

**THE UNIVERSITY OF ZAMBIA**  
**SCHOOL OF VETERINARY MEDICINE**  
**ANNUAL SCIENTIFIC SYMPOSIUM**

**SUSTAINABLE ANIMAL AND HUMAN HEALTH THROUGH  
RESEARCH**

- **50 YEARS OF THE UNIVERSITY OF ZAMBIA (1966–2016)**
- **30 YEARS OF SCHOOL OF VETERINARY MEDICINE (1986–2016)**



**WEDNESDAY 15<sup>TH</sup> JUNE, 2016**

Welcome from the organising committee of the School of Veterinary  
Medicine Annual Scientific Symposium



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**Dr Musso Munyeme**  
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We will be on hand to assist you during the scientific symposium

## **Welcome to University of Zambia, School of Veterinary Medicine for the scientific symposium 2016**

Dear Delegate,

Welcome to the University of Zambia, and especially to the School of Veterinary Medicine, for the 2016 Scientific symposium. Many thanks for attending and supporting us.

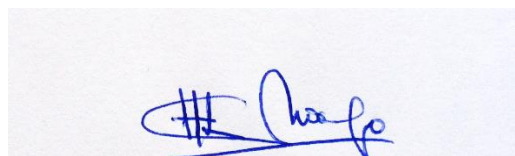
The symposium theme is “**Sustainable animal and human health through research**”, a “**One health concept**”. Our school must continuously strive at identifying innovative ways of interacting with multiple key players to offer feedback to its research themes, training and curriculum and also to identify niches of further collaboration. This event is a double celebration coinciding with 50 years of UNZA’s existence and 30 years of the opening of the School of Veterinary Medicine. It is an event that is going to be done every year as a means of one-stop fora where different players are brought to address common issues in agriculture.

The inaugural symposium format will be showcased in two main parts and these will be divided into sub-themes; the initial part will be scientific sessions. During this time, the issues to be addressed will be cross-cutting and include applied research involving human and animal subjects, use of drugs and the environment. The other session will be purely looking at how the private and public sector (public-private partnerships) can be more interactive and combine efforts at improving service delivery and ultimately meet the nutritional needs of communities. It has been noticed that each sector has different outlook and motivation for its existence which may be achieved using independent fora and means.

The School of Veterinary Medicine has over the years hosted many meetings, conferences and workshops, but this symposium and its concept are new. The organizers and collaborative partners and sponsors hope that you will have a very enjoyable meeting, both scientifically and socially. Whether your interests lie with our special focus sessions on environmental health, human and animal health, drug resistance and discovery or with other topics in our wide-ranging programme, it is hoped that there will be plenty to stimulate you.

The organizers also hope that you will find answers to any questions you may have about the symposium in the rest of this booklet, but should you require further information please do not hesitate to contact the organizers or volunteers.

Best wishes for an enjoyable symposium.

A handwritten signature in blue ink, which appears to read "K. Choongo". The signature is written on a light-colored background.

**Dr Kennedy Choongo**  
**The Dean**  
School of Veterinary Medicine  
[dean-vet@unza.zm](mailto:dean-vet@unza.zm); [k.choongo@unza.zm](mailto:k.choongo@unza.zm)

<b>Annual Veterinary Scientific Symposium</b>	
<b>Wednesday, 15th June, 2016</b>	
<b>Venue: School of Veterinary Medicine Main Lecture Theatre</b>	
08.00-08.45	<b>Registration (counterchecking, meal coupons, any symposium package)</b> Master of Ceremonies (Dr Careen HanKanga)
<b>09:00-09:45</b>	<b>Opening proceedings (national anthem; opening speeches and remarks)</b>
09:05-09:10	Dean opening remarks (Dr K. Choongo)
09.10-09.20	Vice Chancellor speech (Prof E. Mwase)
09.20-09.40	Hokudai Centre for Zoonosis Control in Zambia speech: (Prof H. Kida)
<b>09:45-10:45</b>	<b>Chair (Dr Ntombi Muḽenda)</b> <i>Sub-theme: Environmental Health</i>
09:45-10:00	Lead poisoning in children from townships in the vicinity of a lead zinc mine in Kabwe Zambia
10:00-10:15	Insecticide treated mosquito nets and indoor residual spraying on malaria case prevalence in Geita and Nyang'hwale districts of and Tanzania
10:15-10:30	Occurrence and factors associated with aflatoxin contamination of raw peanuts from Lusaka district's markets, Zambia
10:30-10:45	Assessment of human health risks from heavy metals via consumption of fish ( <i>Clarias gariepinus</i> ) from Kafue River in Zambia
<b>10:45-11:15</b>	<b>Tea/Coffee Break</b> <i>(Combined with poster session/advertising spaces): Department of Biomedical Sciences</i>
<b>11:15-12:45</b>	<b>Chair (Dr Ngonda Saḽaḽa)</b> <i>Sub-theme: Human and Animal Health</i>
11:15-11:30	Zoonotic <i>Mycobacterium bovis</i> circulating in Chacma baboons ( <i>Papio ursinus</i> ) of Lochinvar National Park Zambia public health implications
11:30-11:45	<i>Taenia solium</i> in Zambia control or elimination: which is the best way forward?
11:45-12:00	Genetic diversity of rabies virus circulating in different hosts and regions in Zambia and Zimbabwe
12:00-12:15	Seroprevalence of leptospirosis in dairy cattle kept on commercial farms around Lusaka Zambia: a preliminary report
12:15 - 12:30	Involvement of multiple genotypes of African Swine fever viruses during 2013 - 2016 outbreaks in Zambia
12:30-12:45	Development of an immunochromatography kit (QuickNavi™-Ebola) to detect multiple species of ebolaviruses
12:45 - 13:00	Mathematical modelling of Ebola Virus Disease in Serenje District with a Lusaka District overspill Zambia
<b>13.00-14.00</b>	<b>Lunch</b>
<b>14.00-15.00</b>	<b>Chair (Dr Zuma Munkombwe)</b> <i>Sub-theme: Drug resistance and discovery</i>
14:00-14:15	Detection of extended spectrum beta lactamase producing <i>Escherichia coli</i> in market ready Chickens in Zambia
14:15-14:30	A non synonymous mutation, N176I, in Lanosterol 14 $\alpha$ demethylase underlies <i>in vitro</i> Amphotericin B resistance in <i>Leishmania mexicana</i> promastigotes
14:30-14:45	A novel assay for the detection of anthelmintic activity mediated by cuticular damage to nematodes validation on <i>Caenorhabditis elegans</i> exposed to cysteine proteinases
14:45-15:00	Zambia Medicines Regulatory Authority
<b>15:00-15:30</b>	<b>Tea/Coffee Break</b> <i>(Combined with poster session/advertising spaces): Department of Biomedical Sciences</i>
<b>15.30-17.00</b>	<b>Master of Ceremonies (Dr Careen HanKanga)</b>
15:30 - 15:45	MUSIKA
<b>15.45-16.30</b>	<b>Keynote speech</b> ZAMBEEF
16:30-17:00	<b>Plenary/dsicussion forum</b>
<b>17:00</b>	<b>Closing remarks (Dean), national anthem</b> <b>End of Symposium</b>

## General information about the symposium and School of Veterinary Medicine



School of Veterinary Medicine main entrance



Main Lecture Theatre  
Venue for oral presentations



Department of Biomedical Sciences  
Venue for poster presentations



Main entrance  
UNZA Veterinary Clinics  
Department of Clinical Studies

## **Identification**

Delegates are respectfully requested to wear their name badges at all times in order to identify themselves to the organizers, University of Zambia Veterinary Students Association (UNZAVETSA) volunteers and university staff.

The symposium committee and helpers can be identified by name badges which display the University of Zambia and symposium logos. Student volunteers will additionally be wearing white T-shirts emblazoned with the logos.

## **Reception and Registration**

Registration for the symposium must be done by 17:00 hours on Monday, 13<sup>th</sup> June, 2016 through [unzavetsymposium2016@gmail.com](mailto:unzavetsymposium2016@gmail.com) or the Dean, School of Veterinary Medicine, P.O. Box 32379, Lusaka, Zambia (see registration form on page 23). An additional time on 15<sup>th</sup> June, 2016 from 08:00-18:45 hours will be provided to confirm attendance and collection of refreshment cards. A registration desk will be situated at the entrance to the Main Lecture Theatre.

## **Information for oral presentations**

Oral presentations will be given in the School of Veterinary Medicine main Lecture Theatre. Please ensure that your presentation is loaded by 08:45 hrs at the latest if you are presenting in the early morning session, 11:00 hours for the mid-morning session or by 13:45 hours if you are presenting in the afternoon session (see number of your presentation on pages 7-15). There will be a student volunteer who will help load your presentation and help you if any problems arise with the equipment.

**The scientific programme is very full and speakers are respectfully requested to keep to their timeslots so that efficient use of time is promoted.**

## **Information for Poster Presentations**

Posters may be put up on the walls along the corridor in the Department of Biomedical Sciences from 08:30 hours and must be removed by 17:00 hours. Directions to this venue and other amenities will be clearly marked. Note that all posters must be displayed in time for the poster session starting at 10:45 hrs and repeated at 15:00 hrs. Each poster session lasts for 30 minutes. Each poster has been allocated a number that will correspond to a particular poster place on the wall (see poster number on pages 16-22). Materials to use for poster placement will be provided.

## **Snacks and refreshments**

All tea and coffee breaks will be provided in the Department of Biomedical Sciences alongside the poster displays. Delegates are reminded to ensure their meal cards are easily seen by UNZAVETSA volunteers serving refreshments.

## Symposium Oral Abstracts

### Session 1: Sub-theme - Environmental Health

09:45-10:45 hrs

Or = Oral presentations

#### **Or1 Lead poisoning in children from townships in the vicinity of a lead-zinc mine in Kabwe, Zambia**

John Yabe<sup>1</sup>, Shouta M.M. Nakayama<sup>2</sup>, Yoshinori Ikenaka<sup>2</sup>, Yared B. Yohannes<sup>2</sup>, Balazs Oroszlany<sup>2</sup>, Nesta Bortey-Sam<sup>2</sup>, Kaampwe Muzandu<sup>1</sup>, Kennedy Choongo<sup>1</sup>, Abel Nketani Kabalo<sup>3</sup>, John Ntapisha<sup>3</sup>, Aaron Mweene<sup>1</sup>, Takashi Umemura<sup>2</sup>, Mayumi Ishizuka<sup>2</sup>

<sup>1</sup> School of Veterinary Medicine, The University of Zambia, Lusaka, Zambia

<sup>2</sup> Graduate School of Veterinary Medicine, Hokkaido University, Sapporo, Japan

<sup>3</sup> District Health Office, Kabwe, Zambia

Childhood lead (Pb) poisoning is a serious public health concern worldwide. Young children are particularly vulnerable to Pb exposure and eventual poisoning. Blood lead levels (BLLs) > 10 µg/dL in children are considered elevated and at higher BLLs exceeding 60 µg/dL, clinical symptoms of Pb toxicity become visible. BLLs of 100 µg/dL and higher can cause encephalopathy, convulsions, coma and death. It has been recommended that intensive medical management and chelation therapy be initiated at levels ≥ 45 µg/dL. In Africa, major sources of childhood Pb poisoning include Pb mining and smelting. In Kabwe, the capital of Zambia's Central Province, extensive Pb contamination of township soils in the vicinity of a Pb-Zn mine has been reported and poses a serious health risk to children in these townships. However, no studies have been done to investigate BLLs in children exposed to Pb pollution. Therefore, this study investigated BLLs in children (n = 246), under the age of 7 years, in townships around the Pb-Zn mine in Kabwe and to identify children with BLLs that require medical intervention. Almost all of the sampled children had BLLs exceeding 10 µg/dL. Children in these areas could be at serious risk of Pb toxicity as 18% of the sampled children in Chowa, 57% (Kasanda) and 25% (Makululu) had BLLs exceeding 65 µg/dL; the threshold widely considered to result in Pb toxicity. A total of 8 children had BLLs exceeding 150 µg/dL. These levels were markedly high, especially that concentrations of up to 427 µg/dL were recorded. Therefore, it is recommended that medical intervention be commenced in the children with BLL exceeding 45 µg/dL and other interventions to reduce Pb exposure in the affected townships.

#### **Or2 Impact of insecticide treated nets and indoor residual spraying on malaria case prevalence in Geita and Nyang'hwale districts of Tanzania.**

G. T. Kiputa, R. Mwenechanya and K. Choongo

University of Zambia

Malaria is a protozoan disease and one of the leading causes of illness and deaths in the world. Infection occurs after exposure to blood-feeding infective Anopholes mosquitoes. Malaria is predominant in the tropics and subtropics and it is reported that malaria kills a child every minute. In Tanzania at least 40% of outpatient attendances are attributable to malaria. Geita and Nyang'hwale districts are within Geita region where malaria prevalence is highest in Tanzania. Geita and Nyang'hwale districts of Tanzania, have been controlling malaria transmission by using the combined intervention of insecticide-treated nets (ITNs) + indoor residual spraying (IRS), and IRS alone respectively. This study assessed the impact of ITNs + IRS in Geita district, IRS alone in Nyang'hwale district and compared the two interventions between the two districts. In a retrospective cross sectional study, district malaria surveillance data for five years (2011- 2015) and two years (2013-2014) were

collected and analyzed for Geita and Nyang'hwale districts respectively. A total of 1,387,805 ITNs were distributed and 435,719 households sprayed between 2011 and 2015, however IRS coverage was uneven. There was evidence of malaria prevalence reduction (77%) in Geita district within the five years of intervention. The ITNs coverage was associated with a reduction in malaria prevalence while IRS was not. In Nyang'hwale district malaria cases increased from 103,788 to 123,337 cases in 2013 and 2014 respectively, and were accompanied by decreased households sprayed from 49,554 to 41,632. The combined intervention reduced malaria prevalence in Geita district while an increase in malaria cases was observed in Nyang'hwale district where IRS alone was applied. ITNs + IRS had greater impact on malaria prevalence than IRS alone and only ITNs had a significant effect in the combination. However, even at 100% ITNs coverage malaria prevalence wouldn't be reduced to zero. Therefore, based on this study, the use of the two interventions in combination remains to be important especially when the IRS insecticide is not a pyrethroid.

### **Or3 Occurrence and factors associated with aflatoxin contamination of raw peanuts from Lusaka district's markets, Zambia**

N.F. Bumbangi<sup>1,2</sup>, J.B. Muma<sup>2</sup>, K. Choongo<sup>3</sup>, M. Mukanga<sup>4</sup>, M.R. Velu<sup>2</sup>, F. Veldman<sup>5</sup>, A. Hatloy<sup>6</sup>, M.A. Mapatano<sup>1</sup>

<sup>1</sup>Department of Nutrition, School of Public Health, Faculty of Medicine, University of Kinshasa, PO Box 11850, Kinshasa I, Democratic Republic of the Congo <sup>2</sup>Department of Disease Control, School of Veterinary Medicine, University of Zambia, PO Box 32379, Lusaka, Zambia <sup>3</sup>Department of Biomedical Science, School of Veterinary Medicine, University of Zambia, PO Box 32379, Lusaka, Zambia <sup>4</sup>Plant Protection and Quarantine, Zambia Agriculture Research Institute, P/Bag 7, Chilanga, Zambia <sup>5</sup>University of Kwazulu Natal, South Africa <sup>6</sup>Fafo, Box 2947 Toyen, N-0608 Oslo, Norway

Peanuts, one of the most susceptible crops to aflatoxin (AF) contamination, are widely produced and consumed in Zambia. This cross-sectional study was designed to determine the levels of AFs in raw peanuts sold in Lusaka district's markets as well as identify factors associated with increased AF presence. Raw peanut samples were collected from open markets and supermarkets and analyzed for aflatoxin contamination using high performance liquid chromatography (HPLC). A questionnaire was also administered to the peanut vendors to investigate factors contributing to increased levels of AFs in peanuts. Of the 92 samples, 51 (55.4%; 95% CI: 44.9e65.4) tested positive for presence of AFs. The overall median and geometric mean  $\pm$  standard deviation (SD) concentration for AF were 0.23 ppb (range: 0.014 e48.67 ppb) and  $0.43 \pm 9.77$  ppb, respectively. The association between market types and presence of AFs was not statistically significant (Pearson  $\chi^2$   $\frac{1}{4}$  0.0587,  $p$   $\frac{1}{4}$  0.809). Of 51 samples that tested positive to AF, 6.5% and 12% were above the maximum permissible limits (MPLs) set by the Codex Alimentarius Commission and European Union standards, respectively. There was a significant difference in the levels of AF between *Chalimbana* and *Kadononga* ( $p < 0.0001$ ), and also *Chalimbana* and *Makulu* red ( $p < 0.0001$ ). *Chalimbana* was the most at risk of AF contamination, when compared to other peanut varieties. The high level of AFs in raw peanuts from both supermarkets and open markets samples constitutes a health hazard for the population of Lusaka district. Therefore, intervention strategies that reduce the levels of AF contamination in peanuts should be given priority.



#### **Or4 Assessment of human health risks from heavy metals via consumption of fish (*Clarias gariepinus*) from Kafue River in Zambia**

Ethel M'kandawire<sup>1</sup>, Kennedy Choongo<sup>1</sup>, John Yabe<sup>1</sup>, Maxwell Mwase<sup>1</sup>, Ngonda Saasa<sup>1</sup>, and Claudia A. Blindauer<sup>2</sup>

<sup>1</sup>University of Zambia, School of Veterinary Medicine, P.O. Box 32379, Lusaka, Zambia

<sup>2</sup>University of Warwick, Department of Chemistry, CV4 7AL, Gibbet Hill road, Coventry, United Kingdom

Communities along the Kafue River rely on fish for over 70% of their daily protein intake. However, the river receives anthropogenic waste resulting in heavy metal pollution that can bio-accumulate in fish and bio-magnify in man through the food chain. This study determined concentrations of 13 heavy metals in *Clarias gariepinus* (n = 150) and their associated human health risks through consumption of the fish from six sites (Chimfunshi, Chililabombwe, Chingola-Kanyemo, Chingola-Hippo pool, Kafue flats and Kafue town) along the Kafue River in three seasons. Most of the detected heavy metals showed significant site differences ( $p < 0.05$ ). A seasonal variation ( $p < 0.05$ ) in heavy metal concentrations was also observed, with the warm-rainy season posing the highest risk. The target hazard quotients (THQs) for Co, Cu, Se and Hg at various sites in different seasons were greater than 1, signifying that a daily exposure at this level is likely to cause non-carcinogenic effects during a person's lifetime. Cu was a major non-carcinogenic risk contributor, accounting for 46.6% of the total THQ. The total THQ values were greater than 1 at all sampling sites, suggesting that a daily exposure at this level is likely to cause non-carcinogenic effects during a person's lifetime. The highest total THQ value was observed at Chililabombwe (34.4) in the dry-cold season. Target cancer risk (TR) for detected Cr, Ni and As were higher than the acceptable risk of  $1 \times 10^{-6}$  at some sampling sites in the different seasons, implying that a daily exposure at this level is likely to cause carcinogenic effects during a person's lifetime. The average TR for detected Cr indicated 10, 000 cancer cases per 1, 000, 000 inhabitants and that for detected Ni indicated 1, 000 cancer cases per 1, 000, 000 inhabitants. The average TR for detected As indicated 403, 000 cancer cases per 1, 000, 000 inhabitants.

## **Session 2: Human and Animal Health**

**11:15-13:00 hrs**

#### **Or5 Zoonotic *Mycobacterium bovis* circulating in Chacma baboons (*Papio ursinus*) of Lochinvar National Park, Zambia: public health implications**

Musso Munyeme<sup>1</sup>, David Squarre<sup>2</sup>, John B. Muma<sup>1</sup> and Morten Tryland<sup>3</sup>

<sup>1</sup>School of Veterinary Medicine, University of Zambia, P. O. Box 32379, Lusaka, Zambia.

<sup>2</sup>Zambia Wildlife Authority, Private Bag 001, Chilanga, Zambia.

<sup>3</sup>Department of Food Safety and Infection Biology, Section of Arctic Veterinary Medicine, Norwegian School of Veterinary Science, Stakkevollveien 23, N-9010 Tromsø, Norway

Bovine tuberculosis (BTb), caused by *Mycobacterium bovis* has insidiously and mutely devastated livestock and wildlife of the Kafue Basin in Zambia. Until recently, the disease was diagnosed only in cattle and Kafue lechwe antelopes (*Kobus leche Kafuensis*). However, a recent screening of Chacma baboons (*Papio ursinus*) revealed a spill over effect in infection. Field necropsy findings had revealed typical granulomatous lesions in the entire chest cavity affecting the lungs and all the ancillary draining lymph nodes of the affected baboon. In order to elucidate the exact strain of circulating *Mycobacterium tuberculosis* complex (MTC) bacteria, a logical and chronological step wise genotyping analysis was applied. Firstly, a *Mycobacterium tuberculosis* complex-discrimination multiplex PCR (MTCD-MPCR) targeting genetic regions cfp32, RD9 and RD 12 was used for species differentiation followed with the application of deletion analysis using RD4, TbD1 and 3'cfp32 probes. Then

genetic fingerprinting of the identified *Mycobacterium bovis* strains was done using the direct repeat (DR) based spacer oligonucleotide typing (spoligotyping) in association with mycobacterial interspersed repetitive units–variable-number tandem repeats (MIRU-VNTR). Spoligotyping and MIRU-VNTR analyses revealed that tuberculosis in baboon of Lochinvar National Park shared one distinct spoligo pattern; SBO 120, with cattle and Kafue Lechwe antelopes. This finding has significant public health implications given the close proximity with which baboons roam and forcibly enter human dwellings. This scenario reflects the baboons’ nature with regards to their omnivory eating habits, spatial distribution in close relation to human settlements, habitat and resource utilization patterns, disease susceptibility, transmission modes and their social interaction patterns with access to defensible common pool resources (CPRs) available to humans. The full public health implication, impact and extent of this current finding are likely to be seen in the long-term. Multiplicative factors responsible for its occurrence in this particular specie of social animals will partly depend on the pathogenicity of this bTB strain (SB 120). Therefore future research direction in this area should determine the possible implications of this finding on human health at the wildlife–livestock–human interface.

#### **Or6 *Taenia solium* in Zambia; control or elimination: which is the best way forward? CYSTISTOP Project**

Kabemba E. Mwape<sup>1</sup>, Sarah Gabriel<sup>2</sup>, Isaac K. Phiri<sup>1</sup>, Emma Hobbs<sup>3</sup>, Carol Bulaya<sup>1</sup>, Mwelwa Chembensofu<sup>1</sup>, Gideon Zulu<sup>4</sup>, Niko Speybroeck<sup>5</sup>, Bruno Devleeschauwer<sup>6</sup>, Lee Willingham III, Pierre Dorny<sup>2</sup>

<sup>1</sup>University of Zambia, School of Veterinary Medicine; <sup>2</sup>Department of Biomedical Sciences, Institute of Tropical Medicine, Nationalestraat 155, 2000 Antwerp, Belgium; <sup>3</sup>Ross University School of Veterinary Medicine, One Health Center for Tropical Veterinary Medicine and Zoonoses. St. Kitts, West Indies; <sup>4</sup>Ministry of Health, Government of the Republic of Zambia <sup>5</sup>Université catholique de Louvain, Faculty of Public Health, Institute of Health and Society, Boite 1.30.13, Clos Chapelle aux champs, 30, 1200 Bruxelles, Belgium; <sup>6</sup>Global food safety and zoonoses, Emerging Pathogens Institute and Department of Animal Sciences, University of Florida, USA and University of Gent, Belgium.

*Taenia solium* taeniosis/cysticercosis is a neglected zoonotic parasitic disease complex with significant economic and public health impacts, occurring primarily in developing countries. In Zambia, recent results from a study indicated over 50% of cases of acquired epilepsy are due to NCC, highlighting the urgent need for the control of this parasite. The scattered efforts of researchers into evaluation of control programmes in Sub-Saharan Africa (SSA) have focussed on single control options. It is becoming clear that these stand-alone options have the potential to reduce the occurrence of the parasite, however either long term or more integrated efforts seem to be required to reach an elimination status. This has never been studied, and these hypotheses are based on a disease transmission model that still needed to be improved. Also, the costs of the interventions have hardly been calculated. No large-scale studies according to the Peruvian example (elimination was achieved in a large scale study in a low endemicity area using integrated control tools) have been carried out in SSA, where they are most needed (high endemicity). The objective of the current study is to compare the cost-effectiveness/acceptability of elimination (to be achieved on a short term via integrated measures), versus control (single measures, with an elimination goal on a longer term) of *T. solium* in a highly endemic area in Zambia. Simultaneously, a disease transmission model was optimised, using available data. The selected strategies were firstly pre-tested in the disease transmission model, and will now be implemented in the large-scale intervention study. This intervention study will consist of an elimination study arm in which multiple control options are combined (integrated) aiming at the final (MDA and health education) and intermediate hosts (pig treatment and vaccination), as well as the

environment. In a second study arm a single control option will be carried out. The third study arm, negative control, no control options will be implemented. In all study arms (health) education will be implemented. At baseline and in the final sampling year, prevalence of human taeniosis/cysticercosis and porcine cysticercosis will be determined in all study villages. Active ongoing surveillance and 6 monthly (biannual) sampling will be conducted in the elimination study arm, as well as two-yearly (biennial) sampling of the pig intermediate host ('sentinel' animals) in the control and negative control study arms. Additionally, (open ended) questionnaires and focus group discussions will be administered/held to obtain data on the cost of pig keeping, *T. solium*, the interventions and the perception/acceptability of the proposed control measures to the local communities. The findings of this study will lead to results on effectiveness, cost and acceptability of the proposed control measures, and to a conclusion on the best way forward for *T. solium* control and/or elimination in SSA.

### **Or7 Genetic Diversity of Rabies virus circulating in different hosts and regions in Zambia and Zimbabwe**

Walter Muleya<sup>1</sup>, Herman Moses Chambaro<sup>2</sup>, Masahiro Kajihara<sup>3</sup>, Ngonda Saasa<sup>4</sup>, Akina Mori<sup>3</sup>, Yongjin Qiu<sup>5</sup>, Michihito Sasaki<sup>6</sup>, Lambert Fadzai Gwenhure<sup>7</sup>, Aaron Mweene<sup>4</sup>, Boniface Namangala<sup>8</sup>, Ayato Takada<sup>3</sup>, Hirofumi Sawa<sup>6</sup>

<sup>1</sup>Dept. of Biomedical Sciences, School of Veterinary Medicine, University of Zambia, Lusaka, Zambia

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<sup>3</sup>Division of Global Epidemiology, Research Center for Zoonosis Control, Hokkaido University, Sapporo, Japan

<sup>4</sup>Dept. of Disease Control, School of Veterinary Medicine, University of Zambia, Lusaka, Zambia

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<sup>6</sup>Division of Molecular Pathobiology, Research Center for Zoonosis Control, Hokkaido University, Sapporo, Japan

<sup>7</sup>Central Veterinary Laboratory, Harare, Zimbabwe

<sup>8</sup>Dept. of Para-clinical Studies, School of Veterinary Medicine, University of Zambia, Lusaka, Zambia

Rabies is endemic in Zambia and Zimbabwe. In central Zambia, rabies viruses (RABVs) belong to the Africa 1b lineage and similar RABV strains are detected in different hosts and regions. The genetic diversity of RABVs in other regions of Zambia is unknown. This study aimed at determining the genetic diversity of RABVs, examination of similarity of the Balmoral rabies virus vaccine (BRV) to the street strains in Zambia and assessment of the similarity of RABVs between Zambia and Zimbabwe.

RNAs (n= 96) were extracted from DFAT-positive canine, bovine, caprine, human, Jackal and feline brain tissues collected in 1999-2014 in Zambia, 20 from bovine, canine and caprine in Zimbabwe in 2014 and the BRV strain. The samples were obtained countrywide in both countries. Nested RT-PCR based on the glycoprotein (G) gene produced 81 and 15 positives from Zambia and Zimbabwe, respectively and these were sequenced and phylogenetically analyzed.

Phylogenetic analysis of the G gene showed two clusters, a smaller and a larger cluster. The smaller cluster comprised of only Zambian samples, while the larger cluster comprised of both Zambia and Zimbabwe samples. In the larger cluster, Zimbabwe sequences clustered separately from Zambia sequences, implying that although RABVs in Zambia are similar to those in Zimbabwe, divergence due to geographical and commercial barriers is present. No evidence of clustering based on host or region in both clusters was observed implying circulation of similar RABVs in different hosts and regions in each country. The Jackal sample clustered with sequences from canine, bovine and humans, providing evidence of similar viruses circulating in both wildlife and domestic animals and as such the jackal might be a primary source of RABV infection. The BRV clustered with the Pasteur virus and fox sequences and this dissimilarity from the Zambia street strain warrants a change in vaccination policy.

## **Or8 Seroprevalence of leptospirosis in dairy cattle kept on commercial farms around Lusaka, Zambia- a preliminary report**

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A survey was carried out on selected 10 commercial farms around Lusaka to determine the seroprevalence of *Leptospira hardjo* and *Leptospira pomona* in dairy cattle. A total of 92 samples were collected and examined using an Enzyme linked immunosorbent assay (ELISA) kit (Biovet inc. Netherlands), that detects IgG levels. Blood was collected from the coccygeal vein, transported on ice to the laboratory where serum was collected after allowing the blood to clot at 4°C. Thereafter, serum was stored at -20°C until analysis. The ELISA was performed according to the manufacturer's instructions and results were obtained following a reading on a microplate reader. The study found that out of the 92 samples analysed 19 (20.6%) were positive for *L. hardjo* and 3 (3.3%) for *L. Pomona*. These results indicate that *L. hardjo* is more prevalent in dairy cattle than *L. Pomona*. Furthermore, these results show evidence of leptospirosis infection in dairy cattle in Zambia. In addition and according to the knowledge of the authors, this is the first time that this infection has been demonstrated in the Zambian dairy cattle. The higher seroprevalence observed in this study for *L. hardjo* compared to *L. Pomona* confirms what has been observed by others who reported that *L. hardjo* is the most prevalent serovar of the *Leptospira interrogans* species found in cattle. Therefore, it is important to consider leptospirosis as one of the differentials in all cases of abortion in cattle in Zambia in addition to the always suspected brucellosis. Leptospirosis is zoonotic, therefore, dairy farmers and workers on farms need to take preventive measures to avoid getting infected. The study is on-going on a larger scale and there is need to do similar surveys in both domestic and wild animals in Zambia.

## **Or9 Involvement of multiple genotypes of African Swine Fever viruses During 2013-2015 outbreaks in Zambia**

Edgar Simulundu, Herman M Chambaro, Masahiro Kajihara, Hirohito Ogawa, Akina Mori, Liywali Mataa, Caesar H. Lubaba, Christopher Simuntala, George Dautu, Gerald Misinzo, Ayato Takada and Aaron S. Mweene

African swine fever (ASF) is a highly contagious and fatal viral hemorrhagic fever of domestic pigs. Although ASF is believed to be endemic in the eastern part of Zambia, during 2013-2015, outbreaks of this disease occurred in several provinces of the country including Southern, Lusaka, North Western, Northern, Copperbelt and Eastern. Molecular diagnosis and characterization by polymerase chain reaction and phylogenetic analysis of the p72 (B646L) gene of ASF virus revealed that multiple virus genotypes were involved in these outbreaks, particularly genotypes I, II and XIV. Phylogenetically, genotype II viruses detected in Eastern and Northern provinces clustered with the highly virulent Georgia 2007/1 virus that was introduced into the Republic of Georgia and subsequently spread to several neighboring European countries. While genotype XIV viruses were detected only in Southern and North Western provinces, genotype I virus was more widespread as it was found in Southern, Lusaka, North Western and the Copperbelt. This study suggests the persistent circulation in Zambia of Georgia 2007/1-like viruses. The dissemination of genotype I virus to several provinces was most likely facilitated by movement of infected pigs and/or pig products from affected regions to disease free areas. The need for further studies to unravel the possible endemicity ASF in other regions of Zambia other than Eastern province is warranted.

## **Or10 Development of an immunochromatography kit (QuickNavi™-Ebola) to detect multiple species of ebolaviruses**

Reiko Yoshida,<sup>1</sup> Shino Muramatsu,<sup>2</sup> Hiroshi Akita,<sup>2</sup> Yuji Saito,<sup>2</sup> Miwa Kuwahara,<sup>2</sup> Daisuke Kato,<sup>2</sup> Katendi Changula,<sup>3</sup> Hiroko Miyamoto,<sup>1</sup> Masahiro Kajihara,<sup>1</sup> Rashid Manzoor,<sup>1</sup> Wakako Furuyama,<sup>1</sup> Andrea Marzi,<sup>4</sup> Heinz Feldmann,<sup>4</sup> Aaron Mweene,<sup>3</sup> Justin Masumu,<sup>5</sup> Jimmy Kapeteshi,<sup>5</sup> Jean-Jacques Muyembe-Tamfum,<sup>5</sup> and Ayato Takada<sup>1,3,6</sup>

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The latest outbreak of Ebola virus disease (EVD) in West Africa has emphasized an urgent need for the development of rapid and reliable diagnostic kits. We produced monoclonal antibodies specific to the ebolavirus nucleoprotein and used them to develop an immunochromatography (IC) kit (QuickNavi™-Ebola) for rapid diagnosis of EVD. The IC kit was first evaluated with tissue culture supernatants of infected Vero E6 cells and found to be capable of detecting 103-104 focus-forming units/ml of ebolaviruses. Using serum samples of experimentally infected monkeys, we confirmed that the kit could detect the viral antigen shortly after disease onset. It was also noted that multiple species of ebolaviruses could be detected by the IC kit. Owing to the simplicity of assay procedure and absence of requirements for special equipment and training, QuickNavi™-Ebola kit is expected to be a useful tool for rapid diagnosis of EVD.

## **Or11 Mathematical modelling of Ebola Virus Disease in Serenje District with a Lusaka District overspill, Zambia**

Velu M. Rachel, Simuunza C. Martin, Changula Katendi, Mweene Aaron

The Ebola virus causes an acute, serious illness, which is often fatal. Despite improved control measures, Ebola Virus Disease (EVD) remains a public health concern in endemic areas as well as in unaffected areas. Ecological niche-mapping places Zambia within the ecological niche of filovirus infections. Furthermore, the annual migration of the straw-coloured fruit bats (*Eidolon helvum*) to Kasanka National Park in Serenje District puts Zambia at high risk of exposure to an outbreak of EVD. Thus, a mathematical transmission model using the Susceptible-Exposed-Infectious-Recovered (SEIR) epidemic model was developed to predict spread patterns of a potential EVD outbreak in Serenje and Lusaka districts as well as to determine the influence of intervention measures in disease spread. Following the introduction of one infected person into the rural district of Serenje, the model predicted that without any interventions an epidemic would reach its peak by day 46 and, should the disease spread to the urban district of Lusaka, it would reach its peak by day 40. The epidemic would have a devastating impact in the community, mostly in Lusaka District than in Serenje District with 42.4 percent and 34.4 percent of the population affected, respectively. The model further predicted that with implementation of control measures (community education and reduction of the burial time) the peak days would be delayed by 25 days and 22 days, and the number of EVD cases would be reduced by 10.5 % and seven percent in Serenje and Lusaka districts, respectively. Nevertheless, the intervention would extend the length of the outbreak by almost twice in Lusaka District compared to Serenje District. The overall effect of interventions would be more optimal in Serenje District than Lusaka District. Our model also predicted that community education would have the largest effect on the reduction in the number of cases during the outbreak compared to the effect of reducing the burial time of the deceased person. Preventive measures based mostly on community education should always be implemented to avoid such an outbreak.

Furthermore, a good EVD preparedness plan should always be in place for effective risk management and control.

### **Session 3: Drug resistance and discovery**

**14:00-15:00 hrs**

#### **Or12 Detection of extended-spectrum beta-lactamase-producing *Escherichia coli* in market-ready chickens in Zambia**

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The frequent administering of antibiotics in the treatment of poultry diseases may contribute to emergence of antimicrobial resistant strains. The objective of this study was to detect the presence of extended-spectrum  $\beta$ -lactamase- (ESBL-) producing *Escherichia coli* in poultry in Zambia. A total of 384 poultry samples were collected and analyzed for ESBL-producing *Escherichia coli*. The cultured *E. coli* isolates were subjected to antimicrobial susceptibility tests and the polymerase chain reaction for detection of *bla*CTX-M, *bla*SHV, and *bla*TEM genes. Overall 20.1%, 77/384, (95% CI; 43.2–65.5%) of total samples analyzed contained ESBL producing *Escherichia coli*. The antimicrobial sensitivity test revealed that 85.7% (66/77; CI: 75.7–92) of ESBL-producing *E. coli* isolates conferred resistance to beta-lactam and other antimicrobial agents. These results indicate that poultry is a potential reservoir for ESBL-producing *Escherichia coli*. The presence of ESBL-producing *Escherichia coli* in poultry destined for human consumption requires strengthening of the antibiotic administering policy. This is important as antibiotic administration in food animals is gaining momentum for improved animal productivity in developing countries such as Zambia.

#### **Or13 A non-synonymous mutation, N176I, in Lanosterol 14- $\alpha$ demethylase underlies *in vitro* Amphotericin B resistance in *Leishmania mexicana* promastigotes**

Roy Mwenechanya<sup>1,2</sup> and Michael P. Barrett<sup>2</sup>

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The lack of new drugs coming through to the market, to add to the available few drugs, for use against Leishmaniases calls for ways of safe-guarding the use of the current drugs to prolong their usefulness. One such drug whose judicious use needs to be safeguarded to prevent emergency of resistance and, due to its improved formulation qualities and holds promise for use for some time to come is the anti-fungal amphotericin B (AmB). Therefore, a complementary use of untargeted metabolomic and next generation whole genome sequence analyses was applied to elucidate the mechanism of *in vitro* AmB resistance in *L. mexicana* promastigotes. Resistance to AmB was induced by step-wise increase of the drug concentration in the growth medium of *L. mexicana* promastigotes. Untargeted metabolomics results were used to link a single SNP in lanosterol 14 $\alpha$ -demethylase (CYP51)

gene of the sterol (ergosterol) biosynthetic pathway from a multitude of SNPs that were found in generated AmB resistant cells as compared to the progenitor wild-type cells. The identified non-synonymous mutation, N176I, was found to be outside the active sites of CYP51 and was accompanied by accumulation of an isomer of the enzyme's product, 4, 4-dimethylcholesta-8, 14, 24-trien-3 $\beta$ -ol. These results suggest a break down in a possible protein-protein interaction of CYP51 with the next enzyme in the pathway, sterol C14-reductase, for efficient flow of the metabolite. AmB resistance was accompanied by other general perturbation of the sterol biosynthesis typified by depleted levels of ergosterol, the drug's target, in AmB resistance cells. Extra-chromosomal expression of the wild-type CYP51 in the derived AmB resistant cells restored ergosterol levels to those of the parental wild-type. Associated with restoration of ergosterol synthesis was reversal of resistance to AmB and susceptibility to pentamidine observed in AmB resistant cells. Thus, N176I mutation in CYP51 underlies resistance to AmB in *L. mexicana* promastigotes as deciphered by potential powers of combined techniques of Polyomics approaches.

#### **Or14 A novel assay for the detection of anthelmintic activity mediated by cuticular damage to nematodes: validation on *Caenorhabditis elegans* exposed to cysteine proteinases**

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Plant cysteine proteinases (CPs) from papaya, pineapple, and some fig species are capable of killing parasitic nematode worms *in vitro* and also possess anthelmintic effects *in vivo* by a mechanism different to all commercially available synthetic anthelmintics. There exists, nonetheless, a vast repository of as yet untested plant resources with potential for development into novel anthelmintics. For screening purposes, parasitic nematodes are not an ideal animal model mainly because of the need to maintain complex life-cycles in the laboratory, involving passage through infected animals as well as ensuing costs and ethical considerations. A cheap and effective rapid *Caenorhabditis elegans*-based assay for screening plant CP extracts for nematocidal activity has been developed based on neutral red retention colorimetric assay. More sensitive ways of identifying nematocidal activity of plant products were explored using wild type and different mutant and transgenic strains. These methods involved assessments of behavioural endpoints (e.g. motility), lethality and cuticular damage. The effect of CPs on wild type (Bristol N2) and cystatin null mutant (*cpi-1*<sup>-/-</sup> and *cpi-2*<sup>-/-</sup>) *C. elegans* was concentration-, temperature- and time-dependent. Cysteine proteinases were able to induce elevated *cpi-1* and *cpi-2* cystatin expression thereby suggesting that *C. elegans* deploy cystatins CPI-1 and CPI-2 to resist CP attack. When taken together, the results of lethality, motility assays and cuticle damage in wild type, bacterially unswollen (bus) strains and *cpi*-null mutants point towards a cheap and effective rapid through-put *C. elegans*-based assay for screening the nematocidal activities of plant-derived CPs.

## Symposium Poster Abstracts

10:45-11:15 hrs (First poster session)

15:00-15:30 hrs (Second poster session)

### P = Poster presentations

#### P1 Socioeconomic impacts of *Taenia solium* cysticercosis in eastern Zambia

E.C. Hobbs<sup>1</sup>, C. Bulaya<sup>2</sup>, K.E. Mwape<sup>2</sup>, B. Devleeschauwer<sup>3</sup>, S. Gabriël<sup>4</sup>, C. Mwelwa<sup>2</sup>, I.K. Phiri<sup>2</sup>, M. Masuku<sup>2</sup>, G. Zulu<sup>5</sup>, A. Colston, A.L. Willingham, A. Chota<sup>2</sup>, D. Berkvens<sup>4</sup>, P. Dorny<sup>4</sup>, E. Bottieau, N. Speybroeck<sup>6</sup>

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In evaluating the best option for the control of *Taenia solium* in sub Saharan Africa, one of the additional aims of the CYSTISTOP study was to estimate the socioeconomic impact of *T. solium* cysticercosis infection in both humans and pigs, in a highly endemic region of Zambia. Two separate questionnaire surveys were administered between 2015 and 2016 in Katete and Sinda districts of eastern Zambia. Of all the households in the study villages 50% were randomly selected for the surveys. The human health questionnaire captured direct and indirect costs to the individual, arising from neurocysticercosis and tapeworm infections. The socioeconomic pig questionnaire captured data regarding pig herd demographics, costs related to pig-keeping in general, and both direct and indirect economic losses arising from porcine cysticercosis. A total of 201 and 271 respondents completed the human and pig socioeconomic questionnaires, respectively. Of the human questionnaire respondents, 24 (11.9%) had reported seizure-like episodes, and 5 had also sustained injuries during these events. 83 people (41.3%) had experienced severe chronic headaches, 45 people (22.4%) reported blurry vision, and 4 (2.0%) suffered blindness in one or both eyes. A total of 959 working days were lost due to these conditions. The socioeconomic data revealed that 69.4% (188) of pig owners bought their pigs from within the village, and 95.2% (258) reported that they sold their pigs to traders. Pigs were bought on average at 7 months of age, for approximately K90.00 (US\$9.00), and were normally sold at approximately 24 months of age for an average of K240.00 (US\$24.00). Of the 207 pig owners, 76.4% reported checking the pigs' tongues for cysts at the point of sale, and 94.5% (256) reported being unable to sell tongue-positive pigs. Cysticercotic pigs were most commonly sold for K100.00 (US\$10.00), representing a loss of approximately 60% of the local normal value of a pig. Our results show that *T. solium* causes significant social, economic and public health impacts on individuals living in endemic communities in Zambia. Human infections cause losses due to infected individuals being unable to work, and porcine infections reduce the carcass value by up to 60% leading to financial losses for the farmers.



## **P2 Full carcass dissections of naturally *Taenia solium* infected pigs in Zambia: finding the unexpected**

Chembensofu Mwelwa<sup>1</sup>, K.E.Mwape<sup>1</sup>, C. Bulaya<sup>1</sup>, E. Hobbs, I.K Phiri<sup>1</sup>, M. Masuku<sup>1</sup>, G. Zulu<sup>2</sup>, A. Colston, A.L. Willingham, B. Devleeschauwer<sup>3</sup>, A. Chota<sup>1</sup>, N. Speybroeck<sup>4</sup>, D. Berkvens<sup>5</sup>, P. Dorny<sup>5</sup> and S. Gabriël<sup>5</sup>

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CYSTISTOP is a study in which the implementation of combined, highly intensive interventions (education, human mass drug administration, pig treatment and pig vaccination) aimed at elimination of *Taenia solium* as well as the implementation of a less intensive intervention (education, pig treatment) aimed to control *T. solium*, will be evaluated in rural communities in the Eastern Province of Zambia. In the framework of this study, a total of 66 randomly selected pigs of slaughter age have been dissected to obtain the needed baseline prevalence information. Dissections involved full carcass dissections, including all the organs. Total cyst counts were recorded and collected cysticerci identified of the based on morphology and confirmed with molecular tools (PCR-RFLP). Key findings were the high occurrence of *T. solium* infected pigs (37 animals, 56%) and the occurrence of *T. solium* cysts in the livers of 10 of the 37 infected animals. A high proportion of carcasses (80%) had low infection levels (40% with <10 cysts and 40% with 11-50 cysts). Another interesting finding was the presence of very small (viable) cysts, which could be easily missed at dissection. In two carcasses *Taenia hydatigena* cysts were detected (3%), while no *T. solium* cysts were present. In five carcasses both species were identified (7.5%). Organs are usually not considered when carcass dissections are used as a diagnostic tool to detect (levels of) *T. solium* infections in pigs, as the cysticerci normally establish in the muscles, subcutaneously and in the central nervous system. Our results, indicating the presence of cysticerci in 27% of the livers of infected animals, demonstrate the need to review the methods of full carcass dissections. These are important findings both for transmission and diagnostics.

## **P3 Seasonal survey of gastrointestinal helminths and anthelmintic efficacy in captive wild impala in a game facility in Zambia**

Ntombi B. Mudenda, King S. Nalubamba

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Faecal samples (n=1947) from captive wild impala (*Aepyceros melampus melampus*) were examined over a period of 14 months to determine quantitative seasonal helminth egg excretion patterns. Geometric mean monthly faecal egg counts (FECs) ranged from 20 to 575 and coprocultures revealed three parasite genera, namely *Trichostrongylus*, *Haemonchus* and *Strongyloides*. The nematode FECs showed a marked seasonal variation, being higher during the rainy season, moderate during the cool dry season and low during the hot dry season. The rainy season had significantly higher FECs than the dry season (P<0.01). Overall

mean FECs in unpelleted faeces were significantly higher than in pelleted faeces (P, 0.01). However, the FECs were not significantly different among seasons in unpelleted faeces (P<0.05), but were significantly higher in pelleted faeces in the rainy season than the dry season (P<0.05). Pellet size had a significant effect on FEC, with smaller pellets having higher FEC (P< 0.05). *Strongyloides* eggs and coccidian oocysts were only seen during the rainy season. In the same population, a study was carried out to determine the efficacy of the benzimidazole anthelmintic fenbendazole. At the end of the rainy season, the faecal egg count reduction test was performed at the game facility, and another game facility used as a control, for assessing anthelmintic efficacy of oral fenbendazole. The anthelmintic treatment showed an efficacy of 90%. *Haemonchus* spp. and *Trichostrongylus* spp. were the predominant genera present before treatment, but *Haemonchus* spp. larvae were the only genus recovered from the faecal cultures after anthelmintic treatment. The oral fenbendazole showed borderline efficacy and the study brings to light the need to have a more science-based approach to anthelmintic use in captive wildlife, based on local parasite epidemiology. This will reduce the development of anthelmintic resistance in the wildlife.

#### **P4 Distribution of virulence genes and antimicrobial susceptibility of Salmonella isolated from dogs and chickens in Zambia**

William Ulaya<sup>1</sup>, Bernard Mudenda Hang'ombe<sup>1</sup>, Victor Zulu<sup>1</sup>, King Nalubamba<sup>1</sup>, Evans Mulenga<sup>1</sup>, Hiroshi Isogai<sup>2</sup>, Emiko Isogai<sup>3</sup>.

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The present study was conducted to investigate the distribution of virulence genes and the antimicrobial susceptibility of *Salmonella* isolated from dogs and chickens. A total of 379 samples were examined with 41 *Salmonella* isolates being cultured with 18 (7.4%; 95% CI: 4.57-11.6) and 23 (16.9%; 95% CI: 11.2-24.5) isolates from dog and chicken, respectively. On serotyping, the isolates belonged to Group B, C, D and E, while 6 isolates from dog were untypeable. The Polymerase chain reaction (PCR) assay was carried out to detect *Salmonella* *invA*, *invF* and *sipC* virulence genes. A varying distribution of the targeted virulence genes was observed amongst the isolates. *InvA* was found in all the 41 strains, *invF* was found among 3 dog and 10 chicken isolates with *sipC* being observed among 2 dog and chicken isolates respectively. On antimicrobial susceptibility, dog isolates were susceptible to amoxicillin (100%) and nitrofurantoin (94.4%), whereas chicken isolates showed susceptibility to nitrofurantoin (100%), amoxicillin (95.7%), ampicillin and tetracycline (82.6%). It was concluded that dogs and chickens are important carriers of invasive *Salmonella* in Zambia with a multiple antimicrobial drug resistance pattern. This may be a potential source of human salmonellosis which is difficult to manage by antibiotic therapy.

#### **P5 Ebola and Marburg virus diseases in Africa: Increased risk of outbreaks in previously unaffected areas?**

Katendi Changula<sup>1,2</sup>, Masahiro Kajihara<sup>3</sup>, Aaron S. Mweene<sup>1</sup> and Ayato Takada<sup>1,3</sup>

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Filoviral hemorrhagic fever (FHF) is caused by ebolaviruses and marburgviruses in the family Filoviridae. Egyptian fruit bats (*Rousettus aegyptiacus*) are the most likely natural reservoir for marburgviruses and entry into caves and mines where they stay was often associated with the past Marburg virus disease (MVD) outbreaks. On the other hand, the natural reservoir for ebolaviruses remains elusive; though handling wild animal carcasses has been associated with some of the past Ebola virus disease (EVD) outbreaks. There has been an increase in the incidence of FHF outbreaks in Africa in the last two decades, with some caused by a newly found virus and some occurring in previously unaffected areas such as Guinea, Liberia and Sierra Leone, which suffered the most recent EVD outbreak in 2014. Indeed the predicted geographic distribution of filoviruses and their potential reservoirs in Africa includes many countries where FHF has not been reported. To minimize the risk of virus dissemination in previously unaffected areas, there is a need for increased investment in health infrastructure in African countries, policies to facilitate collaboration between health authorities from different countries, implementation of outbreak control measures by relevant multi-disciplinary teams and education of the populations at risk.

#### **P6 Filarial infections in domestic dogs in Lusaka, Zambia**

Joyce Siwila<sup>1</sup>, Enala T. Mwase<sup>2</sup>, Peter Nejsun<sup>3</sup>, Paul E. Simonsen<sup>4</sup>

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Filariae are common parasites of dogs in many parts of the world, but little is known about the status of these infections in many sub-Saharan African countries including Zambia. A study was carried out to determine the occurrence and species of filariae among 272 dogs in Lusaka, Zambia. Giemsa stained blood smear and Knott's concentration methods were used to identify microfilariae in the blood. Both methods revealed microfilariae in 16 (5.9%) of the dogs. PCR was used to identify the species and it confirmed that most of the dogs had *Acanthocheilonema reconditum* infection. Ten (4.0%) of the examined dogs were positive for *Dirofilaria immitis* circulating antigen (by DiroCHEK® test), but *D. immitis* microfilariae were not identified in any of the dogs and the status of this infection remains unclear. Further studies are needed to explore the occurrence of filariae in Zambian dogs and the zoonotic potential for humans infections.

#### **P7 Population genetic analysis and sub-structuring in *Babesia bigemina* population in Zambia**

Martin Simuunza, William weir, Brian Shiels and Andy Tait

*Babesia bigemina* is an intraerythrocytic protozoan parasite belonging to the genus *Babesia* and together with *B. bovis* are the most important causes of a disease of cattle called babesiosis. Using the unassembled genome of the parasite obtained from the Sanger Institute, we developed a panel of nine mini- and micro-satellite markers and proceeded to investigate the population structure and diversity of the parasite using isolates from Eastern and Lusaka provinces of Zambia. Population genetic analysis revealed high levels of genetic diversity with moderate sub-structuring quantified using  $F_{ST}$  values. Linkage disequilibrium

was observed whether isolates from the two provinces were analysed as one or separate populations. STRUCTURE was used to test the hypothesis that genetic sub-structuring was the cause of the observed linkage disequilibrium and five sub-groups were deduced by the programme. However, the resulting sample size of each sub-group was too small to definitely determine whether they were panmictic. This sub-structuring and the high levels of diversity seen in the Zambian *B. bigemina* populations may have implications in the development of subunit vaccines against the disease.

### **P8 A meta-analysis of canine helminthiasis in Sub-Saharan Africa**

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Dogs are the most widely distributed carnivores and have a close association with humans, providing companionship and security. However, dogs are also potential carriers of zoonotic pathogens that can infect humans through direct contact, environmental contamination or via arthropod vectors. Dogs, therefore, pose a public health risk and a good understanding of canine diseases is important for planning and implementing control measures. The aim of this study was to characterise canine helminthiasis in Sub-Saharan Africa using a systematic approach. Pubmed, Cabdirect and Google Scholar were searched for relevant primary studies published from 2000 to March 2016. Thirty-four eligible studies were included in the meta-analysis. Pooled prevalences were estimated using the quality effects model. Twenty-seven genera of enteric helminths were reported and the pooled estimate of canine helminthiasis across studies was 68% (95% CI: 56-78%). *Ancylostoma* species and *Toxocara* species, causative agents of larval migrans in humans, were the most frequently reported helminths with pooled estimated prevalences of 37% (95% CI: 27-47%) and 19% (95% CI: 13-25%) respectively. *Dipylidium caninum* and Taenia species were the most frequently reported cestodes with pooled estimated prevalences of 17% (95% CI: 7-29%) and 7% (95% CI: 3-14%) respectively. Trematodes were rarely reported. There was a high level of heterogeneity in most pooled estimates ( $I^2 > 75\%$  and  $P < 0.00$ ). The results of this study show that canine helminthiasis is highly prevalent in Sub-Saharan Africa and there is need for regular deworming programmes to improve the health status of the dogs and minimise the potential health risk to humans.

### **P9 Assessing the knowledge, attitude, practices, and perception of health care workers and patients towards prevention of tuberculosis transmission in Dar-es-salaam, Tanzania**

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The aim of this study was to assess knowledge, perceptions and practices of health care workers and patients towards tuberculosis (B) infection transmission in Dar-es-salaam. A study was carried out at Muhimbili National Hospital and Mwananyamala hospital. Focus Group Discussion (FGDs), in-depth interviews and observations were used to collect data. Participants were knowledgeable about causes of TB transmission, symptoms and effects.

Despite their knowledge, this did not translate into improved prevention of TB transmission because many other factors such as: fear for TB/HIV association and HI testing; seeking traditional medicine; self-medication; fear of stigma; and high cost of medical services guide their health seeking behaviors. It is concluded that prevention of TB transmission is not just about knowledge acquisition, but also changing people's attitudes, practices and perceptions; and also availability of policies and guidelines as well as resources for TB management.

#### **P10 Risk factors associated with the outbreaks of African Swine Fever in Lusaka province, Zambia**

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Lusaka province has experienced several outbreaks of African swine fever (ASF). ASF is a highly contagious hemorrhagic disease of pigs. This study was carried out to determine the risk factors that were associated with the outbreaks of ASF in Lusaka province. Semi-structured questionnaires (50 pig farmers, 5 abattoirs and processing plants) and interviews (15 traders, 3 market managers, 5 veterinary check points, 5 district veterinary officers, 5 veterinary assistants and 5 meat inspectors) were utilized to collect the data. The study revealed that the risk factors that were associated with the spread of ASF in Lusaka province were (1) purchase of pigs for replacement and breeding stock from one another and from markets, (2) poor adherence or absence of biosecurity measures, (3) laxity in enforcing livestock movement control and inadequate police and veterinary staff manning check points, (4) evading pig checks at check points by traders who use alternative routes, (5) low awareness levels on ASF transmission among pig farmers and traders, (6) lack of enforcement of regulations at pig markets and (7) inadequate of ASF screening. Of these factors, only absence of a boar ( $P=0.01$ , 95% C.I.:8.22-68.41) and occurrence of ASF outbreaks in the previous year ( $P=0.08$ , 95% C.I.:0.23-35.54) were significantly associated with the ASF outbreak. Improving biosecurity, sensitizing farmers, traders and all stakeholders in the pig value chain on ASF, reinforcement of staff at check points and regulation of pig markets are some of the ways in which future outbreaks can be prevented.

#### **P11 Prevalence of *Taenia solium* and soil transmitted helminths in rural communities of Monze district of southern Zambia**

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A cross-sectional study was conducted to establish the prevalence of *Taenia solium* and soil transmitted helminths (STHs) in Monze District of Southern Province of Zambia. Pig keeping villages were randomly sampled. A total of 243 pigs and 163 humans were examined for cysticercosis using antigen ELISA. After ethical approval, stool samples were collected by the respective individuals themselves in properly tightened sample bottles wrapped in black plastic bags and kept in a cooler box. Of the total 269 pigs which were lingual examined,

2.2% were positive. Coproantigen ELISA revealed 9.9% prevalence of taeniasis while Formo-Ether sedimentation Method revealed 0.006% prevalence of taeniasis. A total of 243 pigs and 163 humans were examined for cysticercosis using antigen ELISA of which 11.6% of pigs and 14.7% of humans were found positive. The prevalence of STHs comprising hookworms and whipworms was found to be 16.5% by copro-microscopy (McMaster method). The high prevalence of *T. solium* infections both in humans and pigs and that of STHs in humans implies that the sanitation is poor in the study area and calls for serious intervention. As the tapeworm carriers and the infected pigs are important in terms of transmission, practical and cost effective interventions in combating this *T. solium* cysticercosis/taeniosis complex lies in synergized control strategies among medical health workers, veterinarians, community workers, policy makers and indeed the community itself.

### **P12 Seroprevalence of canine parvovirus in dogs in Lusaka districts, Zambia**

Ngonda Saasa<sup>1</sup>, King Shimumbo Nalubamba<sup>2</sup>, Ethel M'kandawire<sup>1</sup>, Joyce Siwila<sup>2</sup>  
*University of Zambia, School of Veterinary Medicine*

Canine parvovirus (CPV) enteritis is a highly contagious enteric disease of young dogs. There are limited studies done in Zambia to investigate CPV in dogs. Whole blood was collected from dogs from three small animal veterinary clinics (n = 174) and one township of Lusaka (n = 56). Each dog's age, sex, breed and vaccination status were recorded. Haemagglutination inhibition using pig erythrocytes was performed using modified live parvovirus vaccine. Antibodies to CPV were detected in both unvaccinated and vaccinated dogs. The titres ranged from 160 to 10240 (log 2.2-4.0) and median of 1280 (log = 3.1). Mean log titres for unvaccinated and vaccinated dogs were 2.9 and 3.1, respectively. Vaccinated dogs had significantly higher antibody titres compared to unvaccinated (p<0.001). There was a significant difference in titres of dogs brought to clinics compared to field samples (p<0.0001) but not within breed (p=0.1013) or sex (p=0.572). Multiple regression analysis showed that only age and vaccination status were significant predictors of antibody titre. The presence of antibody titre in all dogs suggests CPV is ubiquitous and the disease endemic, therefore the need for a comprehensive research to determine the correct timing of vaccination to get the most appropriate response to vaccination.

### **P13 Economic and Social consequences of Human African Trypanosomiasis in Lusaka, Eastern and Muchinga Provinces of Zambia**

Mwiinde Mayaba Allan  
*UNZA, School of Veterinary Medicine*

Human African trypanosomiasis (HAT) causes severe economic production losses in humans due to loss of man power and death. In Zambia most of the studies that have been done have focused on analysing the parasite while none have been conducted to establish the economic consequences of the burden of the disease on the affected populations. This study therefore aimed at determining the economic and social consequences of HAT in Lusaka, Muchinga and Eastern provinces of Zambia. This was achieved by a cross sectional survey, using a mixture of qualitative and quantitative research methods. Specifically, the economic and social consequences were measured at the household level using structured interviews and focus group discussions. In addition, mapping was done to determine the spatial

distribution of HAT in the study areas. In order to assess the adequacy of the health delivery system in the management of HAT at the district level in the affected areas, structured questionnaires were administered to the medical officers and government officials (District Health Management Officers). All qualitative data were analysed using inductive approaches with two independent researchers working together to review the transcripts, develop the coding structure and extract the overarching themes and sub-themes emerging from the focus group discussions. From the quantitative data collected, descriptive statistics were generated for the variables under study. Analysis of variance (ANOVA) was used to determine associations between continuous variables. The burden of HAT on the study population was estimated using the Disability Adjusted Life Years (DALYs). This was calculated as Years of Life Lost (YLL) +Years of Life Lived with Disability ( $I \times DW \times L$ ). Results from the study indicated that once a patient contracts HAT, an average of 4.9 months' worth of productive time would be lost due to the illness. In economic terms, this loss in productivity translated to a total of K1, 914.68 incomes lost for one individual due to the illness. Further, it was found that on average, a family would end up spending five times more than their monthly income on the cost of health care for a HAT patient. For the whole sample, (n = 64) the income lost due HAT (estimated as DALYs) was about K3.7 million. According to results, there were a lot of misconceptions about HAT that could be attributed to ignorance. The social consequences of the disease included stigma, dropping out of school, loss of friends due to amnesia and deformity. It was found that the current health care system was not able to adequately handle HAT cases because of inadequate qualified man-power and diagnostic equipment. From this study, it is evident that HAT has high economic and social consequences at both household and community levels. There is therefore need for the country to put up concerted efforts to reduce the burden of this disease and also to educate the communities so as to reduce stigmatisation that is associated with the disease.

## Symposium registration form

**THE UNIVERSITY OF ZAMBIA  
SCHOOL OF VETERINARY MEDICINE  
ANNUAL SCIENTIFIC SYMPOSIUM**

**Main Theme: Sustainable Animal and Human Health through Research**

**Wednesday 15<sup>th</sup> June, 2016**

**08:00 to 17:00 hrs**

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