellosis using modified Milk Ring Test. All other samples were processed and kept in the freezer for transport to the ILRI laboratory in Nairobi where they will be tested for brucellosis. Nasal swabs, EDTA and serum will be forwarded for testing by collaborators.



The day comes to close at 4:00pm with a cold shower and glass of camel milk (not the collected samples definitely.) During our two-week stay we managed to visit sixteen camel herds and collected more than 200 samples. However, on one of the days our still voyage came to a halt for two hours after our car got stuck in a hyena den.

Selected Student Profiles



Caren Ndeta is a Veterinarian working under the Director of Veterinary Services in Nairobi County. She is currently undertaking an

MSc in Moi University under the Filed Epidemiology and Laboratory Training Program (FELTP) a graduate fellow in ILRI under the Urban Zoo Project.



Maurice Omondi is a veterinarian working under the Ministry Of Livestock in Kisumu County. He is currently pursuing an MSc in

Moi University under the Filed Epidemiology and Laboratory Training Program (FELTP). He is Graduate fellow at ILRI under the Urban Zoo Project.



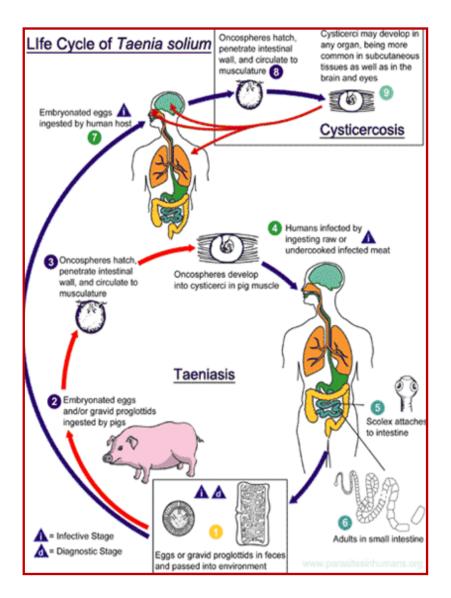
Isaac Ngere is a medical doctor working under the Ministry of Health in Kisumu County. He is currently pursuing an MSc in Moi

University under the Filed Epidemiology and Laboratory Training Program (FELTP). He is a graduate Fellow at ILRI under the Urban Zoo Project



Page 3

A tapeworm found in humans but acquired through eating infected pork (*Taenia solium*), has been linked to acquired epilepsy in humans. The larvae stage of the tapeworm causes a disease called Cysticercosis both in pigs and humans characterised by formation of cysts in muscles. When people consume viable cysts from infected pork, the ingested larvae matures into adult tapeworm which again produces eggs that are released into the environment. Infection in both pigs and humans is acquired through accidental ingestion of human faeces containing *T. solium* eggs or consumption of contaminated food or water. The diagram below shows the life cycle of *Taenia solium*.



Important facts about Cysticercosis

- It can cause neurocysticercosis, which is the leading cause of acquired epilepsy
- It is ranked by Food & Agriculture
 Organisation (FAO) & World Health
 Organisation (WHO) as the most
 important zoonotic foodborne
 pathogen in the world.
- It does not show obvious clinical signs, so it is not easy to detect.
 Therefore the disease may be transmitted for several months or years before detection.
- Previous studies in Homa-Bay and Busia, Kenya has confirmed the presence of this disease in the Kenyan pigs, but national prevalence of the disease in both pigs and people is lacking.
- People who suffer from epilepsy are often marginalised as there are several myths trying to explain the cause.

What Urbanzoo Project is doing about Cysticercosis:

Serological survey of porcine cysticercosis in pigs slaughtered at Ndumbuini abattoir in Nairobi, Kenya

The main objective of the study is to estimate the risk of cysticercosis infected pork entering the Nairobi food system for consumption. We are collecting blood samples from pigs presented for slaughter, then testing for cysticercosis using Antigen ELISA and estimating the prevalence .Focus Group Discussions (FGD) and individual interviews are conducted to gather information for mapping the pork value chain and assess the risk of consuming *T.solium* infected pork from Ndumbuini abattoir (*This will form part of the MSc. research project for James Akoko-Author of this article*).

Neurocysticercosis and Epilepsy study in Busia

A sub-set of the project team is currently in Busia on an associated project in collaboration with the University of Yale, USA, collecting blood samples from people and pigs for serological testing for cysticercosis. A questionnaire and clinical examination is conducted to identify possible cases of neurocysticercosis, who are then taken to Agakhan hospital in Kisumu for CT scan. The main objective of this study is to try and understand the contribution of neurocysticercosis in epilepsy cases in western Kenya.

Article written by James Akoko, Field Coordinator for Urban Zoo Project, working on Cycticercosis as part of his MSc research Project.

WHOLE GENOME SEQUENCING By Melissa Ward, CIIE Research Fellow







The power of next generation sequencing is allowing us to gain a more detailed understanding than ever before about how bacteria spread. I am hugely excited to be a part of the Urban Zoonoses project, which will generate a vast amount of bacterial isolates along with metadata at an unprecedented level of detail.

We will be performing whole genome sequence analysis of bacterial samples collected through many strands of the Urban Zoonoses project, from humans, livestock, food, wildlife and the environment. I will use state-of-the art methods for integrating the bacterial genetic sequence data with information about the time, location and host from which the bacteria were sampled. By combining epidemiological and demographic information with the genetic data, we will be able to under-

stand the *E. coli* diversity within Nairobi, and how this differs across socioeconomic groups, in different housing types and in relation to livestock keeping practices.

From the bacterial genome sequences we can also look for genes of interest, such as those conferring bacterial virulence or resistance to antibiotics. By examining the set of genes carried by bacteria from different individuals, hosts or locations, we can make inferences about reservoirs of antibiotic resistance and pinpoint potential hotspots for disease outbreaks, with a particular emphasis on zoonotic transmissions.

I have previously used whole genome sequence analysis to investigate the transmission of S. aureus between livestock and humans, and have also used phylogenetic techniques to help understand the origins of the HIV-1 group M epidemic. I am currently assessing the utility of whole genome sequencing as a tool for identifying epidemiologically related E. coli infections in collaboration with the Scottish E. coli O157 Reference Laboratory.

My involvement with the Urban Zoonoses project is made possible through a Junior Research Fellowship at the Centre for Immunity, Infection and Evolution at the University of Edinburgh, and a Sir Henry Wellcome Postdoctoral Fellowship from the Wellcome Trust.

Melissa Ward is a CIIE Research Fellow at the University of Edinburg.



UPCOMING EVENTS:

- 2nd ELS Meeting on leptospirosis and other rodent borne haemorrhagic fevers, Amsterdam 16 18 April 2015
- 49th Kenya Veterinary Association (KVA) Annual Scientific Conference and 15th World Veterinary Day celebration, April 22-25th Busia, Kenya. www.kva.co.ke
- 43RD Kenya Medical Association (KMA) Annual Scientific Conference and AGM; 23rd 26th April, 2015, Eldoret, Kenya.
- 14th International Symposium of Veterinary Epidemiology and Economics (ISVEE) November 3-7 Mexico Abstract deadline
 March 31st http://isvee2015.org
- American Society of Tropical Medicine and Hygiene (ASTMH) October 25-29 Philadelphia Abstract deadline April 8th http://www.astmh.org//AM/Template.cfm?Section=Home1
- WAAVP Conference Liverpool, 15-20 August, 2015. Key dates: Call for abstracts opens 8th August 2014; Registration opens 7th January 2015; Deadline for abstract submission 1st March 2015; Notification of oral or poster presentation acceptance 3rd May 2015; Presenting authors registration deadline 17th May 2015.







