Higher Education for Development (HED)
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U.S. Agency for International Development (USAID)

"Capacity Building in Integrated Management of Trans-Boundary Animal Diseases and Zoonoses (CIMTRADZ)"

January 27, 2011 - September 30, 2015

FINAL ASSOCIATE AWARD REPORT
September 2015

USAID/Uganda Associate Award
Cooperative Agreement No. AEG-A-00-05-00007-00
Associate Cooperative Agreement
No. AID-617-LA-11-00001

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PARTNERSHIP INFORMATION

Lead Partner Institutions: Mississippi State University
Secondary Partner Institutions: Makerere University
Region, Country: Sub-Saharan Africa, Uganda
Performance Period: *January 27, 2011 – September 30, 2015*
Funding Level: Associate Award: $2,423,747.00 and Subaward: $2,005,802.00
Proposed Cost Share: $324,006 ($165,000 (NDSU) + $159,006 (MS State))

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List of Acronyms

ACE	American Council on Education
AFRISA	Africa Institute for Strategic Animal Resource Services and Development
BLT	Bio-Medical Laboratory Technology
CIMTRADZ	Capacity Building in Integrated Management of Trans-Boundary Animal Diseases and Zoonoses
COVAB	College of Veterinary Medicine, Animal Resources and Bio-security
CSU	Columbus State University
ECA	Eastern and Central Africa
HED	Higher Education for Development
HICD	USAID's Human and Institutional Capacity Development
IHM	Integrated Health Management
IDM	Integrated Disease Management
MAK	Makerere University
MEME	Multiple Entry, Multiple Exit
M&E	Monitoring and Evaluation
MS-IDMB	Masters of Science- Infectious Disease Management & Biosecurity
MSU	Michigan State University
MS State	Mississippi State University
MUSK	Makerere University System Knowledge
NDSU	North Dakota State University
PhD	Doctorate Degree
TADZ	Trans-boundary Animal Diseases and Zoonoses
USAID	United States Agency for International Development
USAID/Uganda	United States Agency for International Development Uganda Mission
USG	United States Government
WARM	Wild Life & Animal Resources Management
WHM	Wildlife Health & Management

1. Executive Summary

This final report is for the Associate Award Agreement No. AID-617-LA-11-00001 between the United States Agency for International Development, Uganda Mission (USAID/Uganda) and the American Council on Education, Office of Higher Education for Development (ACE/HED) to manage the implementation of program objectives of the Africa-U.S. Higher Education Initiative between Makerere University (MAK) and Mississippi State University (MS State). The original two-year award effective January 28, 2011, was extended an additional 19 months from February 28, 2014 to September 30, 2015, with a total award amount of $2,423,747. The award provides funding for a partnership between MAK in Kampala, Uganda and MS State, titled "Capacity Building in Integrated Management of Trans-Boundary Animal Diseases and Zoonoses" (CIMTRADZ). Between January 2011 and March 2014, the CIMTRADZ project was implemented by North Dakota State University (NDSU) and MAK, in collaboration with Michigan State University (MSU), Washington State University (WSU) and Columbus State University (CSU).

All CIMTRADZ partnership activities were put on hold between October 1, 2013 and February 2014, as all obligated funds had been exhausted. At the time, modifications to the award to extend the period of performance and obligate additional funding were pending, and the partnership director, Professor Margaret Khaitsa was preparing to move from NDSU to MS State. The partnership was officially transferred to MS State, as of March 2014. This transfer was agreed upon by NDSU, MS State, MAK, ACE/HED, and USAID/Uganda. Because the transfer was effective as of March 2014, no accomplishments are reported for the October 1, 2013 to March 31, 2014 period. Partners postponed planned activities awaiting extension of performance period and obligation of additional funds. During the active implementation period of April 2014 to June 30, 2015, the partners worked to compensate for these delays and were able to implement all of the originally planned activities and report significant progress on the majority of their indicators.

2. Partnership Overview

Background

The award provided funding for a partnership between Makerere University (MAK) in Uganda and Mississippi State University (MS State), effective February 15, 2011, titled "Capacity Building in Integrated Management of Trans-Boundary Animal Diseases and Zoonoses" (CIMTRADZ). The partnership worked to enhance the capacity of MAK and higher education institutions in Eastern and Central Africa (ECA). The partners also developed and tested evidence-based strategies for socio-economic development through Integrated Health Management (IHM) and sustainable food security.

The innovative core of this partnership was the development of a coordinated surveillance system to enable the risk assessment and reduction of diseases that endanger food security, trade and human productivity in Uganda and the ECA region. The surveillance system was integrated with the academic curriculum in the MAK School of Veterinary Medicine, so that field research conducted by students contributed to the surveillance of zoonotic diseases in rural communities. This applied research was designed and supervised by MAK faculty who could report significant findings to national and regional health authorities. The centers established as as focal points for this surveillance system are equipped to conduct research and develop solutions in the area of assessment, communication and response to trans-boundary pandemic zoonotic and vector-borne diseases as well as endemic zoonotic and production-limiting animal diseases that jeopardize food security.

Goals and Vision
The partnership's goal was to enhance the capacity of Makerere University and higher education institutions in Eastern and Central Africa (ECA to improve surveillance and management of Trans-boundary Animal Diseases and Zoonoses (TADZ) and food security through implementation of an IHM program. It established a program of disease surveillance and community engagement (Africa-U.S. Integrated Health Management (AFRUS-IHM) network) that enhances regional higher education capacities for research, education, and community outreach in ECA.

Partnership Objectives
1) To improve Trans-boundary Animal Diseases and Zoonoses academic programs at Makerere University.
2) To improve human capacity at Makerere University & the ECA Region.
3) To improve research capacity at Makerere University & the ECA Region to generate & disseminate knowledge in IHM for TADZ.
4) To strengthen the center of excellence at Makerere that provides academic, research, and community engagement leadership in IHM for TADZ.
5) To improve community outreach and engagement program in the ECA Region.

Collaborating Stakeholders
The CIMTRADZ project worked with over 20 stakeholders to help achieve their partnership objectives, hold conferences, offer additional trainings and develop partnerships and sustainability opportunities outside of this award. The Summer School and International Boma workshop have been two of the most successful outcomes of these collaborations by both securing additional funds to sponsor activities and students and bringing together students from regional institutions.

<u>Educational Institutions:</u>
- Mekelle University (Mek'ele, Ethiopia)
- Sokoine University of Agriculture (Morogoro, Tanzania)
- Tufts University (Medford, MA, USA)
- University of Cameroon (Bamenda, Cameroon)
- University of Minnesota (Minneapolis, MN, USA)
- University of Nairobi (Nairobi, Kenya)
- University of Rwanda (Kigali, Rwanda)
- University of Saskatchewan (Saskatoon, Canada)

<u>Government:</u>
- Agency for Accelerated Regional Development (AFARD), Uganda
- Emerging Pandemic Threats (EPT), RESPOND project
- Kampala City Council Authority, Uganda
- Ministry of Agriculture Animal Industries and Fisheries (MAAIF), Uganda
- Ministry of Education and Sports, Uganda
- Ministry of Tourism, Wildlife and Antiquities, Uganda
- National Council for Higher Education (NCHE), Uganda
- U.S. Department of Agriculture (USDA), Foreign Animal Service (FAS)
- Uganda National Council for Science and Technology (UNCST)
- Ugandan Ministry of Agriculture Animal Industries and Fisheries (MAAIF)
- Ugandan Ministry of Education and Sports (MOES)

Non-Government Organizations:

- African Union Inter-African Bureau for Animal Resources (AU-IBAR)
- Butaleja Women's Group, Uganda
- Centre for Environmental Health Action (CEHA)
- Conservation Through Public Health (CTPH)
- Food and Agricultural Organization (FAO)
- One Health Central and Eastern Africa (OHCEA)
- Ugandan District Hospitals (i.e., Kumi Hospital)

3. Partnership Results and Performance

This section presents results and performance against the end of partnership targets. Structured around the partnership's M&E plan, the following sub section examines the partnerships' achievements and progress in relation to the objectives, outcomes and outputs as envisioned and designed by the partners.

3.1 Achievements and Implementation Progress

Objective 1: To improve Trans-boundary Animal Diseases and Zoonoses academic programs at Makerere University.

Outcome 1.1: Makerere University and Regional partner institutions offer improved modules/courses in International Infectious Disease Management & Biosecurity

Curricula Newly Developed and/or Revised

The CIMTRADZ partnership worked with collaborating stakeholders to develop and/or revise 26 curricula at MAK and significantly improve their Integrated Disease Management (IDM) program (Table 1). The IDM Masters of Science has been modified and improved considerably from its original creation with NDSU in Phase I, first called Integrated Health Management (IHM) and is attached to this report as Appendix C. Over the lifetime of this award, the partners developed 16 new courses and 2 revised courses for the MS-IDM program. Through collaborations with the Africa Institute for Strategic Animal Resource Services and Development (AFRISA) and the private sector, the Uganda National Council for Higher Education (NCHE) approved 11 Commodity Value Chain (including livestock) Degree programs, Diplomas, Certificates.

In FY13, the College of Veterinary Medicine, Animal Resources and Bio-security (COVAB) at MAK worked with medical laboratory training institutions in Uganda to harmonize training through a curriculum that offers a career path from certificate to diploma and finally to degree in Bio-Medical Laboratory Technology (BLT). This newly developed curriculum offers credit transfer from participating institutions and saves student time and resources under a multiple exit and multiple entry (MEME) model. The MEME model offers affordable training packages to students with limited resources who need tuition assistance. The curriculum has also created the opportunity to share resources and exchange students for practical attachments and joint student supervision.

The partners worked with COVAB's Department of Wild Life & Animal Resources Management (WARM) to develop a two year Master's degree program in Wildlife Health & Management (WHM). Utilizing an ecological and veterinary approach, and aligned with the University's mission to produce skilled manpower that addresses Uganda's development needs. The program aims to address Uganda's most urgent wildlife and conservation priorities. The overall goal of the program is to enhance skills and competences of graduates in management of wildlife and aquatic resources, environment and public

health and enable them to identify problems and then design and implement programs related to health, management and production of wild animals, aquaculture, environmental and public health.

In FY14 and FY15, MAK held annual curricula revision workshops with University of Nairobi, Sokoine University, CSU, MS State, University of Rwanda, Mekelle University and University of Saskatchewan to identify gaps in the course curricula. The meeting participants worked together to update the descriptions, goals, learning objectives, syllabi outlines, delivery and mode of assessment, staff and laboratory resources, and reference materials for each selected course. In FY14, the curricula revision workshop selected and revised following three courses; Law and Health Ethics, Applied Biostatistics, and Advanced Microbiology. In FY15, the partners revised and/or developed the following 17 courses: 1) Introduction to Microbiology, 2) Introduction to Epidemiology, 3) Infectious Diseases and Zoonosis, 4) Gender and Culture in Infectious Diseases Management, 5) Infectious Disease Surveillance and Management, 6) Research Methods, 7) Seminar Series I, 8) Introduction to Bioethics, 9) Health Information Systems and Database Management, 10) Advanced Microbiology and Diagnosis, 11) Conflict and Health, 12) Monitoring and Evaluation, 13) Advanced Biostatistics, 14) Seminar Series II, 15) Dissertation, 16) Advanced Epidemiology, and 17) Infectious Disease Management in Disasters and Emergencies.

Table 1
Curricula Developed and/or Revised (FY12 to FY15)

FY	Total number of curricula newly developed and/or revised	Curricula newly developed and/or revised with private and/or public sector employers' input or on the basis of market research	
		Number	Percent (out of all curricula newly developed and/or revised)
FY12	3	11	367%
FY13	3	3	100%
FY14	3	3	100%
FY15	17	17	100%

Experiential/Applied Learning

The partners developed one new experiential/applied learning opportunity in the International Infectious Disease Management & Biosecurity curriculum. The Global Health Policy course (MICR 722) was offered for the first time in May 2012 under the guidance of Dr. Bill Sischo, from WSU. The experimental summer course curriculum was enhanced with new modules, like One Health, Service learning, Data Analysis (using R software), and Rabies Diagnosis. Partners from CSU, MSU, University of Minnesota, WSU, University of Saskatchewan, Kansas State University/ University of Pretoria (South Africa) all participated in the development of this new course. In its first year, six MS-IDM students were sponsored through this award and attended the course. In collaboration with EPT-RESPOND, an additional 12 individuals from ECA institutions were sponsored ($60,000) for the summer 2012 course.

Textbooks, Journals and Reference Materials

The CIMTRADZ partnership ambitiously targeted to purchase 510 textbooks, including 100 reference books and subscriptions to two journals for each of the five partner institutions. Unfortunately due to delays in the partnership transfer and budget constraints, the partners were only able to purchase and ship 114 textbooks and reference materials (Table 2). The purchased reference materials will help faculty members and students at MAK in teaching-learning and research activities.

Table 2 **Number of textbooks, journals and reference materials**	
Description	Quantity
Microbiology 3ED	15
Basic Methods of Medical Research	15
Prescott's Microbiology African Edition	1
Essential Clinical Anatomy 4E	5
Gray's Anatomy	15
Medical Microbiology	15
Textbook of Medical Biochemistry	15
District Lab Practice in Tropical Countries P2	7
Research Methodology 3rd Edition	15
Colour Atlas of Biochemistry	1
Viral Hemorrhagic Fevers	1
Handbook of Zoonoses	1
Identification and Prevention Biosecurity: Understanding Assessing and Preventing the Threat	1
Medical Lab Technology 6Ed Vol. 1 & 2	6
Subscription to the African Journal of Animal and Biomedical Sciences	1
TOTAL	114

Objective 2: To improve human capacity at Makerere University & the ECA Region.

Outcome 2.1: Improved teaching and research skills of faculty and students in integrated disease management (IDM) for TADZ

Short-Term Training

The CIMTRADZ partnership held 30 short-term trainings (Table 3) which benefited over 1,128 participants (425 female and 703 male). These trainings included data collection and analysis methods, e-learning workshops, MUSK training, manuscript writing, and Statistical Analysis System (SAS) software trainings. In addition to on-line and classroom trainings, the partners held a One Health field attachment, which exposed students to the practices and application of the One Health concept. The field attachment allowed students to improve and develop communication skills with stakeholders, apply their technical knowledge while practicing skills to solve community problems, and identify community problems and develop solutions.

The international Boma workshop has been one of the CIMTRADZ project's most successful events and is a traditional that will continue at COVAB after the end of this award. It has grown each year since its inception and reported over 200 participants in FY15. The Boma is held at the end of the summer school and brings together stakeholders, field practitioners, faculty, staff and students from the North America and Eastern Africa to share One Health experiences and lessons learned. In addition to presentations, the Boma provides specialized trainings and workshops on One Health issues.

Table 3
Short-Term Training Totals (FY12 to FY15)

FY	No.	Name	Number of People		
			Female	Male	Total
FY12	1	Summer Courses Trainings (incl. Global Policy, Microbiology & USAID webinar)	12	11	23
	2	Workshop series on Data Analysis, Risk Analysis, Service Learning & Rabies Diagnostics	53	78	131
FY13	3	National Animal Health and Food Security Policy Training	3	3	6
	4	One Health Field Attachment	13	35	48
	5	Online course delivery system (MUSK)	15	17	32
	6	Veterinary CAP (VETCAP) Training Workshop	26	29	55
	7	Mathematical and Epidemiological Modeling of Endemic Infectious Diseases	3	0	3
	8	EcoHealthNet 2013 Workshop	0	1	1
	9	International Boma Workshop (Kampala, Uganda)	24	53	77
FY14	10	MUSK Courseware Developers Workshop	4	16	20
	11	E-Learning Workshop	9	15	24
	12	Bio Risk Management	8	15	23
	13	Lab Diagnosis of Brucellosis	9	12	21
	14	Data Management	8	17	25
	15	Fish Training	8	16	24
	16	Poultry Pathology Training	2	25	27
	17	Women's Leadership and Management	17	0	17
	18	Research and Report Writing	3	6	9
	19	Summer School	1	14	15
FY15	20	MUSK e-Learning	7	22	29
	21	Manuscript Writing Workshop	8	12	20
	22	Junior Faculty Training at MS State and MSU	4	4	8
	23	Summer School	2	8	10
	24	Introduction to R Software	6	17	23
	25	Food Safety Investigations	0	0	0
	26	Laboratory Diagnosis Practical Uses of DVM Digital Pathology Software	0	0	0
	27	Model African Union	3	11	14
	28	International Boma Workshop	92	139	231
	29	Scientific Meeting	67	89	156
	30	Statistical Analysis System (SAS) software training	18	38	56
TOTAL Individuals			425	703	1,128
TOTAL Trainings					30

Long-term Training

The CIMTRADZ partnership reported a total of 11 completed long-term trainings over the course of this award, including four master degrees (1 female and 3 male) and seven certificate degrees in food protection (3 female and 4 male). The partners did not conduct any long-term training in FY14 due to the partnership transfer from NDSU to MS State, delays in funding and inadequate communications between the partners. In FY14, the CIMTRADZ partnership enrolled six new individuals (1 female and 5 male) in a Master's Degree Program and five in a Doctorate program (1 female and 4 male). These degrees were not completed before the end of the award but the students will continue their programs with the support of outside funding.

Access Students

The CIMTRADZ partnership reported 18 individuals from underserved and/or disadvantaged groups gaining access to tertiary education programs (Table 4). For the purpose of this partnership, individuals from the Northern and Eastern part of Uganda, rural cattle-keeping communities and those with low income livelihoods were considered underserved and/or disadvantaged. In order to increase access for women to tertiary education programs, the partnership endeavored to enroll an equal number of female and male students.

In FY14, the partners did not meet their target of 35 and reported 11 individuals during this reporting period. The six in the Master's program and five in the doctorate program are two female and nine male students from the Northern and Eastern part of Uganda, from rural cattle-keeping communities and those with low income livelihoods. The partners did not report student access in FY15 because MAK was unable to provide the degree program breakdown and did not track this indicator correctly.

Table 4
Number of Individuals from Underserved and/or Disadvantaged Groups Accessing Tertiary Education Programs (FY12 to FY15)

Program Type	FY12 Target: 70	FY13 Target: 10	FY14 Target: 35	FY15 Target: 35
Master's Degree Program	7 (4F & 3M)	0	6 (1 F & 5M)	0
Doctorate Degree Program	0	0	5 (1 F & 4M)	0
Total	7	0	11	0

Objective 3: To improve research capacity at Makerere University & the ECA Region to generate & disseminate knowledge in IDM for TADZ.

Outcome 3.1: Applied new technologies or management practices that address development problems developed.

Applied Research

The cohort of MS-IDM students prepared seven policy briefs in FY13 (Table 5). These seven briefs were shared with stakeholders like the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and the Ugandan Ministry of Health, and the greater community of MAK. The seven policy briefs are attached as Appendix D.

Table 5 Applied Research: Policy Briefs (FY12 to FY15)		
No.	Title	Release Date
1	A Decade of Foot and Mouth Disease (FMD) Vaccination Failure in Uganda: Recommendations for effective FMD Control	January 2013
2	Prevention and Control of the Deadly Ebola Haemorrhagic Fever in Uganda	March 2013
3	Merging of two forms of Human African Trypanosomiasis in Uganda: An Intervention to rid Uganda of Sleeping Sickness	February 2013
4	Hepatitis B and Hepatitis C Co-infections among HIV Patients: A Call for integration of HBV and HCV interventions into HIV Prevention and Control Programs	February 2013
5	Contagious Bovine Pneumonia (CBPP) outbreaks in Uganda, 1950 - 2011.	September 2013
6	Lessons Uganda can learn from the U.S. in control of anthrax outbreaks	September 2013
7	Effective Control and Prevention of Non-0157 Shiga Toxin Producing Escherichiacoli (STEC) Outbreaks	October 2013

Joint Research

The CIMTRADZ project has supported 18 joint research projects between FY 2012 and FY 2015 with research topics including rabies control, food security, dairy farmers in Northern Ethiopia and Human Brucellosis (Table 6). The joint research projects conducted in FY 2013 were presented at the One Health Conference in Addis Ababa, Ethiopia in September 2013. Due to changes in reporting requirements, the partners only reported the research topics during Phase 1 (FY12 and FY13) and consequently the authors' names are not reported for the first nine joint research projects in the chart below.

Table 6 Competitive Research Grantees & Joint Research Projects (FY12 to FY15)				
FY	No.	Researcher	Institution	Research Topic
FY12	1	Not Provided	NDSU, MSU & MAK	Baseline survey instrument for trans-boundary animal disease surveillance systems in Uganda
	2	Not Provided	MSU & MAK	Brucellosis Outbreak Investigation in Uganda
	3	Not Provided	NDSU, CSU, MSU & MAK	Gender Auditing Survey in Uganda
FY13	4	Not Provided	NDSU & MAK	Integrated approach to rabies control in Mbuya zone II in Kampala city and Effective Control and Prevention of Non-0157 Shiga Toxin Producing Escherichiacoli (STEC).
	5	Not Provided	NDSU & MAK	Environmental influences to infectious disease occurrence: A case of land cover and weather changes and their role in the increased occurrence of Lyme disease in North Dakota
	6	Not Provided	NDSU & MAK	Mapping Listeria hotspots in New York State using GRASS GIS
	7	Not Provided	NDSU & MAK	Evaluation of a Stamp Out Sleeping Sickness Campaign In Uganda to Control Human African Trypanosomiasis (2004 - 2009).
	8	Not Provided	NDSU & MAK	Food Security in Uganda: The spatial and temporal trends of Contagious Bovine Pleural-

				Pneumonia in Uganda: 1956-2011.
	9	Not Provided	NDSU & MAK	Lessons Uganda can learn from the U.S. in control of anthrax outbreaks
FY14	10	Erick Komba	Sokoine University of Agriculture, Department of Veterinary Medicine and Public Health	Identification of sources and risk pathways of *Campylobacter* contamination of boiler carcasses in small scale production systems in Morogoro, Tanzania
	11	Etsay Kebede	Mekelle College of Veterinary Medicine	Contribution of dairy farms to urban and periurban development in Northern Ethiopia
	12	David Ruguh Ndeereh	University of Nairobi, College of Agriculture and Veterinary Medicine	Epidemiology of spotted fever group rickettsioses and Q fever at the wildlife-livestock interface in Maasai Mara and Laikipia, Kenya
	13	Gabriel Tumwine	COVAB & School of Biosecurity, Biotechnical and Laboratory Sciences (BLS)	Molecular Epidemiology, Risk Factors and Prevention/Control Strategies of Human and Animal Brucellosis in Uganda
	14	Kato Drago Charles	COVAB & School of Biosecurity, Biotechnical and Laboratory Sciences (BLS)	Cytokine responses & parasite genotypes associated with the pathogenesis of human African trypanosomiasis in North-Eastern Uganda
FY15	15	Etsay Kebede Assefa	COVAB	Contribution of dairy farms for urban, periurban development and environment in the Northern Ethiopia
	16	Erick V. G. Komba, Msetule Lameck, Robinson H. Mdegela and Sharadhuli I. Kimera	COVAB	Occurrence and antimicrobial resistance of thermophilic Campylobacter isolated from frozen broiler chicken meats in Morogoro Municipal, Tanzania
	17	Gabriel Tumwine, Enock Matovu, John David Kabasa, David Okello Owinyi and Samuel Majalija	COVAB	Human brucellosis: Sero-prevalence and associated risk factors in agro-pastoral communities of Kiboga District, Central Uganda
	18	Charles D. Kato, Vincent P. Alibu, Ann Nanteza, Claire Mugasa, Enock Matovu	COVAB	Interleukin (IL)-6 and IL-10 are Up Regulated in Late Stage Trypanosoma brucei rhodesiense Sleeping Sickness

Research Scholarships

In FY13, the partnership awarded three dissertation fellowships to MAK students (2 female and 1 male) totaling $9,000 to facilitate the completion of their graduate studies (Table 7). These three fellows used the graduate funding to conduct research on Hemorrhagic Fevers, Marburg Disease and Food Contamination and Hygiene in Uganda.

Table 7 Research Scholarships Awarded (FY12 to FY15)		
FY	Research Topic	Award Amount
FY13	Economic Impacts of Selected Hemorrhagic Fevers in Uganda	$2,000
FY13	Socio Economic Impact of Marburg Disease in Kabale District South-Western Uganda	$2,000
FY13	Hygiene Practices and Food Contamination in Managed Foodservice Facilities in Uganda	$5,000

New Technologies or Management Practices Developed

The partners reported four new technologies, innovations and/or management practices (Table 8). To address this indicator, members of the CIMTRADZ network, including students and staff submitted ideas and a review committee comprised of CIMTRADZ partners worked to identify the top high impact innovative research projects for which to seek additional funding.

Table 8 New Technologies or Management Practices Developed			
No.	Technology or Management Practice	Author	Status
1	Development of Feed for Quail and Guinea Fowl	Joelia Nasaka, MAK Junior Faculty	Selected & being implemented with trial group of Uganda Quail farmers
2	Development of Feed for Fish & Use of Fish Feed Formulation Software	Margaret Nabulime, MAK Junior Faculty	Selected & being implemented at MAK with software purchased through CIMTRADZ award
3	Mobile Veterinary Clinic for training and vaccinations	Sam Okech, MAK Junior Faculty	Selected & seeking additional funding
4	Hydroponic Fodder Production for Livestock	MAK Junior Faculty	Selected & seeking additional funding
5	New teaching techniques for Anatomy and Physiology	Sam Okech, MAK Junior Faculty	Not Selected
6	Graduate School Template for Thesis Submission	MAK Junior Faculty	Not Selected

The two management practices that were not selected for additional funding opportunities are low cost improvements that the MAK faculty plan to implement on a trial basis. During his study tour at MS State, Dr. Sam Okech, a MAK junior faculty member, was very impressed with MS State's teaching techniques, specifically the use of videos to teach procedures in Anatomy and Physiology. Before returning to Uganda, Dr. Okech made copies of these teaching videos, with MS State's permission, and plans to share them with his colleagues and use them in future lessons. Dr. Okech believes that this new practice will enhance the learning experience of his students and allow for better standardization of content taught in these classes. It will also allow those students that were not able to attend a particular class to view the video and procedure at another time and not miss any important information.

Exchanges made through the CIMTRADZ partnership also resulted in MAK adopting MS State's Center for Advanced Service Leaning practice of using templates for all theses submitted. Three new templates were developed and will now be utilized for all thesis submissions at MAK. These templates were created as tools to assist authors in meeting the formatting requirements as set forth in the Standards for Preparing Theses and Dissertations.

Objective 4: To strengthen the Center of Excellence at Makerere that provides academic, research, and community engagement leadership in IDM for TADZ.

Outcome 4.1: Regional coordinating capacity for community-oriented & problem solving education, research and extension/outreach in IDM developed at the Center of Excellence.

Nodes of Centers of Excellence

The CIMTRADZ partnership initiated seven nodes of centers of excellence, exceeding their original target of five (Table 9). Four of these centers of excellence were created at MAK, including the Africa Institute for Strategic Services and Development (AFRISA), the Zoonotic and Biosecurity Center (ZOOBIC), the Joint-National Animal Diseases Diagnostic Centre (J-NADIC) and the Ruth Keesling Wildlife Health and Research Center. AFRISA, one of the most successful centers of excellence, is a semi-autonomous Agency of MAK, which serves as a platform for advancing Industrial and Development Higher Education to transform society and contribute to national development through Animal Resources. AFRISA operates as an Academic-Community-Public-Private Partnership where the university works with the private and public sectors to train and deliver services. J-NADIC, another MAK center, was jointly established by the Government of Japan, MAK and the Government of Uganda to undertake research and training in biosafety and biosecurity centered on zoonotic diseases.

Table 9
Nodes of Centers of Excellence Initiated (FY12 to FY15)

No.	Country	University	Center of Excellence
1	Uganda	MAK	AFRISA
2	Uganda	MAK	ZOOBIC
3	Uganda	MAK	J-NADIC
4	Uganda	MAK	Ruth Keesling Wildlife Health and Research Center
5	Kenya	University of Nairobi	Wangari Maathai Institute for Peace and Environmental Studies
6	Tanzania	Sokoine University of Agriculture	SUA Centre for Sustainable Rural Development
7	Rwanda	University of Rwanda	Animal Biology Laboratory Center

Publications Produced

The partners have published six monographs and twelve peer reviewed articles between FY13 and FY15 (Table 10) featuring project activity lessons learned and student theses. Four of the articles were published in the special issue journal of North America Colleges and Teachers of Agriculture (NACTA) in September 2013. The theme of the journal was "Globalization: Implications for teaching and learning in post-secondary agricultural education." The papers discussed examples of scholarship of teaching with internationalization of curricula. The six monographs cover the experiences of MS-IDM students, faculty exchanges, disease outbreak investigation protocol, and gender and One Health issues (attached as Appendix E).

Table 10
Publications Produced (FY13 to FY15)

No.	Type	Title	Authors	Universities/Journal
1	Monographs	Research Fellowships and MS-	Etsay Assefa, Erick Komba,	MAK, MS State, SUA,

		International Infectious Disease Management Scholarships	Gabriel Tumwine & Charles Kato	Mekelle University, University of Nairobi, National University of Rwanda
2	Monographs	Disease Outbreak Investigation Protocol: Brucellosis Case Study	John Kaneene, Francis Ejobi, RoseAnn Miller, Jesca Nakavuma & John Kabasa	MSU & MAK
3	Monographs	Assessment of Human and Animal Disease Surveillance Systems in the East-Central Africa Infectious Disease Hotspot: A Case Study of Uganda	John B. Kaneene, John David Kabasa, Michael Muleme, Joyce Nguna, Richard Mafigiri & Doreen Birungi	MS State, MSU & MAK
4	Monographs	Gender Audit for Capacity Building in Integrated Disease Management: College of Veterinary Medicine, Animal Resources and Biosecurity, Makerere University, Uganda	Florence Wakoko-Studstill, Claire Card, Margaret Khaitsa, Douglas Freeman, Samuel Majalija, Gabriel Tumwine, David Okello Owiny, Samuel George Okech, John Kaneene & John Kabasa	MS State, MAK & CSU
5	Monographs	Exploration of One Health in the Global Environment through Model African Union (MAU)	Margaret Khaitsa, Florence Wakoko-Studstill, John B. Kaneene, Gabriel Tumwine, David Okello Owiny, Samuel George Okech & John Kabasa	MS State, MAK, MSU & CSU
6	Monographs	Africa-North America Faculty Exchange: An Accelerated Model for Capacity building	Margaret Khaitsa, John B. Kaneene, Gabriel Tumwine, David Owiny, Samuel George Okech & John David Kabasa	MAK, MSU & MS State
7	Peer Reviewed Article	An International Experiential Learning Program: A Study Abroad Experience in Uganda	Abel Ekiri, John Dacvid Kabasa, L.F Aceng, Margaret Khaitsa & Francis Ejobi	North American Colleges and Teachers of Agriculture Journal
8	Peer Reviewed Article	International Infectious Disease Management: A Case Study of Internationalizing Curricula	Abel Ekiri, John David Kabasa & Margaret Khaitsa	North American Colleges and Teachers of Agriculture Journal
9	Peer Reviewed Article	Africa-U.S. Integrated Disease Management Consortium: A Model for International Education and International Development	Margaret Khaitsa, John David Kabasa & Abel Ekiri	North American Colleges and Teachers of Agriculture Journal
10	Peer Reviewed Article	Effectiveness of vaccines and vaccination programs for the control of foot-and-mouth disease in Uganda, 2001–	Michael Muleme, Robert Barigye, Margaret Khaitsa, Eugene Berry, Anthony Wamono, & Chrisostom	Tropical Animal Health Production - Springer

		2010	Ayebazibwe	
11	Peer Reviewed Article	Case Study of Experiential Learning through a Training Model at the Science and Policy Interface: The National Animal Policy and Food Security Course	David Tendo, Abel Ekiri, Margaret Khaitsa & William Sischo	North American Colleges and Teachers of Agriculture Journal.
12	Peer Reviewed Article	Hygiene practices and good contamination in managed food service facilities in Uganda	Sylvia Baluka, RoseAnn Miller & John B. Kaneene	African Journal of Food Science
13	Peer Reviewed Article	The prevalence of brucellosis in cattle, goats and humans in rural Uganda: a comparative study	R. Miller, J.L. Nakavuma, P. Ssajjakambwe, P. Vudriko, R. Musese & John B. Kaneene	Transboundary and Emerging Diseases
14	Peer Reviewed Article	Knowledge, Attitudes and Practices regarding risk to human infection by zoonotic tuberculosis due to Mycobacterium bovis among cattle farming communities in Western Uganda.	Herbert Brian Kazoora, Samuel Majalija, Noah Kiwanuka & John B. Kaneene	Advanced tropical medicine and public health international
15	Peer Reviewed Article	An assessment of human disease surveillance systems in the East-Central Africa infectious disease hotspot: a case study of Uganda	Michael Muleme, Joyce Nguna, Richard Mafigiri, Doreen Birungi, John David Kabasa & John B. Kaneene	International Journal of Public Health
16	Peer Reviewed Article	A Comparative Assessment of Animal and Human Disease Surveillance Systems the East-Central Africa Infectious Disease hot spot: A case Study of Uganda.	John B. Kaneene, Michael Muleme, Joyce Nguna, Richard Mafigiri, Doreen Birungi & John David Kabasa	Transboundary and Emerging Diseases
17	Peer Reviewed Article	Gender Audit for Capacity Building in Integrated Disease Management: College of Veterinary Medicine, Animal Resources and Biosecurity, Makerere University, Uganda.	Florence Wakoko-Studstill, Juliet Kiguli, Margaret Khaitsa & John David Kabasa	The African Journal of Animal & Biomedical Sciences (AJABS)
18	Peer Reviewed Article	Service-learning yields benefits in zoonotic disease control: the case of rabies control in Mbuya II Zone in Kampala, Uganda.	Joshua Isiko, Samuel George Okech, Berna Nakanwagi, Samuel Majalija, David Okello Owiny, Margaret Khaitsa, and Florence Wakoko	American International Journal of Social Science

Objective 5: To improve community engagement and outreach program in the ECA Region.

Outcome 5.1: Problem-solving capacities of universities enhance livelihoods in the Region.

Outreach/Extension Activities

The CIMTRADZ partners conducted 17 outreach/extension activities between FY2013 and FY2015, including One Health field attachments, radio talk shows, community vaccinations and working with local businesses on food safety issues (Table 11). The most success activities were those were the MAK students were able to work independently and get hands on experience. The One Health field attachment exposed students to the practices the One Health concept and their practical application. It created an environment for MAK students to improve their communication skills with stakeholders, apply their technical knowledge while practicing skills to solve community problems, and identify community problems and opportunities and categorize them appropriately. The MS-IDM students and faculty traveled to Kotido and Kaleburr to administer vaccinations to their pastoral communities' sheep, goats, dogs and cats. These two communities are especially prone to livestock disease outbreaks because their pastoral system of livestock commonly results in livestock crossing international borders and easily sharing diseases.

Table 11
Outreach/Extension Activities (FY12 to FY15)

FY	No.	Outreach Activity
FY13	1	Transdisciplinary university teams for community engagement with the Pastoral Communities of Karamoja Systems
	2	Uganda Medical Association & Uganda Veterinary Association Conference
	3	One Health Field Attachment
	4	Veterinary Cap (VETCAP)
	5	Local Poultry and Goat Production and Business
FY14	6	Interaction with livestock owners at the Bukedea Livestock Market
	7	Introduction to livestock production systems, and visits to small holder farmers at Mbale
	8	Visit to a hospital, presentation on zoonotic diseases and malnutrition and communal grazing, visit to communal grazing operations and deworming cattle at Kumi
	9	Vaccination (Rabies and Newcastle) and deworming, radio show on Brucellosis and Hepatitis B and ox traction at Soroti
	10	Safe handling of birds, Measurements and Sampling (Blood, Fecal), and rodents Handling, Measurement and Sampling at Kibale National Park
	11	Darting, monitoring, Sampling and treatment at Queen Elizabeth National Park
	12	Identifying challenges and research opportunities at Lake Mburo National Park
FY15	13	Community sensitization outreach at Kalerwa Abattoir
	14	Vaccination of Sheep and Goats in Kotido
	15	Radio Talk Show on Brucellosis
	16	Vaccination of Sheep, Goats, Dogs and Cats in Kaleburr
	17	Service Learning

3.2 Challenges

Delay in Remission of Invoices/Receipts
The MAK program team struggled with submitting their quarterly expenses and receipts to NDSU in a timely manner, which resulted in delay of release of more project funds. This delay led to delays in implementation of project activities at MAK, including continued work on partnership reports up to the

end of the project and the NDSU partners working long hours and weekends to meet project deadlines. In order to continue with project implementation, MAK was forced to find temporary alternative sources of funds to support activities until NDSU processed their payments. Throughout Phase I of the partnership, NDSU continued to work with MAK to speed up acquisition of receipts and invoices for cost reimbursement.

M&E Reporting
During HED's four monitoring visits to MAK, the partners shared the reporting challenges they encountered throughout the partnership implementation. Reporting did not always include all the activities that had occurred during the reporting period. The majority of the issues related to reporting occurred during Phase I of this partnership when several M&E procedures and tools, including target setting, indicator definitions and establishing the level of analysis were incorporated into the M&E plan in the middle of implementation. The partners struggled with differentiating between the network and the partnership and establishing a consistent and clear level of analysis. The NDSU and MAK partners originally wanted to include all activities that occurred under the larger network in reports. This made it difficult to reach consensus on what were results of the partnership and which occurred beyond the scope of the partnership.

After the second tranche of funding was approved and the lead U.S. partner institution changed, HED and the partners worked together to redesign the Results Framework and implementation plan. There were many conference calls and in person meetings held to review the scope of work and better under the meaning of the indicators. This type of reporting was initially very challenging for MAK because their departments did not have prior experience with M&E.

Target Setting
Confusion over the indicators and the scope of work resulted in the partners setting incorrect targets at the beginning of the partnership. HED worked with the partners to carefully review each of the standard indicators in order to better understand their definitions and establish accurate targets.

Costed Extensions and Partnership Transfer
Delays in the modification for the costed extension to the Associate Award by USAID created subsequent delays in execution of subawards between ACE/HED and MS State, as well delays in sub-sub agreements between as MS State and MAK. This situation significantly affected FY14 implementation and accomplishments. These delays resulted in pushing back and changing some of the activities planned for FY14 and FY15.

Communication between MS State and MAK
MS State and MAK did not establish an effective communication strategy and plan, resulting in difficulties obtaining information and submitting reports in a timely manner. This also affected the transferring of funds to MAK from MS State and flow of necessary financial documentation from MAK to MS State. HED instituted regular conference calls with MS State and MAK to address these issues.

Quality of Reporting
Throughout the life of the partnership, it was challenging to get comprehensive and accurate programmatic and financial reports from the partner institutions. Although the monthly conference calls with HED and USAID ameliorated the situation somewhat, HED still had to work extensively with partners to systematize data collection, storing and reporting so that partnership progress could be adequately documented and the pace of implementation improved. The reporting quality improved significantly in FY15, when both MS State and MAK appointed project managers to oversee implementation and reporting.

3.3 Lessons Learned

Importance of Communication
Both of the U.S. lead partner institutions, NDSU and MS State, and MAK struggled with establishing clear and consistent communication channels to keep all members of the project team up to date on the status of implementation and potential challenges. The partners worked best when they met regularly, whether over the phone or in person. All partners agreed that it is imperative that the project team hold monthly conference calls to give updates, discuss the financial burn rate and review the implementation plan.

Need for Financial Database and/or Tracking System
The MAK partners discovered gaps in their financial system that prevented them from submitting and tracking invoices in a timely manner. These delays impacted the U.S. institutions ability to submit payments for their completed activities. In order to better track this process, the MAK project team noted that they needed to develop a parallel database to both track project activities and expenses by accounting personnel, Project Manager and the Partnership Director.

Map Complex Approval Processes to Ensure Timely Implementation
This partnership has been true to its goal to engage researchers in neighboring countries of East and Central Africa. Because the focus of the research was zoonosis, research boards at the institutional and national level accorded heightened importance and visibility to the review process. As a consequence, an already cumbersome process was made more difficult with the added levels of institutional bureaucracy required for approval of research on animal and human subjects. The partners learned that they needed to start processing approvals for the different institutions, the Institutional Review Boards (IRBs) and the Institutional Animal Care and Use Committee (IACUC), as early as possible to avoid delays in conducting research and general project implementation.

Frequent and Timely Management Communication
HED organized monthly conference calls to help facilitate timely discussions and troubleshoot challenges in support of success in implementation, as well as create common understanding of challenges and issues related to implementation. Continuous engagement and communication between HED and the MS State/MAK partners, as well as USAID/Uganda provided guidance on issues such as developing M&E plans, budget utilization and realignment, faculty/staff travel and meeting organizations.

4. Sustainability

The CIMTRADZ partners continue to pursue funding from external resources and work to expand their engagement with institutions in the ECA region, including strengthening the collaborative relationships with the Inter-African Bureau for Animal Resources of the African Union (AU-IBAR). The CIMTRADZ partners and their institutions are committed to continuing this partnership after the end of the award and currently working on additional proposals to continue funding activities, like the faculty exchange program, the annual Boma workshop and the vaccination outreach program.

5. Success Stories

5.1 Collaborative Efforts to Enhance Epidemiological Research Capacity

The Africa-U.S. Integrated Disease Management Network (AFRUS-IDM) is a strong collaboration of partner Higher Education institutions both in US and Africa that was established to advance Higher Education led Development in Africa. As part of the CIMTRADZ project, North Dakota State University (NDSU) and Makerere University (MAK), Kampala, Uganda run a joint Master of Science Degree curriculum in International Infectious Disease Management and Biosecurity (MS-IDM) and a Graduate Certificate (GC) and Undergraduate Certificate (UGC) in International Infectious Disease Management and Biosecurity (IDM). As of September 2013, 10 students from Uganda have benefitted from the CIMTRADZ project. A cohort of four students completed the MS-IDM program in December 2012, and a second cohort of 6 students will complete the program in December 2013.

Michael Muleme is an assistant lecturer in the department of Bio-molecular resources and Bio-laboratory sciences at MAK. He was born and raised in Kampala and went to St. Henry's College Kitovu and St. Mary's College Kisubi. Michael holds a Bachelors degree of Veterinary Medicine from MAK, Kampala Uganda with a Grade Point Average of 4.17, and a Master of Science in International Infectious Disease Management (MS-IDM) from NDSU. Through his studies, the partnership provided Michael the opportunity to do a clerkship in Food Animal Medicine and Surgery at Michigan State University Teaching Hospital, with the Training Centre for Dairy Professionals and Centre for Comparative Epidemiology. This experience expanded Michael's expertise and knowledge of Microbiology, Epidemiology and Clinical aspects of Infectious Diseases in the Developed World.

The MS-IDM program also paved Michael's way to receive a PhD offer in Infectious Disease Epidemiology from the University of Melbourne and a 25,000AUD scholarship per year that covers living expenses, research, and a relocation grant. Michael has presented his work in several conferences, including the One Health conference in Uganda, and published his first publication Effectiveness of vaccines and vaccination programs for the control of foot-and-mouth disease in Uganda, 2001-2010 in the Journal of Tropical Animal Health and Production.

5.2 Vaccination of dogs and cats against rabies: A One Health service-learning community outreach in Soroti District in Uganda

By Ms. Julia Kabajurizi

I was one of the beneficiaries of Summer School 2014 Eastern Route. I was given an opportunity to interact with both local and international participants from Rwanda, Canada, USA, Kenya, Tanzania and Uganda. It was really a global knowledge sharing platform where different participants from different regions or countries shared their experiences and socio-culture.

We got involved in many activities, like the introduction to livestock production systems, visit to small holder farmers, culture and society. We also participated in One Health activities like Brucellosis radio talk show; carrying out vaccination of dogs and cats against rabies and poultry against New Castle Disease; district hospital visits; cattle market visits, among others. My interesting activity was the Rabies Vaccination One Health outreach activity in Kamuda sub-county in Soroti District in Eastern Uganda, given that my undergraduate degree was in Biomedical Laboratory Technology and now I am a Graduate student of International Infectious Disease Management (IDM) in Makerere University.

Through HED-USAID, under summer school, I got to come closer to dogs and later I realized that I have a role to play in line with One Health. Rabies being a zoonotic disease, I appreciated community concerns about dog bites and likelihood of rabies that was reported to be a problem in the communities especially where dogs were not vaccinated routinely and their welfare not well managed by the owners. In this activity we were engaged in community mobilization, community sensitization about Rabies (how humans and animals get infected, how it is prevented and what should be done in case of dog bite) and also later in the next day vaccination of the animals. The team involved veterinarians from the district, health inspectors, clinicians, nurses and other stakeholders like community leaders and elders. It was so fascinating how people in rural Uganda treasure their dogs and how they were willing to learn more about other diseases a man can get from dogs. I got to know the values of restraint in dogs when administering any treatment, also learned that Rabies is a killer disease that is controllable. We vaccinated dogs of all breeds and origin. I remember one of the dog owners wishing to be vaccinated also using human vaccine and when I asked my Veterinary colleagues they just laughed and advised me not to. It was really great as I valued team work and appreciated professionalism, specialization and the benefits of multidisciplinary approach to contributing solutions to community problems.

Julia Kabajurizi conducting rabies vaccine trainings in the Soroti District (Uganda 2014)

5.3 Brucellosis Radio Talk Show

By Mr. Patrick King

It was my first time to participate in a radio talk show; moreover a live broadcast. It was in the evening when a team of experts from Makerere University and summer school participants were involved in the talk show. It involved two main languages i.e., English and Ateso. It covered a talk time of more than one hour on a live call-in popular evening radio program whose topic of focus was Brucellosis. We talked about brucellosis as a disease, how it is transmitted in animals and humans, clinical signs of the disease in animals and humans and how the disease can be prevented. It was interesting to hear the version in the local language.

Summer School students and Dr. Margaret Khaitsa participating in the live broadcast radio talk show in both English and Ateso (Kampala, Uganda 2014)

After our elaborate introductory presentation, the public was invited to call in. It was interesting that many calls came in. Initially I thought people would not understand the subject that easily but many people called in and asked relevant questions which showed that people understood. I learnt from their questions that the public was eager to know more information about their livelihood as well as animal welfare. One caller was so excited that he asked “should people now stop eating meat since no one can

see the disease and it is dangerous?" To me I had a mixed feeling that either the caller was genuinely worried or just joking. He was told that he handles delivering animals with care as well as eating well cooked milk and meat. Many called to appreciate the program and requested for more related programs. Professor Margaret Khaitsa informed the public that the talk show was sponsored by USAID-HED through Makerere University and partner universities from America led by Mississippi State University. She requested local leaders and professionals to embrace the One Health approach and use it to educate the community so as to meet community need for knowledge to improve their health and that of their livestock.

Summer School students from Ethiopia, Kenya, Rwanda and Uganda taking questions during the live radio talk show (Kampala, Uganda 2014)

The program was very exciting to me and I am sure it was to my fellow participants as well. Special thanks to USAID-HED and all the partner universities in the CIMTRADZ project for working together with Soroti District professionals; district leaders; management and staff of Caritas Radio to organize this wonderful talk show.

5.4 The Role of Abattoirs in Public Health: A training on the aspects of abattoir hygiene and occupational health

With financial support from Capacity Building in Management of Integrated Trans boundary Animal Diseases and Zoonoses (CIMTRADZ) project and material support from Kampala Capital City Authority, students of International Infectious Diseases Management (IDM) together with the One Health Students' Club at Makerere University and the One Health residency program held a Community Sensitization outreach at Kalerwe abattoir on 6th December, 2014. Abattoir workers are at very high risk of acquiring zoonotic diseases in the course of their day to day activities such as brucellosis and tuberculosis. The main aim of the outreach was to create awareness among abattoir on possible zoonotic diseases associated with handling and slaughter of animals. The mobilization for the campaign was done by the area local chairperson while that for the students was done by the student leaders. Associate Professor Samuel Majalija led the team which was comprised of students from College of Veterinary Medicine Animal Resources and Biosecurity and the School of Public Health.

MAK students and abattoir staff cleaning and clearing the cattle holding area outside of the abattoir (Kampala, Uganda 2015)

Workshop Objectives:
1. Sensitization of abattoir workers on possible zoonotic diseases associated with handling and slaughter of animals.
2. To promote proper hygiene in the abattoir through cleaning as an example.

With respect to disease transmission, food safety, environmental conservation and public health issues, this community engagement activity focused on the health for abattoir workers in regards to zoonoses, animal welfare, production of quality meat and sanitation and hygiene in abattoirs. This workshop

attracted over 150 participants among which were cattle traders, butcher-men, local leaders, and meat consumers.

Opening remarks were given by the managing director of the Kalerwe abattoir, Haji Ahmed Kezaala, who shared on the public health concerns in abattoirs, challenges faced in regards to diseases. He asked the abattoir workers to cooperate with the students and declared the exercise open. The students started by cleaning the various compartments of the abattoir to set an example in improvement of abattoir sanitary conditions. Thereafter, a sensitization workshop involving discussions and sharing of information on zoonotic diseases was held. Dr. Nkuranga Charles started by highlighting the importance of meat inspection, Dr. Bugeza James and Dr. Kankya Clovice shared the risk factors to zoonotic diseases with a main focus on tuberculosis and brucellosis. This was then followed by Dr. Tayebwa Dickson who talked about issues to deal with animal welfare such as animal handling, transportation and slaughter. Mr. James Muleme, a student from School of public Health shared on sanitation and Hygiene in abattoirs. Closing remarks were given by Associate Professor Samuel Majalija who thanked the entire team for working together during the activities despite varying backgrounds. Thereafter, he announced the activity closed.

Workshop participants actively engaged in One Health talk with MAK staff and students (Kampala, Uganda 2015)

5.5 New Skills in Applied in Dairy Product Processing and Safety

By Dr. Norah Gulaita

Making cheese of various types and flavors through manipulation of the ingredients and processing parameters. Making premium ice cream using cream and milk and the importance to concentrate on products that one can process to make the best quality product and allow enough time to come up with new customized items and products. Each of those flavors was made to suit a particular occasion. I could not believe ice cream flavors existed for such occasions like Halloween, Thanksgiving, College football, to mention but a few.

Dr. Norah Gulaita at Department of Bio-molecular Resources and Bio-lab Sciences learned how to properly plan a profitable dairy processing enterprise taking into consideration the consumer's preferences to ensure that it is self-sustaining. Such an enterprise if properly managed can generate income while acting as a training ground or a business incubation center for other people. Dr. Gulaita said, "with experience from the exposure visit in the U.S. attached to the sensory evaluation lab in the Department of Food Science and Human Nutrition, College of Agriculture and Natural Sciences, I wanted to carry out value addition on milk." Whereas there has been improvement in the quality of chees and ice cream products, more research is needed to take them to a level where they are very competitive on market. "I learned the principles of food product development ranging from carrying out consumer market surveys, coming up with new ideas and recipes for developing alternative products to designing and performing the sensory evaluation of new foods that will equip me with the knowledge and skills to help our students offering AFRISA courses to improve their products," said Dr. Gulaita.

In the area of training, Dr. Gulaita indicated that before he attended this training he was very good in teaching the principles of chemical analysis of nutrients in animal feeds and food but mostly theoretical in nature. "The training helped me appreciate how instruments are used in analysis of fat soluble vitamins, free fatty acids, phytochemicals and micro minerals in food and feed. I can now explain the

principles behind chemical analysis of nutrients in feed and food and blood with more confidence, and ably advise students on some of the methods to use in their research," said Dr. Gulaita.

5.6 Mind Opening Opportunities at Mississippi State University

By Dr. Muzoora Saphan

September 15, 2014 was the day I left Uganda for USA specifically to a state with Southern hospitality, the Mississippi State where the prestigious Mississippi State University (MS State) is located. Although there were many reasons I went to MS State, the overarching objective was capacity building. While at MS State, I got an opportunity to undertake various trainings in the fields of pedagogy, laboratory diagnostics, grant writing, policy brief formulation, research proposal writing among others. I must emphasize that I went to USA with an open mind and therefore could not afford to close my senses to any learning opportunity that came by. For instance, I appreciated the good working relationships between professors and students. On this note, I must report that my working relationships with students have greatly improved. I now find time to learn about the learners' profile and make appointments with students to address their unique concerns. This was a great achievement because the practice in most African Universities and other institutions of higher learning is that there is always a big gap between the teacher and the student. This does not only create a poor learning environment but also ill trained graduates are churned out. The situation is bad when it comes to gender issues where it is perceived that interacting with students of opposite sex tantamount to a crime.

While in different laboratories, I observed that students are heavily involved in the daily running of the labs and that faculty work with students particularly in research. This creates an opportunity for the students to acquire the necessary practical skills. With this experience, I developed an action plan of establishing a mini research laboratory at my University to enable both the junior faculty and students do research and acquire the necessary practical skills. This action plan was presented to the faculty at MS State and later to the administration at Makerere University, COVAB. I am happy to report that the space for this lab has already been secured and renovations are ongoing. It is anticipated that by the end of April, the lab will be fully operational. On this note, allow me thank the CIMTRADZ team and USAID for giving me the necessary support to undertake this training. I would also like to thank my colleagues in the division of Biochemistry for making this dream a reality.

In addition, I was able to write several PhD concept notes under the guidance of my mentors Prof. Hart Bailey and Prof. Khaitsa Margaret. What is interesting about this experience is that together with my mentors basing on one of PhD concepts I developed, we wrote and submitted a mini research grant worth USD 5000 on "Strengthening and advancing Food safety Education (SAFE)": The Case study of Uganda. I am happy to note that we won this grant and the International Institute of Mississippi State University is funding it. One of the objectives of this grant proposal was to develop my PhD concept on chronic human aflatoxicosis in Uganda into a full proposal. Thus, one of my mentors will travel to Uganda in June to do a ground assessment of the physical facilities needed for execution of this work and continue with physical mentorship. It also anticipated that the full PhD proposal will be used in applying for a bigger funding. I must report that before I went to USA, I had no grant writing skills. Thank you my mentors! Lastly, while at MS State I attended several lectures and appreciated the different teaching approaches including video recording and provision of notes to students through various avenues in advance. With support from USAID, I was able to acquire the necessary teaching aids to improve my teaching skills.

5.7 Enhanced capacity in designing service-learning impact assessment tools

By Dr. Sam G. Okech

I am one of the faculties from the College of Veterinary Medicine, Animal Resources and Biosecurity (COVAB), Makerere University (MAK) who visited universities in the United States with support from the CIMTRADZ project for capacity enhancement over a period of three months (September to December 2014). I was stationed at Mississippi State University (MS State) where I learned a lot from the people I interacted with, places I visited and practices I saw and engaged in. One of the key areas of interest for me was to gain deeper understanding and capability in designing studies for assessment of service-learning impact, which is the subject of my PhD study interest. Coming from a largely science background, designing studies and data collection tools in social sciences was not one of my strengths and yet I had a deep desire to carry out studies (in service-learning) that required these skills. My draft concept therefore needed greater improvement in the methodology area.

While at MS State, through the mentorship guidance and support from Dr. Margaret Khaitsa and Dr. Skip Jack (both of the College of Veterinary Medicine), I was privileged to meet Dr. Kathleen Ragsdale of the Social Sciences Research Center (SSRC), Dr. April Heiselt and Dr. Laura Downey of the Center for Advancement of Service-Learning Excellence (CASLE). Their guidance, advice, tips and resource materials recommended and shared have greatly enhanced my capacity to write my PhD study methodology. While still in MS State, I improved on and submitted the PhD concept to Makerere University and was offered provisional admission. I am now in the process of developing the concept into a full proposal to gain full admission. I am very sure I am on the right track in writing especially the methodology section of the proposal and particularly developing data collection tools, among others. I am confident that I will soon embark on the study, obtain very good data, successfully complete the PhD studies and write joint publications and grant applications with colleagues in MS State. I am also now in a better position to guide my students in design and execution of social sciences-related studies. Thanks to the opportunity presented by the USAID-funded CIMTRADZ project managed by HED.

6. Appendices

Appendix A: Makerere University & North Dakota State University Final Report

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APPENDIX B ATTACHED AS SEPARATE DOCUMENT

Appendix C: Master of Science Degree in International Infectious Disease Management Curriculum

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Appendix D: CIMTRADZ Policy Briefs

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Appendix E: CIMTRADZ Monographs

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Appendix F: Additional Success Stories

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Appendix A. Makerere University & North Dakota State University Final Report

CAPACITY BUILDING IN INTEGRATED MANAGEMENT OF TRANSBOUNDARY ANIMAL DISEASES AND ZOONOSES (CIMTRADZ)

Partnership Phase 1(2011-2013) Report

Lead Higher Education Institutions: Makerere University & North Dakota State University

North American Partners: Columbus State University, Kansas State University, Michigan State University, University of Minnesota, University of Saskatchewan, Washington State University.

East & Central Africa (ECA) Partner Institutions: Mekelle University (Ethiopia), Sheik Technical College (Somalia), Sokoine University of Agriculture (Tanzania), University of Nairobi (Kenya), Umutara Polytechnic (Rwanda)

ECA Non-Government Organizations: Africa Field Epidemiology Network (AFENET), Conservation Through Public Health (CTPH) and Terra Nuova.

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Acryomns

AFENET	Africa Field Epidemiology Network
AFRISA	Africa Institute for Strategic Animal resource services and development
AU-IBAR	African Union –International Bureau for Animal Resources
CDC	Centre for Disease Control (USA)
CoVAB	College of Veterinary Medicine, Animal Resources and Biosecurity (Mak)
CSU	Columbus State University (USA)
FAO	Food and Agricultural Organization
HEIs	Higher Education Institutions
IFRI	International Forestry Resources Institution
IGAD	Inter-Governmental Authority on Development
MAK	Makerere University (Uganda)
MEME	Multiple Entry Multiple Exit
MSU	Mississippi State University (USA)
MSc IDM	Master of Science, Infectious Disease Management
NDSU	North Dakota State University
NGO	Non-Governmental Organization
USAID	United States Agency for International Development
USDA-	United States Department of Agriculture

Executive Summary

Transboundary Animal Diseases (TADs) are epidemic diseases which are highly contagious or transmissible with potential to rapidly spread irrespective of national boarders causing serious socio-economic and public health concerns. They have caused and continue to cause major livestock production losses, inhibited or disrupted trade in livestock and their byproducts posing imminent danger for food insecurity and high levels of poverty especially in local communities. In recognition of the potential impact of TADs on national and global economies, **Africa-US Integrated Disease Management Network (AFRUS-IDM)** with support from USAID through Higher Education for Development (HED) implemented a project entitled: ***Capacity Building in Integrated Management of Transboundary Animal Diseases and Zoonoses (CIMTRADZ)*** in East and Central Africa (ECA) since 2011. The project implemented a number of initiatives in capacity building to improve surveillance, diagnostic potential and management of TADs in the participating institutions. In addition, protocols were developed for disease surveillance and research undertaken that further contributed to knowledge and skills for the management of TADs. Partnerships and networks of participating institutions were enhanced and more stakeholders brought on board especially the national agencies responsible for disease control in the participating countries.

1.0. Introduction

In order to address the challenges posed by Transboundary Animal Diseases (TAD) that continue to threaten the regional and global health and economies, USAID provided funding to the Higher Education Institutions (HEIs) in Africa, United States and Canada. The USAID funding was towards an identified project theme entitled: ***Capacity Building in Integrated Management of Transboundary Animal Diseases and Zoonoses (CIMTRADZ)*** in East and Central Africa (ECA). This project was launched in Uganda during the 1st stakeholder's inception meeting 29th Jan-3rd Feb, 2013 at Hotel Imperial Royal in Kampala, Uganda. The project would be implemented under the forum constituted by HEIs in Africa, United States and Canada and for all references in all documents referred to as "**Africa-US Integrated Disease Management Network (AFRUS-IDM)"** to advance higher education led development in Africa.

The AFRUS-IDM then set forth the **vision** of being: '***A leading higher education consortium for excellence in integrated disease management and socio-economic development in Africa*"** with the **mission** *to transform a consortium of higher education institutions into agents of development change.* The main goal of AFRUS-IDM was to empower food security, animal and public health systems for sustainable community development in Eastern and Central Africa.

AFRUS-IDM implemented phase 1 project (2011-2013) under the program CIMTRADZ with the primary goal of building capacity for integrated management of trans-boundary diseases and zoonoses and inclusive social-economic growth in ECA. In order to build a system for effective disease management, the program had three principle broad objectives:

1) Provide transformative education in integrated disease management for trans-boundary animal diseases and zoonoses (pathogens that move from animals to people) that affect East and Central Africa (ECA) and the world;

2) Promote and support collaborative research and training in trans-boundary animal diseases and zoonoses of regional and global importance in ECA; and

3) Engage communities' positive involvement in sustainable resource management practices which promote animal health, public health, and food security.

1.1 Background information

Protecting the world from trans-boundary health threats demands a global perspective in investment in global animal and public health infrastructure (Domenech *et a*l., 2006). While any point on the globe could be the origin of the next global pandemic, at least 70% of the known human and animal pathogens affecting animal production, public health, global trade, and security are resident in Sub-Saharan Africa (AU-IBAR, 2007) and, in particular, Eastern and Central Africa (ECA). Thus this region has become a bio-risk incubator for Africa and the global community (Wakhusama *et al*., 2009). Sustainable interventional strategies are therefore necessary to minimize these risks. Indeed the current outbreak of the deadly Ebola virus in West Africa which continues to challenge those attempting to contain it and the very real risk of its becoming a global pandemic due to fast mobility highlights the need for continued global approaches and collaborative research with Sub-Saharan Africa. *'More than 22 million people live in parts of Africa where conditions exist for the Ebola virus to jump from animals to humans, a bigger area than previously thought, researchers said on September 08. While the actual risk of animal-to-human or "zoonotic" transmission is low - with just 30 confirmed cases in history - the wide geographic spread boosts the potential for future human outbreaks, which always start with the virus crossing the species barrier, they said'* Business Recorder Sept 15, 2014.

1.2 Partnership Overview

Higher Education Institutions (HEIs) are among the most stable, neutral and sustainable institutions in Africa, with tremendous untapped resources of human skills and infrastructure, therefore possess the best way forward, for research in order to keep up with evolving animal and human diseases. "**Africa-US Integrated Disease Management Network (AFRUS-IDM)"** was established on this strong belief and desire to advance Higher Education-led development in Africa. The North American partners include North Dakota State University (NDSU), Michigan State University, Columbus State University, University of Minnesota, Kansas State University, Washington State University, University of Saskatchewan (Canada) and more recently Mississipi State University in 2014 joined the

consortium (Fig.1). On the other hand the African partners include: University of Nairobi (Kenya), Sokoine University of Agriculture (Tanzania), Mekelle University (Ethiopia), Umutara Polytechnic (Rwanda), Sheik Technical Veterinary School (Somali land), Africa Epidemiology Network (Non- Governmental Organization [NGO]), Terra Nuova - Eastern Africa (NGO), The Intergovernmental Authority on Development (IGAD), and Conservation Through Public Health (NGO) (Fig 2).

Figure1: USA and Canada Collaborating Partners

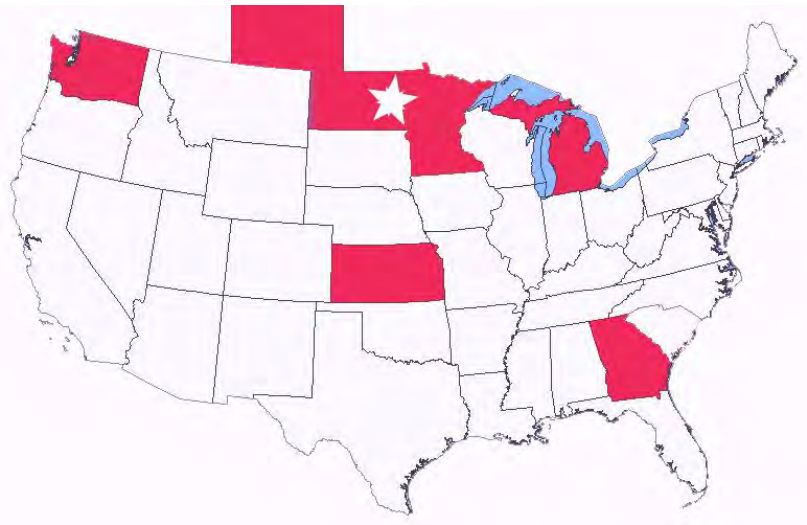
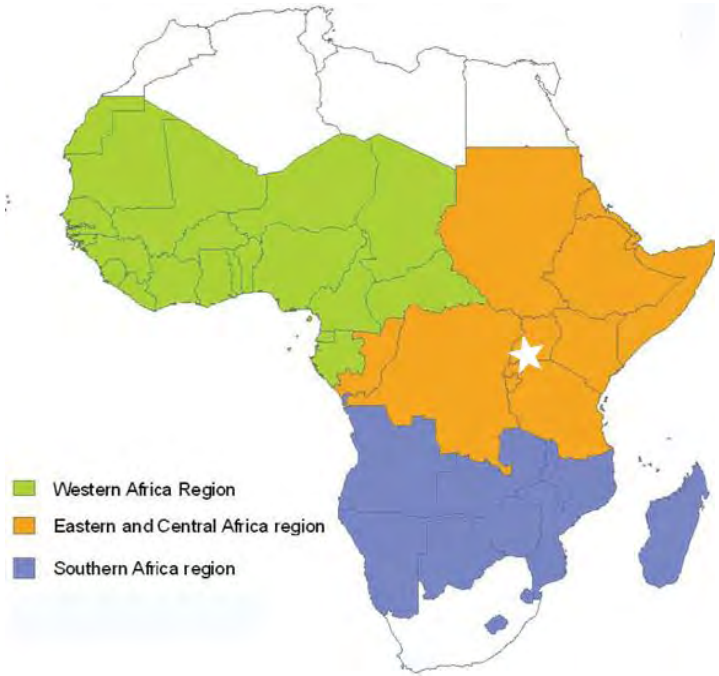


Figure 2: East and Central Africa Partners



2.0 Key Achievements

Africa-US Integrated Disease Management Network (AFRUS-IDM) has registered tremendous achievements in the implementation of CIMTRANDZ program since 2011.

- **Launch of CIMTRADZ**: The landmark and a trigger to the achievement was with the launch of the network during the inception workshop 29th Jan-3rd Feb, 2013 at Hotel Imperial Royal in Kampala, Uganda. (Appendix 1: AFRUS-IDM Newsletter, 2012). Here, the program was launched but importantly the CIMTRADZ governance structure was established and participating partners agreed on the implementation framework (Appendix 2: Work plan).
- **Communication Strategy**: The network also agreed on communication strategy that led to the development of a functional and dynamic website for easy sharing of information, updates and any other resources: http://www.afrusidm.org
- **Training and capacity building.** A number of academic programs and short courses were established, curriculum reviews were undertaken to ensure appropriate training is undertaken to address the challenges of TAD. The details of the programs described in the next text.
- **Resource Mobilization;** The Network utilized its strength of a strong partnership to mobilise for leverage funding for program sustainability (Details below)

2.1 Training and Capacity Building

2.1.1 Master's Program in International Infectious Disease Management at Makerere University (MSc.IDM)

Master's Program in International Infectious Disease Management at Makerere University (IDM) was established and jointly offered in the first phase with North Dakota State University. The enrolled students under this program were fully supported in terms of tuition and research fees including stipends while in Uganda and USA. A total of 10 students have graduated from the program and more students 25 will be completing in the year 2015.

One of the course modules in IDM was smartly delivered through the Summer Course to achieve the following objectives:

i. To equip participants with knowledge and skills in animal production, disease surveillance and public health

ii. To expose participants to practical skills (experiential learning) in wildlife and eco-system health management

iii. To equip participants with soft skills for knowledge sharing, mentorship and networking through an international cultural boma[1].

iv. To provide an opportunity for dissemination of research outputs in integrated diseases management through a scientific conference

The project has for trained 14 students in the MS-International Infectious Disease Management and Biosecurity (MSc-IDM) program and more 25 students and faculties are expected to be trained by the end of phase11 in 2015.

Inaugural Class of MS International Infectious Disease Management and Biosecurity (MS-IDM, 2011)

[1] *An African culture that involves transfer of wisdom and knowledge from the (wise, knowledgeable and highly experienced) elders to the young that they are nurturing and mentoring into responsible members of the community*

2.1.2 **Summer Course**

The annual COVAB summer course was adopted, reviewed and incorporated as part of the Msc.IDM. This is a 4 weeks program that is attended annually by graduate students from Uganda & USA and academic staff who are at the beginning of their careers among participating institutions in East and Central Africa (ECA). The 4-week program is sub-divided into four sections:

- 3-4 Days of lectures undertaken from COVAB
- 16 days of field and hands-on exposure in Production Systems in Small holding settings and livestock disease control (Eastern Route) and Wildlife and Ecosystem Health Experiences (Western Route)
- 2-3 days of International Cultural Boma
- 2 days of International Conference

Between 2011 and 2013, 45 students benefited (through enhanced knowledge, exposure to a tropical environment and cultural understanding) from the summer course and several academic and administrative staffs involved in organizing and implementing the summer course have gained new skills with multiple benefits to their universities and their personal and professional development.

Summer School Participants, 2012 before departing for wildlife field experience in Western, Uganda

Summer Course (2012-2013) Field work in Queen Elizabeth National Park (Western Route)

2.1.2 **International Cultural Boma**

In order to enhance the culture of mentoring and information sharing, an International Cultural Boma was introduced in the summer course based on the principle described below:

The concept of 'Boma' is derived from an African word with varied but closely related meanings and interpretations. Its use in this context is based on one of the interpretations drawn from a practice in an African culture that involves transfer of wisdom and knowledge from the (wise, knowledgeable and highly experienced) elders to the young that they are nurturing and mentoring into responsible members of the community. This happens in a relaxed peaceful, relatively secure and conducive environment usually around a fire place in the evening, sometimes under a roof and sometimes in open air with a bright sky lit by the moon and stars. Bites and drinks are shared; sometimes roasted or boiled using the same fire that also drives away cold and disease vectors (such as

mosquitoes). Fire also scares away wild animals thereby limiting them within safe distance so that they and humans can peacefully co-exist in the same environment. Such a setting would be called a 'Boma' in some African communities. Besides the wisdom and knowledge shared and transferred in a Boma, lots of new ideas are hatched during the discussions and several plans and strategies are crafted.

The 'Boma' was held twice in the first phase for 2-3 days at COVAB, Makerere University, Kampala, Uganda. The 'Boma' discusses the past (drawing from experiences, case studies and best practices), the present (learn from current developments) and the future (lay down strategies for progressive development) of the 'One Health' agenda. Makerere University is not only one of the oldest and prestigious universities in Africa, but its campus is located in an ecosystem rich in diversity, sitting on one of the many hills that define Kampala City. It is hoped that from this 'Boma' will sprout research and development ideas from which plans and strategies for collaboration will be drawn.

Boma objectives include but not limited to

- Provide opportunity for presentations, brainstorming, meditations and discussions that will yield research and development ideas for collaborative initiatives.
- Provide an environment for a mentoring relationship between students, junior faculty, field practitioners, technicians, researchers, practitioners and distinguished academicians.
- Enhance inter-regional and international networking between participants from various institutions.
- Provide opportunity for sharing unique experiences from which best practices will be derived.
- Provide opportunity for skills and knowledge transfer and acquisition.

The participants of the Boma for 2012 and 2013 were multidisciplinary and composed of mainly funders, policy makers, university administrators, academicians, researchers, field practitioners, graduate and undergraduate students drawn from public and private institutions from North America and Eastern Africa represented by the following:

- **North America Universities**: North Dakota State University, Michigan State University, University of Minnesota, Iowa State University, etc.
- **Eastern Africa Universities**: Makerere University (Uganda), University of Nairobi (Kenya), Sokoine University of Agriculture (Tanzania), Mekelle University (Ethiopia), Umutara Polytechnic (Rwanda), Sheik Technical Veterinary School (Somali land)
- **Regional and Local Institutions**: African Field Epidemiology Network (AFENET), Conservation Through Public Health (CTPH), Regional Universities Forum (RUFORUM), COVAB, College of Health Sciences, Uganda Wildlife Authority, NADDEC, Uganda Veterinary Association, Uganda Wildlife Veterinary Network.

The Boma also offered specialized workshops to participants in 2012; two workshops (Rabies diagnostics, and use of R-Software for data analysis) were conducted as part of capacity building.

2.1.3. International Conference

Platforms for the scientific research and information dissemination remain unlimited in the developing country settings, hence under CIMTRADZ, opportunity was established to fund annual conference at the end of summer course. Two International Conferences Integrated Diseases Management (IDM) under the funding were held in 2012 and 2013. The conference in 2012 held on 12-13th July, 2012 at Sheraton Hotel, Kampala under the theme: "Integrated Management of Trans-boundary Diseases for Inclusive Economic Growth", was attended by more than 250 regional and international participants.

The conferences provide opportunities from sharing experiences, research findings and advances in technology to management of transboundry zoonotic diseases in the global perspective of One Health Concept in relationship to the specific theme. The conferences attracted global keynote speakers that interacted and shared their experiences with the students, professionals, practitioners of veterinary and public health nationally and regionally. Important topics like: ***A World in Change; The Rising threat of 'Zoonotic' Diseases*** **Dr. Thomas Easley (Emerging Pandemic Threats Program;** ***Cultural context in Disease Management*** **by Prof. Wotsuna Khamalwa** were presented and discussed. (Conference Report)

2.1.4 Workshops and Short term Training

In order to ensure efficient resources utilization, specialized workshops were organized and held during the International Cultural Boma period for the year 2012-2013 and these include;

a. Rabies Diagnostic Workshop

b. Use of R-Software for data analysis

c. Outbreak Investigation Workshop

2.2 Other special Trainings

i. **National and Global Animal Health and Food Security Program (NGAHFS):** Climate Change and Livestock - the Science, Politics, and Beliefs and how they may affect food security.

The program by Washington State University in partnership with University of Minnesota, and University of California Davis was offered to students from universities under the consortium as part of capacity building. The training program attended by 44 participants in Washington DC was run in three sessions as follows:

- 18 participants (1-UCD, 3-WSU, 5-UMN, and 9-NDSU) in May 14-18, 2012,
- 13 participants (1-UCD, 2-WSU, 2-UMN, and 8-NDSU) in March 25-28, 2013, and
- 13 participants (1-UCD, 2-WSU, 3-UMN, and 7-NDSU) in May 20-24, 2013

NB: The NDSU students included the students from Makerere University undertaking MSC IDM

Program objectives

- To decipher the difference between policy formulation and implementation for governments versus intergovernmental organization
- To understand the roles governments, non-governmental organizations, and citizens have in the development and implementation of policy at an intergovernmental level,
- To explain how agreements that transcend national boundaries are enforced, ~~what is~~ the role that non-governmental organizations play in defining and implementing global policies, and

- To understand the motivation for governments to engage in global policy development and implementation.

Program implantation approach: The program engages national and global organizations in Washington DC including FAO (North American Liason Office), InterAmericas Development Bank, International Forestry Resources Institution (IFPRI), World Bank, EcoAgriculuture Partners, USDA (Chief Veterinary Officer), USDA, Environmental Protection Agency (EPA), US Dairy Export Council, National Science Foundation (NSF), Embassy staff, and US-AID. At each of these organizations, the participants engage with staff and leadership to define the organizational structure and governance, determine policies associated with climate change, livestock, and food security, determine the nature of their involvement in these policy areas (policy development, policy research, or policy implementer), organizational funding, and how they interact with other organizations.

Program outcome: At the end of the week, a short brief about each of the organizational visits is produced and visits are made to stakeholders to discuss findings and discuss the way forward for policies on climate change, animal agriculture and food security. Several outputs from these sessions include the preparation, submission, and revision of a paper describing the program and how it could be globalized. This effort was led by the MS-IDM students and faculty.

Table: Summary of Students and Faculties trained in TAD since 2011-2013 in Michigan Partner Institution

Year	No. of Undergraduate	MSc	PhD	Staff Training
2011	10	2		1
2012	25	2		1
2013	20	2		1

2.3 Curriculum Development

As part of capacity building, the project supported a number of initiatives to review and update curricular for different programs as identified by stakeholders, some of which are listed below:

i. Summer course Curriculum Review

The summer course curriculum in Uganda was reviewed and updated with 3 new modules of;

- Service learning,
- Infectious Disease Modeling, and
- Disease Outbreak investigation.

ii. International Animal Production, Disease Surveillance and Public Health module review

Two new courses, International Animal Health, Policy and Biosecurity and Applied Epidemiology and Biostatistics; were developed and implemented as online blended course in International Animal Production, Disease Surveillance and Public Health, which is accessible to East Africa Higher Education institutions and NDSU.

iii. A Gender Sensitive Community Service Learning Module developed based on service leadership

A gender sensitive community service learning module was also developed and adopted by College of Veterinary Medicine, Animal Resources and Biosecurity (COVAB).

iv. MSc.Veterinary Preventive Medicine Curriculum Review

The Project supported the review of the MS-Veterinary Preventive Medicine that lead to establishment of two tracks in the revised program:

- MSc. VPM track -Veterinary Field Epidemiology and
- MSc. VPM track - Animal Health Economics.

The program was reviewed through a series of stakeholder consultations and workshops co-funded by USAID through HED

v. Gender Sensitive Multiple Entry-Multiple Exit (MEME) model

The project also supported revision and introduction of gender sensitive Multiple Entry-Multiple Exit (MEME) model for Biomedical Laboratory Program (women and other disadvantaged groups), One Health Program.

vi. Review and development of 11 AFRISA SPEDA programs

Supported the development of on-going 11 AFRISA SPEDA programs in industrial value chain programs that were approved by the University Council and National Council for Higher Education. Details of the program can be found on the provided link: http://www.afrisa-africa.org/Skills_for_production_Employement_and_Development.html

AFRISA SPEDA PROGRAMS
1. Laboratory Science Education and Industrial Technology
2. Poultry Production, Value Addition and Entrepreneurship

3. Pig Production, Value Addition and Entrepreneurship
4. Dairy Production, Value Addition and Entrepreneurship
5. Meat Production, Value Addition and Entrepreneurship
6. Leather Production, Value Addition and Entrepreneurship
7. Bee Keeping, Products Development and Entrepreneurship
8. Feed Production, Value Addition and Entrepreneurship
9. Fish Production, Value Addition and Entrepreneurship
10. Wildlife Production, Value Addition and Entrepreneurship
11. Companion and Recreation Animal Management and Training

2.4 Community Outreach and Extension

At least 15 outreach activities were conducted including student attachment programs, and student undergraduate service learning, and community engagement;

a. Piloted Service Learning using on Rabies Vaccinations

This was piloted in Mbuya Primary School and a local women's organization in Mbuya, and Kiswa, the suburbs of Kampala. IDM and Some COVAB Veterinary students in firth year were involved in this community work where more than 100 dogs were vaccinated and public educated on the dangers of rabies.

b. Rock Mountain Spotted Fever intervention in Arizona, USA

In the US, 4 exchange students from Uganda participated in Rock Mountain Spotted Fever intervention in Arizona in collaboration with US Centers for Disease Control & Prevention (CDC). As a result of Networking at the CDC Veterinary Day, CDC and students from Virginia Tech, NDSU and Makerere students participated in Rock Mountain Spotted fever intervention in Arizona. This outreach activity was led by Rickettsial Zoonoses Branch, Division of Vectorborne Diseases, National Center for Emerging and Zoonotic Infectious Diseases, Office of Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, GA 30333.

2.5 Partnership & Networking Capacity building

Establishment and launch of Africa-US network of higher education institutions (AFRUS-IDM) focused on integrated management of trans-boundary diseases, zoonoses and socio-economic growth

CIMTRADZ Regional Meeting was held Addis Ababa, Ethiopia in 2012

3.0 Institutional Capacity Building and development

a. Contributed to development of a multi-stakeholder platform – AFRISA (Africa Institute for Strategic Animal Resource Services and Development); an Academic-Community-Public-Private Partnership (ACPPP) (www.afrisa.org).
b. Contributed to transformation of a Faculty of Veterinary Medicine to a College of Veterinary Medicine, Animal Resources & Biosecurity (CoVAB) at Makerere University based on the strong partnership and collaborations through HEIs. This provided a strong evidence of college sustainability required for a college system. It was on this basis, that the Veterinary Faculty was transformed into the College.

Institutional Development

- Improved computer lab, purchased 10 computers.
- Adopted and modified new online platforms from MSU and Tufts
- Trained ICT manager in technical skills on use of online systems
- Restructured faculty of Veterinary medicine into a college to better align with issues of biosecurity and IDM

4.0 Research and Publications

Conducted joint research which resulted into several peer-reviewed scientific publications; an additional 6 submitted; over 20 presentations at international research symposiums

a. Joint research with MSU on enhancing the productivity of dairy value chain
b. At least 10 policy briefs and lay reports produced
c. At least 10 student theses completed related to IDM

Co-funding

During the Period of performance – October 1, 2011 to November 30, 2013, partners Leveraged funds (over $960,500) from other sources as summarized below:

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Institution	Amount (US$)	Period	Type of funding	Activity supported	Comments
USAID RESPOND	60,000	2012	Cash	Summer School	
University of Saskatchewan	10,000		In-kind	Faculty travel & support	To attend International cultural boma
IRLI	124,000			PhD thesis support	
USAID PREDICT-MGVP	45,000	2012	Cash	Bio-Bank Center establishment	
MGCF	105,000	2012-2013	cash	Renovation of building for the Wildlife Research Center	

Mississipi State University (MSU)	70,000	2014	Dairy Value Chain research and training
AFRAD	400,000		
Wildlife Conservation	30,000		
Borlaug Fellowship Program in Animal Sciences	66,500		Two PhD students
Biological Engament Scholarships	50,000		
Grand Total	960,500		

5.0 Significant Challenges encountered in the phase of implementation

- Insufficient infrastructure/ resources at partner institutions (both US & Africa)
- Weak institutional support (higher administration, trained personnel in international partnerships)
- Limited support for personnel involved in project (resources, cost share, release time)
- Frequent turnover of administrative leadership and personnel involved in the project
- Lengthy and sometimes unclear process for legal and regulatory structures governing research in different institutions (Getting institutional review approvals (IRB, IACUC, IBC) in time)
- Communication: Lack of efficient communication between all parties involved in the grant – HED, US & African partners

- Cultural sensitivities leading to unintended clashes
- Delays in the project implementation as almost a year was spent developing agreements

Factors that contributed to success of the Project

1. Ability to work with interdisciplinary teams (One Health), across several institutions
2. Consortium model – was a strength)
3. Strong Networks in ECA
4. Long term Relationships with Makerere University, Uganda & other other ECA institutions
5. Patience/ Positive attitude
6. Leadership Trainings (HERS) HERS-East Africa
7. Cultural Sensitivity/Mutual respect

6.0 Conclusions

The first phase of CIMTRADZ was a resounding success and a platform for strong partnerships and Collaboration. The establishment of "**Africa-US Integrated Disease Management Network (AFRUS-IDM)** provided a framework for cooperation. Several students, faculties and government civil servants were equipped with knowledge and skills for responding and management of Transboundry Animal Diseases. Programs and short courses were established as a strong backbone for institutional development, accompanied with the necessary infrastructure. Advances in knowledge and technology in the **Transboundry** Animal Diseases Surveillance and Management was achieved through various research studies leading to several peer reviewed publications.

7.0 Acknowledgement

The AFRUS-IDM wishes to thank USAID through HED for the funding support extended for the implementation of CIMTRADZ. The support has established a strong network with a potential for sustainable continuation of established programs and expansion. It also formed a basis for attracting other funds/grants for other institutions. Additionally, we wish to thank all institutions that supported CIMTRADZ activities and all partners for team work and all achievements accomplished at different levels.

9.0 Appendix

Summary list with details to be provided on request

Appendix B. Makerere University & Mississippi State University Final Report

CAPACITY BUILDING IN INTEGRATED MANAGEMENT OF TRANSBOUNDARY ANIMAL DISEASES AND ZOONOSES (CIMTRADZ)

Partnership Phase II (2013 - 2015)

Report

Lead Higher Education Institutions: Makerere University & Mississippi State University

North American Partners: Columbus State University, Kansas State University, Michigan State University, University of Minnesota, University of Saskatchewan, Washington State University.

East & Central Africa (ECA) Partner Institutions: Mekelle University (Ethiopia), Sheik Technical College (Somalia), Sokoine University of Agriculture (Tanzania), University of Nairobi (Kenya), Umutara Polytechnic (Rwanda)

ECA Non-Government Organizations: Africa Field Epidemiology Network (AFENET), Conservation Through Public Health (CTPH) and Terra Nuova,

Partnership Context and Objectives

Partnership Overview

In 2010, the United States Agency for International Development (USAID), The Association of Public and Land-grant Universities, (APLU) and Higher Education for Development (HED) awarded 11 Africa-US Higher Education partnership grants to universities in Africa and the US to address national and regional priorities in sub-Saharan Africa. Each partnership was to develop collaborative research and academic programs to build the capacity of the African and US institutions to affect change in Africa. One of the 11 grants was Capacity Building in Integrated Management of Transboundary Animal Diseases and Zoonoses (CIMTRADZ) in Eastern and Central Africa whose focus was to offer global educational experiences with an emphasis on animal production and health and food security.

Transboundary Animal Diseases (TADs) are epidemic diseases which are highly contagious or transmissible with potential to rapidly spread irrespective of national boarders causing serious socio-economic and public health concerns. They have caused and continue to cause major livestock production losses, inhibited or disrupted trade in livestock and their byproducts posing imminent danger for food insecurity and highly levels of poverty especially in local communities. In recognition of the potential impact of TADs on national and global economies, **Africa-US Integrated Disease Management Network (AFRUS-IDM)** with support from USAID through Higher Education for Development (HED) implemented a project entitled: ***Capacity Building in Integrated Management of Transboundary Animal Diseases and Zoonoses (CIMTRADZ)*** in East and Central Africa (ECA) in 2011. The project implemented a number of initiatives in capacity building to improve surveillance, diagnostic potential and management of TADs in the participating institutions. In addition, protocols were developed for disease surveillance and research undertaken that further contributed to knowledge and skills for the management of TADs. Partnerships and networking of participating institutions was enhanced and more stakeholders brought on board especially the national bodies and agencies responsible for disease control per country. This report is a compilation of work done from 2013 – 2015.

Partnership Objectives

In order to address the challenges posed by Transboundary Animal Diseases (TAD) that continue to threaten the regional and global health and economies, USAID provided funding to the Higher Education Institutions (HEIs) in Africa, United States and Canada. The USAID funding was towards an identified project theme entitled: ***Capacity Building in Integrated Management of Transboundary Animal Diseases and Zoonoses (CIMTRADZ)*** in East and Central Africa (ECA). This project was launched in Uganda during the 1st stakeholder's inception meeting 29th Jan-3rd Feb, 2013 at Hotel Imperial Royal in Kampala, Uganda. The project would be implemented under the forum constituted by HEIs in Africa, United States and Canada and for all references in all documents referred to as "**Africa-US Integrated Disease Management Network (AFRUS-IDM)"** to advance higher education led development in Africa. The AFRUS-IDM then set forth the **vision** of being: '***A leading higher education consortium for excellence in integrated disease management and socio-economic development in Africa*"** with the **mission** *to transform a consortium of higher education institutions into agents of development change.* The main goal of AFRUS-IDM was to empower food security, animal and public health systems for sustainable community development in Eastern and Central Africa.

AFRUS-IDM implemented phase 2 project (2013-2015) under the program CIMTRADZ with the primary goal of continuing to build on the work done from 2011 – 2013 in capacity for integrated management of trans-boundary diseases and zoonoses and inclusive social-economic growth in ECA. In order to build a system for effective disease management, the program had three principle broad objectives:

- Providing transformative education in integrated disease management for trans-boundary animal diseases and zoonoses (pathogens that move from animals to people) that affect East and Central Africa (ECA) and the world;
- Promoting and supporting collaborative research and training in trans-boundary animal diseases and zoonoses of regional and global importance in ECA
- Improve human capacity at Makerere University and the ECA Region
- Strengthen the center of excellence at Makerere University that provides academic, research, and community engagement leadership for TADZ

- Engaging communities' positive involvement in sustainable resource management practices which promote animal health, public health, and food security.

Key Achievements

Africa-US Integrated Disease Management Network (AFRUS-IDM) of higher education institutions (AFRUS-IDM) (with government of Uganda and Non-government organizations). This network focused on integrated management of trans-boundary diseases (TADs), zoonoses and socio-economic growth. CIMTRADZ ends in 2015 but the AFRUS-IDM network continues to seek additional funding for more projects.

Regional University – Mediated Partnerships for Enhancing Livelihoods and Health in Africa (RUMPELHA) Developed a Regional University-Mediated Partnerships for Enhancing Livelihoods and Health in Africa (RUMPELHA) proposal that was endorsed by AU-IBAR and endorsed by ECA partners on June 19, 2015. RUMPELHA provides a mechanism for advancing University mediated partnerships across Africa (www.RUMPELHA.org) and sustainability of CIMTRADZ beyond 2015.

Institutional Development. Restructured Makerere University Faculty of Veterinary Medicine into a College of Veterinary Medicine, Animal Resources & Biosecurity (CoVAB) to better align with issues of biosecurity and Integrated Disease Management (IDM). Developed multi-stakeholder platform – AFRISA (Africa Institute for Strategic Animal Resources Development) an academic-community-public-private partner-ship (www. Afrisa.org). Developed and approved 11 (Multiple Entry, Multiple Exit - MEME) courses in industrial value chain programs at AFRISA, Makerere University, Uganda. Improved computer laboratory, adopted and modified new online platforms from MSU and Tufts, trained ICT manager in technical skills on use of online systems.

Human Capacity building. Over 700 people underwent short term training (International Summer School, In-training leadership and community service learning) and over 23 graduate students enrolled into the MS-IDM program, 10 have graduated. Several junior faculty exchange

from Makerere University s acquired specialized skills in infectious disease management with 8 junior faculties being trained for three months at Mississippi state university (4) and Michigan state university (4). Fellowship and small grants offered to MSc and PhD students under the CIMTRADZ project.

Joint Research. Conducted joint research which has resulted into several (over 50) peer-reviewed scientific publications; over 20 presentations at inter-national research symposiums, at least 20 policy briefs and lay reports. This included a baseline survey of Surveillance System capacity (animal, human and environment) in Uganda, Ethiopia and Tanzania, a gender audit of Makerere University College of Veterinary Medicine, Animal Resources and Biosecurity. 10 Student Thesis completed related to IDM.

Higher Education Resource Service – East Africa (HERS_EA) This organization brings together women in institutions of higher learning to sharpen their leadership skills. HERS-EA drew over 150 women participants from universities and research institutions in the East African countries of Uganda, Kenya, Tanzania, Burundi, Rwanda and Ethiopia. Participants from Ugandan universities came from universities all over the country, including disadvantaged areas such as Gulu and Muni Universities in the North, and other upcountry universities of Busitema, Mbarara and Kabale.

Curriculum Development – The Master of Science degree in International Infectious Disease Management at Makerere University that was developed in Phase 1 was modified with many new courses and modules. In addition, many more students enrolled and to date there have been over 23 graduate students enrolled & at least 10 have graduated; enhanced curricula for various programs (such as the MS in Veterinary Preventive Medicine) and courses such as the International summer course which trained over 50 junior faculty from East Africa. Developed a gender sensitive community service learning module.

Community Outreach and Extension. At least 20 outreach activities were conducted including student attachment programs, and student undergraduate service learning, and community

engagement (vaccination of poultry against Newcastle disease, and dogs against, rabies; educative local radio talk show on zoonosis like Brucellosis, Tuberculosis and Trypanosomiasis).

Conferences, Workshops/and Short term Training. Held two International Scientific Meetings/Inter-national Bomas in Kampala, Uganda (2013-2015). Held several workshops and there were many presentations during those events.

Partnership Results

Regional University – Mediated Partnerships for Enhancing Livelihoods and Health in Africa (RUMPELHA)

There has been an endless wish by several African Veterinary and Animal Resource Tertiary Institutions to have a well-organized and coordinated framework by which they can work with the Africa Union – Inter-Africa Bureau for Animal Resources (AU-IBAR) and other regional bodies to synergize and support the African development efforts of the African Union (AU) and her member states. Universities believe that, their integration and engagement in Africa's transformation in a more systematic manner at that level is long overdue. After several consultations and planning meetings, a consortium of Veterinary Training Institutions (VTIs) together with our partners decided to come together and form a consortium of institutions that will pave way for a broader agenda for engagement, sharing, supporting and jointly planning with AU-IBAR. Presently, the VTIs involved in the initiative include those in DRC, Ethiopia, Kenya, Rwanda, Sudan, Somaliland (IGAD ISTVS), Tanzania and Uganda. There are several international Universities and partners in support of this move. Arising from their role of coordinating the regional program on Capacity Building for Integrated management of Transboundary Diseases and Zoonoses (CIMTRADZ), supported by USAID and USA Higher Education for Development (HED) agency, the Makerere University College of Veterinary Medicine, Animal Resources and Biosecurity (COVAB) has been leading the coordination of the development of a new University-IBAR engagement framework effort.

The RUMPHELHA proposal is a sustainable way of advancing University mediated partnerships that were initiated by CIMTRADZ beyond June 30, 2015 when CIMTRADZ project ends. Some of the objectives include:

- Support AU-IBAR agenda for a renaissance in integrated animal resource development on the continent in a well-coordinated, organized and systematic manner
- Work with AU-IBAR in formulating and implementing an overarching livestock development strategy for Africa in alignment with OIE guidelines.
- Support member states to build capacity, efficiency and resilience for ILH development at community level, disease surveillance and outbreak response in country and cross borders
- National governments are selective by nature in setting their priorities while universities are transboundary. RUMPELHA will provide a non-partisan independent trans-Africa framework for addressing Africa challenges.
- Serve as a channel through which the African Diaspora and other stakeholders can redirect resources and opportunities to address the needs of Africa in a more appropriate and well-coordinated manner, and with minimal interference. E.g. Young African Leaders Initiative (YALI).
- Inter-Africa alliance for better organized regional resource mobilization and frugal utilization to achieve sustainable livelihoods and health (human, infrastructure, equipment, technologies, financial)
- A continental mechanism for accreditation standards and quality of Higher education, research and community engagement
- Systematically Discover and Generate evidence based data to advance training, science, technology, policy and practice in support of regional efforts
- Building capacity for food security and livelihoods is one way to mitigate the costs of conflict resolution. There is no peace in an empty stomach .AU and IGAD are faced with immense regional conflicts and heavy investments and made to resolve these conflicts.
- Establish an authoritative regional framework that enables interface of a body of Africanist scholars with the global actors such as OIE, FAO, World Bank and connections in setting the agenda and developing models for the continent
- Harmonization framework to minimize duplication of resources and efforts and mitigate inequalities in regional development
- Africa is cordoned off by international legislation due to TAD diseases. ECA is a global epicenter for the world's most deadly diseases and germs. Animal world is the natural reservoir for human pathogens, 70% from animals. Coordinated effort is essential

- Gender and Diversity – Africa is the most diverse continent ethnically and geo-politically. Women constitute a critical mass of rural agriculturalists engaged in ensuring for livelihoods, health, and household and community management. If Africa is to harness the gender dividend, a more coordinated effort in mainstreaming gender and diversity into Africa's complex socio-cultural systems is critical for attaining equitable development and poverty alleviation in a rapidly regionalizing Africa. The platform will empower vast majority of women who are currently not targeted in the current fragmented development effort.

- Improve the size and capabilities of workforce involved in producing food products for Africa in an integrated manner at all levels (pre-service, in-service, community)

- Provide a framework that will advance the mobility, integration, and mutual recognition of a Trans-African cadre of graduates to practice more effectively throughout Africa.

- RUMPELHA will establish an inventory professors/ experts that can be accessed easily to fill existing gaps.

- Trans-African courses that incorporate African value systems are critical for supporting development that is relevant to Africa and its workforce. RUMPELHA will champion the designing of innovative curricula and provide hands-on pre-service training to support the AU Graduate

- Strengthen regional infrastructure capacity- e.g. ICT innovations for enhanced service delivery, credit transfer, regional mobility, centers of excellence, innovation labs and business incubation centers.

- Serve learning: - Students are a renewable resource for sustainable development and Future leaders of the region. A student-community-centered learning approach aimed at exposing students to indigenous learning methods while enabling local communities to provide input in innovative ways of managing livelihoods and health. Service learning is a special pedagogy and innovation mechanism that build resilience, empowering both the learners and the community; informs community-based research in a more comprehensive manner with more impact.

Participants working on the framework for RUMPELHA

Summer Course

The 8th annual COVAB summer course continued to be offered to students from the East Central Africa Region. This is a 4 week program that is attended annually by graduate students from Uganda, Ethiopia, Rwanda, Tanzania, Kenya and the USA. The 4-week program is sub-divided into four sections:

- 3 Days of lectures undertaken at Makerere University in the College of Veterinary Medicine and Biosecurity (COVAB)
- 16 days of field and hands-on exposure in Production Systems in Small holding settings and livestock disease control (Eastern Route) and Wildlife and Ecosystem Health Experiences (Western Route)
- 2 days of International Cultural Boma
- 2 days of International Scientific Meeting

Students de-worming sheep at Summer School

Higher Education Resource Service – East Africa (HERS-EA)

On 5th August 2014 Higher Education Resource Services (HERS-EA) was launched. HERS brings together women in institutions of higher learning to sharpen their leadership skills. HERS-EA drew over 150 women participants from universities and research institutions in the East African countries of Uganda, Kenya, Tanzania, Burundi, Rwanda and Ethiopia. Participants from Ugandan universities came from universities all over the country, including disadvantaged areas such as Gulu and Muni Universities in the North, and other upcountry universities of Busitema, Mbarara and Kabale.

The Launch Conference was the end result of two years of planning by the HERS-EA Planning Committee which had been set up at the initial gathering on 15th October 2012, at the Sheraton Hotel in Kampala. On 3rd Oct. 2013, Makerere University signed a memorandum of understanding to host HERS-EA until it is ready to operate on its own.
HERS-EA's volunteer Secretariat is currently hosted at the Africa Institute for Strategic Services and Development (AFRISA) in Makerere University's College of Veterinary Medicine, Animal Resources and Biosecurity (CoVAB).

Objectives of the Conference were to:

1. Officially launch HERS-EA as an independent entity
2. Create awareness of HERS among its target group

3. Agree immediate, medium and long term activities

4. Agree on the organizational structures, strategic and operational plans

5. Draw up a list of individuals and organizations to partner with HERS-EA

Dr. Raymonda Burgman, Director HERS Institutes USA, shakes hands with Chair HERS-EA Dr. Margaret L. Khaitsa (2nd R) as participants in HERS-EA cheer after the official inauguration, 5th August 2014, Imperial Royale Hotel, Kampala Uganda

Faculty Exchange

This past year 8 junior faculty travelled to the US. Four junior faculty went to Mississippi State University and four went to Michigan State University.

The overall goal of this program is to:

- Accelerated training of junior faculty from ECA in specific areas of expertise
- Expose junior faculty from ECA to resources in HEIs in North America that will advance their career development including Ph. D proposal development and research completion, and publishing papers in peer-reviewed journals
- Identify faculty collaborators for future partnerships and collaborations
- Link HEIs in ECA with those in North America in other areas of collaboration including Graduate school administration Instructional Development and Distance Learning

Faculty exchange programs between HEIs in ECA and North America have been extremely successful resulting into several outcomes and impacts including peer review publications, joint symposia and conferences, joint grant submissions and awards and career advancement of faculty from ECA and North America HEIs. Also, student interactions with faculty from various higher education institutions has resulted into joint mentorship and exposure to other additional faculty and their research facilities.

Some of the highlights of the Junior Faculty

Sam G. Okech – Mississippi State University

While at Mississippi State, he improved upon and submitted the PhD concept to Makerere University in Uganda and was offered provisional admission. Upon returning to Uganda, he is now developing the concept into a full proposal to gain full admission.

Saphan Muzoora – Mississippi State University

Saphan was able to bring back several skills that he acquired while studying at Mississippi State. He was able to see how good working relationships between professors and students enhance the learner's experience. In addition, he observed that the students are heavily involved in the daily running of the labs and that faculty work with students particularly in research. With this experience, he developed an action plan of establishing a mini research laboratory at Makerere University to enable both the junior faculty and students do research and acquire the necessary practical skills.

Joelia Nasaka – Mississippi State University

While at Mississippi State she gained a lot of experience working with graduate students in the poultry department under the leadership of Dr. Kelley Wamsley. She was able to work at the poultry farm, participate in feeding experiments and attend classes in feed formulation as well practically mixing feeds, batching them and pelleting them.

Margaret Nabulime – Mississippi State University

During Margaret Nabulime's studies at Mississippi State she completed data cleaning and analysis of results from the first part of her PhD research and was able to publish a paper: Margaret was also able to improve the fish research unit at Makerere University using the knowledge and technology adopted from the training at Mississippi State University.

Julius Okuni – Michigan State University

Julius's main interest at the beginning of the training at Michigan State was to improve his skills in diagnostic pathology of animal diseases. He also wanted to experience how pathology is taught in American Universities.

Florence Tushemerirwe – Michigan State

Florence's participation in the capacity building program at Michigan State University was timely for her. She received guidance from her mentors Prof. John B. Kaneene and Dr. Won. O. Song. She was to develop her sketchy PhD concept into a draft PhD proposal. Through this exposure at Michigan State, she gained better seminar preparation and presentation skills that she is currently using to enhance the Seminar Series course that she coordinates under the Master of Public Health Nutrition program at Makerere University.

Celsus Sente – Michigan State

While at Michigan State, Celsus was introduced to the Immunodiagnostic/parasitology section at the Diagnostic Center for Population and Animal Health (DCPAH). He met Dr Ailam Lim and Professor Steve Bolin, his immediate superiors who did a great job in instilling in him the very essential practical aspects of molecular diagnostics, right from DNA extraction procedures to designing PCR primers, performing PCR assays, nucleic acid sequencing analysis, and construction of phylogenetic trees.

Norah Gulaita – Michigan State University

The main goal for Norah's training was to build a critical mass of academic staff with the ability to provide intellectual leadership along the dairy value chain. To achieve her project goal, she was attached to various sections under different leadership where she achieved the objectives of dairy product development, dairy product processing and safety; and methods used to analyze for nutrients in feeds/food.

Fish Pond Management: Margaret Nabulime and her colleagues learn about fish pond management with Dr. Lester Khoo at Thad Cochran National Warm Water Research Center at Stoneville, MS (Mississippi State University)

International Cultural Boma

In order to enhance the culture of mentoring and information sharing, an International Cultural Boma was introduced in the summer course based on the principle described below: The BOMA has been held for the past 4 years and every years proves to be more successful than the last as the number of speakers and participants increases.

For the past 4 years the Boma was held for 2 days at the College of Veterinary Medicine Makerere University, Kampala, Uganda. The Boma discusses the past (drawing from experiences, case studies and best practices), the present (learn from current developments) and the future (lay down strategies for progressive development) of the 'One Health' agenda. Makerere University is not only one of the oldest and prestigious universities in Africa, but its campus is located in an ecosystem rich in diversity, sitting on one of the many hills that define Kampala City. It is hoped that from this 'Boma' will sprout research and development ideas from which plans and strategies for collaboration will be drawn.

Boma objectives include but not limited to:

- Provide opportunity for presentations, brainstorming, and discussions that will yield research and development ideas for collaborative initiatives.
- Provide an environment for a mentoring relationship between students, junior faculty, field practitioners, technicians, researchers, practitioners and distinguished academicians.
- Enhance inter-regional and international networking between participants from various institutions.
- Provide opportunity for sharing unique experiences from which best practices will be derived.
- Provide opportunity for skills and knowledge transfer and acquisition.

The participants of the Boma for 2014 and 2015 were multidisciplinary and composed of mainly funders, policy makers, university administrators, academicians, researchers, field practitioners, graduate and undergraduate students drawn from public and private institutions from North America and Eastern Africa represented by the following:

- **North America Universities**: Mississippi State University, Michigan State University, Columbus State University, University of Saskatchewan.
- **Eastern Africa Universities**: Makerere University (Uganda), University of Nairobi (Kenya), Sokoine University of Agriculture (Tanzania), Mekelle University (Ethiopia), Umutara Polytechnic (Rwanda), Sheik Technical Veterinary School (Somali land)
- **Regional and Local Institutions**: African Field Epidemiology Network (AFENET), Conservation Through Public Health (CTPH), Regional Universities Forum (RUFORUM), COVAB, College of Health Sciences, Uganda Wildlife Authority, NADDEC, Uganda Veterinary Association, Uganda Wildlife Veterinary Network.

The Boma also offered specialized workshops to participants in addition to the presentations where the students from the Summer School had the opportunity to present their experiences.

Professor George William Nasinyama discussing food security and food safety issues

International Scientific Meeting

The 4th International Scientific Meeting on Sustainable Livelihoods and Health in Africa held at Imperial Royal Hotel Kampala was also held for the past 2 years of the reporting period. The meeting was organized under the USAID, Higher Education for Development with collaboration from Mississippi State University USA, Makerere University (CoVAB), University of Nairobi, Sokoine University of Agriculture Tanzania, Mekelle University Ethiopia, National University of Rwanda, Columbus State University, Michigan State University, University of Minnesota, University of Saskatchewan, University of Missouri, Washington state University . The program has been running for the fast 4 years between June to July and Makerere University has always been the host. The purpose of the conference is on Sustainable Livelihoods and Health in Africa with themes in Zoonotic and Trans-boundary animal diseases and Eco-health and Biodiversity Management

The conferences provide opportunities from sharing experiences, research findings and advances in technology to management of transboundary zoonotic diseases in the global perspective of One Health Concept in relationship to the specific theme. The conferences attracted global keynote speakers that interacted and shared their experiences with the students, professionals, practitioners of veterinary and public health nationally and regionally. Important topics like: *Capacity Building in the Control of Zoonotic and Transboundary Animal Diseases in the Region by Dr. Clovice Kankya*.

Workshops and Short term Training

In order to ensure efficient resources utilization, specialized workshops were organized and held during the International Cultural Boma and throughout the year to for the year 2014 – 2015. The workshops and short term training included:

Musk Training

This workshop was designed to provide COVAB staff course developers the opportunity to develop skills to in utilization of Makerere University Science Knowledgebase (MUSK) as a tool to up load and share lecture notes. The training used a 'Diary Hygiene' online course under MUSK as a case study. The course used was drawn on research and open resources sourced and created by four students involved in research in the area of diary hygiene.

E-Learning Workshop

This workshop was designed to provide COVAB students the opportunity to develop skills to access and utilize online courses. The materials that were used were drawn from research and open resources sourced and created by the MSc IDM students involved in research in the area of infectious diseases. Consequently attempts were made to identify potential multimedia assets aligned with individual student research proposals that could be used in both the online course and in later feedback interactions with the farming community.

Manuscript Writing

Manuscript writing is a process that every scientist goes through before publishing. It has been noted that many scientists carry out research and most of the time the work remains unpublished. Makerere University emphasizes and encourages the researchers to publish. Staff promotion policy considers the number of papers published in a peer reviewed journals. Many of the staff do supervise Graduate students who end up not publishing their work. This has been a great draw back in regard to building a pool of knowledge.

Model African Union

Although it is now believed that the global community is under constant threat of emerging pandemics, and that the ill researched and culturally insensitive policies undermine solutions to disease control and prevention, food safety and food security, social justice, and economic growth, these realities are less explored and often misunderstood in many African settings. Misconceptions about Africa as a country and not a continent comprising of 54 independent states are abound. They blur our appreciation of the complex nature of the challenges and prospects facing the continent especially as the global community becomes more integrated economically, socially, politically, culturally and scientifically. CIMTRADZ (Capacity Building in Integrated Management of Transboundary Animal Diseases and Zoonoses, a USAID supported project has decided to simulate the role, organization and policies of the African Union as a means of promoting One Health education and cultural competencies in learning about the formulation and implementation of policies regarding livestock farming, animal to human diseases and overall human development. The Model AU Summer Seminar was conducted on June 15th , 2015 to provide CIMTRADZ partner institutions with guidance on how best to integrate the MAU in teaching about One Health in the International Infectious Disease Management summer program.

Local Policy at the Intersection of Environment, Animal Agriculture, and Food Security

The program was held in Sacramento, California. Participants included 8 faculty from Makerere University and graduate students and faculty from Washington State University (WSU) and University of California Davis. The program was designed as an experiential program with participants meeting with officials from California charged with implementing policy to adapt to climate volatility and support California's important agricultural industry. The policies and legislative approaches that the participants were exposed to during the program were particularly compelling because of the profound drought conditions in California. WSU supported the travel of the Makerere faculty participants and the costs of organizing and planning the program.

Data Management Skills Using Microsoft Excel

The participants (31) utilized an existing animal health data set on a respiratory disease outbreak to learn the following specific skills:

1. How to enter/arrange data in an excel spread sheet in preparation for data analysis using various software.

2. How to check for accuracy of the data
3. How to run descriptive statistics using pivot tables and simple inferential statistics.
4.

This was a hands on activity with participants working individually & in groups of 3. After successfully completing the course students were expected to:

1. Acquire skills in study designs
2. Gain knowledge in data management skills
3. Gain knowledge in selecting appropriate quantitative methods for the research questions
4. Develop an understanding of how to integrate the methodological and analytical tools gained in applied public health research.
5. Develop skills in data interpretation.
6. Develop an appreciation of the contribution of Epidemiology to public health policy.

At the end of the data analysis, each group shared their work with the instructor who provided feedback onsite on how they had analyzed their data based on correctness of method of analysis and completeness of the analysis.

Curriculum Development

As part of capacity building, the project supported a number of initiatives to review and update curricular for different program. A new Master of Science Degree in International Infectious Disease Management was developed with many new courses being offered as part of the program. . This should ensure adequate human capacity in infectious diseases and zoonoses. The new curriculum developed 16 new courses and 2 being revised to this program.

- Introduction to Microbiology - New
- Introduction to Epidemiology – Revised
- Infectious Diseases and Zoonoses – New
- Gender and Culture in Infectious Diseases and Management – New
- Infectious Disease Surveillance and Management – New
- Research Methods – New
- Seminar Series I – New
- Introduction to Bioethics – New
- Health Information Systems and Database Management – New
- Advanced Microbiology and Diagnosis - New
- Conflict and Health – New
- Monitoring and Evaluation – New

- Advanced Biostatistics – New
- Seminar Series II – New
- Dissertation – New
- Advanced Epidemiology – New
- Infectious Disease Management in Disasters and Emergencies – New
- Ecosystem Health – Revised

Summer course Curriculum Review

The summer course curriculum was reviewed and updated with 3 new modules:

- Infectious Disease Modeling, and
- Disease Outbreak investigation
- Service Learning

African Institute for Strategic Resource Services and Development (AFRISA)

The Africa Institute for Strategic Resource Services and Development (AFRISA) is a Not-for profit autonomous agency of Makerere University, College of Veterinary Medicine, Animal Resources & Biosecurity (COVAB) and local and international partners. AFRISA was developed by Makerere University and the Government of Uganda through the Ministry of Education and Sports to address a gap in job creation in the animal resource sector. This institute is an Academic -Community-Public-Private Partnership engagement platform that is powered by innovations and programs for positive societal change. With support from USAID, under CIMTRADZ (Capacity building in Integrated Management of Transboundary Animal Diseases & Zoonoses) project, AFRISA was able to continue to provide meaningful education resources to the community.

The programs accredited at AFRISA focus on Commodity Value chains eg. Dairy, meat, leather, poultry, pig, bees, and fish. The Ordinary certificate, diploma and degree address specific value chains. This means one gets comprehensive training, for example on the Dairy value chain that includes primary milk production on the farm to milk value addition in the dairy industry where students are taught to make dairy products like cheese, yoghurt, powdered milk, ice cream and others.

All students (certificate, diploma and degree) must graduate with a home project or enterprise as part of the award; and are assisted to nurture the business for profitability for a given period depending on the enterprise. This means that before graduation students set up their enterprises or improve some-one else's enterprise e.g. parents or relatives' businesses. The project or enterprise is selected from the value chain of one's choice.

Community Outreach and Extension

At least 15 outreach activities were conducted including student attachment programs, and student undergraduate service learning, and community engagement;

Service Learning - Rabies Vaccinations

In the district of Kotido, Summer School students vaccinated over 30 dogs against rabies. Rabies is the number one health concern for the region.

Summer School student vaccinating a puppy while the family looks on.

One Health Radio Talk Show on Brucellosis – June 2014 and June 2015

Through support from USAID-HED, the Africa-US universities Capacity Building in Integrated Management of Transboundary Animal Diseases & and Zoonoses (CIMTRADZ) project implemented a community service initiative as part of a multidisciplinary One Health student training approach. The initiative involved community education through a live radio talk show about zoonotic diseases, vaccination of dogs and cats against rabies, and vaccination of poultry against Newcastle Disease.

The radio is one of the most commonly used media to reach or engage communities. Therefore, a radio talk show was organized in Soroti to discuss zoonoses particularly brucellosis, tuberculosis and rabies. A popular radio station (Veritas FM) with wide coverage in the Teso sub-region, was used.

This was a community outreach program organized collaboratively by universities in East & Central Africa (Mekelle University, Ethiopia; Sokoine University of Agriculture, Tanzania; University of Nairobi, Kenya, University of Rwanda, Rwanda) led by Makerere University, Uganda and the US (Mississippi State University, College of Veterinary Medicine). The main objective was to disseminate information on zoonoses to livestock and to expose participants to the mass medium for dissemination of information on livestock and human health.

2014 – Students respond to the callers questions

2015 Students respond to the callers questions

Kalerwe Abattoir

With financial support from Capacity Building in Management of Integrated Trans boundary Animal Diseases and Zoonoses (CIMTRADZ) project and material support from Kampala Capital City Authority, students of International Infectious Diseases Management (IDM) together with the One Health Students' Club at Makerere University and the One Health residency program held a Community Sensitization outreach at Kalerwe abattoir on 6th December, 2014. Abattoir workers are at very high risk of acquiring zoonotic diseases in the course of their day to day activities such as brucellosis and tuberculosis. The main aim of the outreach was to create awareness among abattoir on possible zoonotic diseases associated with handling and slaughter of animals. The mobilization for the campaign was done by the area local chairperson while that for the students was done by the student leaders. Associate Professor Samuel Majalija led the team which was comprised of students from College of Veterinary Medicine Animal Resources and Biosecurity and the School of Public Health.

One health students along with the abattoir staff clean the area where the cattle are brought in.

Vaccination of Goats, Sheep, Dogs and Cats in Karamoja

In summer 2015, the students and local veterinarians spent two days in Kotido, Karamoja administering vaccinations to dogs, cats, goats and sheep. The first day, the students dewormed and vaccinated 30 dogs and 3 cats against rabies. Rabies is a big public health issue in Uganda where 99% of all cases of human rabies are contracted through a dog bite from an infected animal. Vaccination of animals is one of the most important ways to reduce the incidence in humans. The students also administered the Peste des petits ruminants (PPR) or goat plague vaccine and dewormed 521 goats and sheep in the Kotido community. PPR is a highly contagious viral disease of sheep and goats and results in heavy losses to a farmer's herd when infected. PPR is controlled by vaccination and immunity can last up to four years.

Summer school students learning how to administer rabies vaccine to local dogs.

Research and Publications

Conducted joint research which resulted into several peer-reviewed scientific publications and over 20 presentations at international research symposiums.

1. Baluka, S.A., Miller, R., and Kaneene, J.B. Hygiene practices and food contamination in managed food service facilities in Uganda. *African J. Food Sci.* 9(1):31-42, 2015.

2. Kazoora, H.B., Majalija, S., Kiwanuka, N., and Kaneene, J.B. Prevalence of *Mycobacterium bovis* skin positivity and associated risk factors in cattle from Western Uganda. *Trop. Animal Health Prod.* DOI 10.1007/s11250-014-0650-1.

3. Miller, R., Nakavuma, J.L., Ssajjakambwe, P., Vudriko, P., Musese, R., and Kaneene, J.B. The prevalence of brucellosis in cattle, goats and humans in rural Uganda: a comparative study. *Trans. Emerg. Dis.* doi:10.1111/tbed.12332.

4. Muleme, M., Nguna, J., Mafigiri, R., Birungi, D., Kabasa, J.D., and Kaneene, J.B. Assessment of human disease surveillance systems in the East-Central Africa infectious disease hotspot: a case study of Uganda. *E. African J. Pub. Health* (accepted, 2015).

5. Kazoora, H.B., Majalija, S., Kiwanuka, N., and Kaneene, J.B. Knowledge, Attitudes and Practices regarding risk to human infection by zoonotic tuberculosis due to *Mycobacterium bovis* among cattle farming communities in Western Uganda. *Intl. J. Pub. Health* (submitted, 2014).

6. Afema JA, Byarugaba DK, Shah DH, Atukwase E, Nambi M, Sischo WM. Potential Sources and Transmission of *Salmonella* and Antimicrobial Resistance in Kampala, Uganda. PlosOne (2015 Pending Acceptance).

7. Wakoko-Studstill, Florence, Kiguli, Juliet, Khaitsa L.Margaret, Kabasa, J. David. Gender Audit for Capacity Building in Integrated Disease Management: College of Veterinary Medicine, Animal Resources and Biosecurity, Makerere University, Uganda. The African Journal of Animal & Biomedical Sciences (AJABS) (*In press, submitted in October, 2014).*

8. Joshua Isiko[a], Samuel George Okech[a]*, Berna Nakanwagi[b], Samuel Majalija[a], David Okello Owiny[a], Margaret Khaitsa[c], Florence Wakoko[d] . Service-learning yields benefits in zoonotic disease control: the case of rabies control in Mbuya II Zone in Kampala, Uganda. *American International Journal of Social Science (In press, submitted in December, 2014).*

Monographs

1. Wakoko, F., Card, C., Khaitsa, M.L., Freeman, D., Majalija, S., Tumwine, G., Owiny, D., Okech, S., Kaneene, J.B., and Kabasa, J.D. Gender Audit for Capacity Building in Integrated Disease Management: College of Veterinary Medicine, Animal Resources and Biosecurity, Makerere University, Uganda.

2. Kaneene, J.B., Kabasa, J.D., Muleme, M., Nguna, J., Mafigiri, R., and Birungi, D. Assessment of Human and Animal Disease Surveillance Systems in the East-Central Africa Infectious Disease Hotspot: A Case Study of Uganda.

3. Kaneene, J.B. and Khaitsa, M.L. Africa-North America Faculty Exchange: An Accelerated Model for Capacity Building.

4. Kaneene, J.B. and Miller, R. Disease Outbreak Investigation Protocol: Brucellosis Case Study.

Significant Challenges encountered in the phase of implementation

- Insufficient infrastructure/ resources at partner institutions (both US & Africa)
- Weak institutional support (higher administration, trained personnel in international partnerships)
- Limited support for personnel involved in project (resources, cost share, release time)
- Project host university changed from North Dakota State University to Mississippi State University resulting delay of activities
- Frequent turnover of administrative leadership and personnel involved in the project
- Lengthy and sometimes unclear process for legal and regulatory structures governing research in different institutions (Getting institutional review approvals (IRB, IACUC, IBC) in time)
- Communication: Lack of efficient communication between all parties involved in the grant – HED, US & African partners
- Cultural sensitivities leading to unintended clashes
- Delays in the project implementation as almost a year was spent developing agreements

Conclusions

The second phase of CIMTRADZ was a resounding success and a platform for strong partnerships and Collaboration. The establishment of Africa-US Integrated Disease Management Network (AFRUS-IDM) provided a framework for cooperation. Several students, faculties and government civil servants were equipped with knowledge and skills for responding and management of Transboundary Animal Diseases. Programs and short courses were established as a strong backbone for institutional

development, accompanied with the necessary infrastructure. Advances in knowledge and technology in the transboundary Animal Diseases Surveillance and Management was achieved through various research studies leading to several peer reviewed publications.

Recognizing the need to continue this partnership The Regional University-Mediated Partnerships for Enhancing Livelihoods and Health in Africa (RUMPHELHA) was formed. This is the foundation that will provide a sustainable way of advancing university mediated partnerships that were initiated by CIMTRADZ well beyond the closeout of the project that will occur on June 30, 2015.

Acknowledgement

The AFRUS-IDM wishes to thank USAID through HED for the funding support extended for the implementation of CIMTRADZ. The support has established a strong network with a potential for sustainable continuation of established programs and expansion. It also formed a basis for attracting other funds/grants for other institutions and thank you to all institutions that supported CIMTRADZ activities. We wish to thank all partners for team work and all achievements accomplished at different levels.

Appendix C. Master of Science Degree in International Infectious Disease Management Curriculum

Master of Science Degree
In
International Infectious Disease Management

Makerere University
College of Veterinary Medicine and Biosecurity

COURSE NAME: INTRODUCTION TO MICROBIOLOGY (NEW)

Course description

The course focuses on introduction to microbiology. The emphasis will be put on the biology of microorganisms, their structure, classification, their interactions with the human and animals, environment and their implications and applications in disease.

Course goal

Students successfully completing this course will be able to understand the structures of different microbes and they interact with humans and animals to cause diseases and how they can be detected.

Course objectives

This course will provide the students with:

1. Knowledge, understanding of different microbes that cause disease to humans and animals.
2. Details of the biology, structure, classification and pathogenic mechanisms of microbes in order to be able to detect the associated infections.
3. Knowledge in application of microbes in clinics, food industry, environment and other industries.

Learning objectives

1. Demonstrate knowledge and understanding of microbes in relation to: (i) Biology; (ii) structure and classification/taxonomy; (iii) Ways in which microbes cause infections.
2. Clearly understand the role of microbes in causing infections, food industry and environments.
3. Carry out a range of laboratory techniques, including isolation and identification of microorganisms.

Course outline

Topic	Content
Introductory microbiology	• Introduction to clinical, food and environmental microbiology • Classification and biology of specific microbes (plant, animals & humans). • Evolution & historical perspectives of micro organisms
Microbial structure and biology	• Visualisation & structure, growth & metabolism, genetics of micro organisms • Virus structure and function
Microbial applications	• Food microbiology: food preservation, food spoilage, microbiological production of food • Environmental microbiology: Environment - growth & distribution of microbes interactions, Biochemical cycling & microbial population interaction, biodegradation of wastes & pollutants, bioremediation • Industrial microbiology: fermentation industry, recovery of

	mineral resources, bio-deterioration. • Microbial pathogenesis, diseases
Microbial detection procedures and methods	• Concepts, principles & diagnostic techniques of microbiology • Sampling procedures and plans for food microbiology including storing and shipping. • Measurement of physiological properties and assay of metabolites. • Specimens and reagents preparation, handling & processing and management. • Inoculation, isolation and identification staining and biochemical tests. Fungal isolation and identification. • Interpretation of results.

Course Delivery and mode of assessment

- Lectures and discussions
- Tutorials
- Seminars
- Practicals

Course assessment consists of course work and assignments (30%); evaluation of seminar presentations (10%) and a written examination (60%) at the end of the 1st semester.

Reference/reading list

1. Brock Biology of Microorganisms by Madigan, M. T., Martiniko, J. M. and Parker J.
2. Bacterial pathogenesis: A molecular approach by Salyers B. A. and Whitt, D. D.
3. Introduction to Modern Virology by Dimmock, Easton and Leppard
4. Methods for General and Molecular Bacteriology by Gerhardt, Murray, Wood and Krieg

COURSE NAME: INTRODUCTION TO EPIDEMIOLOGY (REVISED/REVIEWED)

Course description

The course aims at providing the students with knowledge and skills relevant for disease prevention and control. Epidemiology is population medicine and provides knowledge that contributes to better understanding of disease dynamics in populations. The roles of epidemiology in the control of diseases including emerging and re-emerging diseases are very crucial in human and animal health.

Course objectives

1. To understand epidemiologic principles and methods for infectious disease investigation
2. To understand factors causing emergence and re-emergence of infectious diseases
3. To utilise epidemiologic skills and knowledge in infectious disease prevention and control

Learning outcomes

At the end of the course students should be able to:

1. Design appropriate methods for prevention and control of major infectious diseases
2. Plan and execute investigations of disease outbreaks
3. Utilise epidemiologic skills in disease prevention and control
4. Apply appropriate analytic skills for epidemiologic data

Course outline

Lesson 1: Orientation and Scope of Epidemiology
Lesson 2: Causality
Lesson 3: Measures of Disease Occurrence: Counts and Proportions
Lesson 4: Measures of Disease Occurrence: Rates
Lesson 5: Descriptive Epidemiology
Lesson 6: Rate Standardization
Lesson 7: Excess Risk
Lesson 8: Study Design
Lesson 9: Cohort Studies
Lesson 10: Case Control Studies
Lesson 11: Screening
Lesson 12: Error/Bias/Confounding

Course delivery

The course will be delivered through the use of lectures, tutorials, assignments and practical sessions.

Reading list

1. Abraham M. Lilienfeld and David E. Lilienfield, (1994): Foundations of Epidemiology. Oxford University Press (New York, Oxford).Third Edition. ISBN-10: 0195050363
2. Ian Dohoo, Wayne Martin, Henrik Stryn (2009). Veterinary Epidemiological Research. Second Edition. ISBN-13:978-0-919013-60-5
3. Robert H. Fletcher, Suzanne W. Fletcher and Edward H. Wanger (2005): Clinical Epidemiology: The Essentials. Fourth Edition. ISBN- 0-7817-5215-9 (alk paper)
4. Micheal Thrushfield (2005): Veterinary Epidemiology. Blackwell Science. Third edition **ISBN:** 0632063971, **ISBN-13:** 9780632063970
5. Kelsey JL, *et al*. (1996): Methods in observational epidemiology. Second edition. New York Oxford University Press. ISBN 0-19-508377-6
6. Koepsell TD, Weiss NS. (2003): Epidemiologic methods. Studying the occurrence of illness. Oxford: Oxford University Press. First Edition. ISBN-0-19-515078-3
7. Boston MacMahon B, Trichopoulos D. Little (1996): Epidemiology Principles and methods. Second edition. Brown and Company. ISBN- 0316542229, 9780316542227
8. Nelson, KE, Masters Williams CF (2007): Infectious disease epidemiology: Theory and practice. Second edition. Boston: Jones and Bartlett Publishers. ISBN- 13:978-0-7637-2879-3, 10: 0-7637-2879-9
9. Rothman KJ (2002): Epidemiology: An introduction. Oxford: Oxford University Press. 2002. ISBN- 0-19-513553-9 (alk paper), 0-19-513554-7 (pbk)

COURSE NAME: INFECTIOUS DISEASES AND ZOONOSES (NEW)

Course description

The module deals with the increasing number and importance of emerging and re-emerging diseases of animals and humans and their main drivers. Man-made land use changes induce disease agents to occupy new niches. Due to the unknown direction and speed of subsequent newly emerging diseases, the livestock-environment interactions deserve particular attention.

Objectives

1. To equip students with knowledge on infectious diseases of zoonotic nature.
2. To equip students with knowledge on human-livestock-environment interactions that may play a role in disease transfer from livestock to humans.
3. To impart into students knowledge on emerging and re-emerging zoonotic pathogens and the major drivers for their spread.
4. To expose students to programs used to predict infectious disease emergence/re-emergence and spread.

Learning outcomes

After successful completion of this module, the students will;

1. Understand the need for alertness, rapid response capabilities and control of infectious zoonoses.
2. Understand the principles of the complex interactions between human expansion, livestock production, environmental issues and animal diseases in general and emerging and re-emerging diseases in particular.
3. Know the major drivers responsible for emergence and re-emergence of zoonoses.

Course content

1. Zoonotic agents of humans, domestic livestock, domestic carnivores and wildlife. Food-borne and occupational zoonotic diseases.
2. Newly recognised agents and Emerging Infectious Diseases (EID); Important new EID zoonoses: e.g. BSE, AI, TB, West Nile Virus, Hendra, Chikungunya,
3. Major drivers (travel, migration, trade, land-use change, urbanisation, climate change, multidrug resistance and its evolution, cultural practices etc).
4. Prevention and control options (application of science and policy issues), novel technologies (from remote sensing to nano technology).
5. Programs on infectious disease prediction.
6. General issues of human-livestock- environment interactions and disease spread.
7. Infectious disease guidelines (FAO, WHO, OIE, AU-IBAR).

Course delivery

1. Lectures and discussions
2. Tutorials/seminars
3. Internet-based research

Reading list

1. Krauss, H, Weber, A, Appel, M, Enders, B, Isenberg, H,D, Schiefer, H.G, and Zahner, H (2003). Zoonoses: Infectious Diseases Transmissible from Animals to Humans. ASM Press, Washington, USA.
2. Benenson, A. S. Control of communicable diseases in man. *Control of communicable diseases in man.* (recent edition).
3. Acha, P. N., & Szyfres, B. (2003). *Zoonoses and Communicable Diseases Common to Man and Animals: Parasitic Zoonoses* (Vol. 580). Pan American Health Org.
4. Internet resources

Course Delivery

- Lectures and discussions
- Tutorials
- Case studies and presentation
- Seminars
- Internet-based research

CORSE NAME: GENDER AND CULTURE IN INFECTIOUS DISEASES MANAGEMENT (NEW)

Course description

The course is designed into a one semester module to expose students to a broad understanding of gender and development issues within the context of the agriculture sector in general and animal health in particular as well as human health component.

Course goal

Students successfully completing this course will be able to understand a fundamental working knowledge and principles of gender and how these principles can be applied infectious disease management.

Course objectives

This course will provide the students with:

4. An overview of relevant concepts, history, and approaches in the field of gender and development.

5. Skills in carrying out gender analysis in disease outbreaks and management.

6. Knowledge and skills to deal with gender responsive in health planning and management.

7. Skills in Participatory Rural Appraisal methodologies in health delivery system.

Learning objectives

Students should be able to;

4. Define and explain key gender and development concepts in relation to infectious disease management
5. Demonstrate understanding of the intersections of gender, class, ethnicity, and sexuality in determining resource access to, and use, such as education, information, health care, land, and agricultural inputs.
6. Apply theoretical explanations of gender to disease management with specific examples drawn from the East African region.
7. Illustrate the relevance of the gender concepts and issues to health service delivery.

Course outline

Topic	**Content**
Introduction to gender and Health in Africa	• Difference between gender and sex • Gender roles, Gender Needs, • Gender Mainstreaming, WID, GAD, links between gender and health
Gender and the policy environment	• National Gender policy
Gender analysis frameworks	• Control over resources profile; resources and benefits index • Practical and strategic gender needs in human and animal health management index • Role of culture in infectious disease management
Introduction to gender mainstreaming, Gender responsive health planning	• Overview of gender maintaining concept and approaches • Engendering the planning cycle • Gender and sex disaggregated data • Monitoring and evaluation indicators.
Introduction to PRA methodologies in health services	• Overview of Participatory Rural Appraisal (PRA) in relation to health services • Background and history Overview of PRA tools and techniques • Application of selected tools(practical)
	•

Course Delivery and mode of assessment

- Lectures
- Group discussions and tutorials
- Group assignments and presentations
- Case studies and Internet-based research

Course assessment consists of course work and assignments (30%); evaluation of seminar presentations (10%), Case study analysis/Service learning (30%) and a written examination (30%) at the end of the 1st semester.

References

E-Learning Course: Gender in Agriculture. Also here: http://www.genderinag.org/content/e-learning-course

FAO. 2013. Understanding and Integrating Gender Issues into Livestock Projects and Programs: A Check List for Practitioners.

HRSA. 2014. Beyond *Beyond Women's Health: Incorporating Sex and Gender Differences Into Graduate Public Health Curricula. Also at the following link: www.aspph.org/wp-content/uploads/2014/.../Womens-Health-FINAL.pdf*

IFAD. 2011. Women and Rural Development. Also here:

Moser, Caroline. 1993. Gender Planning and Development: Theory, Practice & Training.London & New York

USAID. 2010. Guide to Gender Integration And Analysis.

USAID. http://www.usaid.gov/who-we-are/agency-policy

COURSE NAME: INFECTIOUS DISEASE SURVEILLANCE AND MANAGEMENT (NEW)

Course description

This course deals with infectious disease surveillance at national and international level, the management of zoonoses at national, regional, and international levels. Emphasis will be placed on the management of emerging and re-emerging zoonoses. It also covers the ecology of disease and human-livestock-wildlife interactions which may be useful in infectious disease management/surveillance.

Objectives

1. To equip students with knowledge on principles and systems of infectious diseases surveillance and evaluation of surveillance systems.
2. To equip students with knowledge necessary for emergency preparedness planning and response to zoonoses outbreaks.
3. To impart into students the knowledge on management, prevention and control of infectious zoonoses.

Learning outcomes

After successfully completing the course, students will;

1. Be able to carry out infectious disease surveillance.
2. Know how to apply principles and strategies for management of major zoonoses.
3. Be familiar with international efforts and mandates for control of major zoonoses.
4. Understand the underlying concept and rationale for the "One Medicine"approach in the management of zoonoses.

Course content

a. Principles of ecology of diseases.

b. Issues related to human-livestock-wildlife-environment interactions
c. Principles of infectious disease surveillance and global surveillance systems
d. Risk-based surveillance (RBS) of zoonoses; RBS design steps, RBS cycle, RBS applicability and cost effectiveness.
e. New trends in surveillance of zoonoses: sentinel surveillance, syndromic surveillance, scenario tree modeling.
f. Evaluating and implementing surveillance systems
g. Introduction to International Health Policy & Regulations.
h. Need and rationale for Centers of Excellence for Management of Zoonoses.
i. Systems concepts in the management of zoonoses; "One Medicine, One Health"pragmatic approaches.
j. Epidemiology, prevention and control of selected viral, bacterial, and parasitic zoonoses of regional and international prominence.
k. Roles and mandates of regional and international organizations in management of zoonoses (WHO, OIE, PAHO, AU-IBAR, FAO etc)
l. Emergency preparednes planning and response to zoonoses outbreaks.
m. Country-specific case studies (success stories) on disease surveillance, management and containment of recent outbreaks of zoonoses (e.g., Ebola and Marburg in Uganda, SARS in Asia).

Course delivery

1. Lectures and discussions
2. Tutorials/seminars
3. Case studies and presentation
4. Internet-based research

Reading list

1. Acha, P.N. and Szyfres, B (1989). Zoonses ans Communicable Dieaseas Common to Man and Animals. Pan Amercican Health Organisation. Waashington, USA.
2. Internet resources

COURSE NAME: RESEARCH METHODS (NEW)

Course description

This course is designed to deal with the general logic of scientific inquiry, research design, sampling, measurement, and the methods of data collection. It will expose students to instrument development techniques, qualitative analysis software applications, advanced statistical procedures. In addition, the students will be introduced and facilitated to develop skills needed to conceptualize a problem, make use of available literature, design a research strategy, evaluate, organize, and integrate relevant data (both existing and new), derive useful solutions based on knowledge, and communicate those solutions to clients and colleagues.

Course objectives

1. Be able to explicate what biomedical research is and its importance.
2. Comprehend and employ theory, models, variables and hypotheses in the conceptualization of a biomedical research problem.
3. Appreciate the basic research designs used in research and their relative strengths and weaknesses.
4. Understand how to do literature reviews and critically review the literature.
5. Be familiar with basic sampling techniques and the role of sampling in conceptualizing the research problem.
6. Grasp some fundamental aids to analysis, planning and implementation and report preparation.
7. Be able to list the major ethical issues in doing biomedical research and to begin to formulate their own ethical research standards.

Learning outcomes

1. To demonstrate understanding of the process of writing a research proposal
2. To be able to design, execute and analyze research in a biomedical field
3. To be able to interpret and critically evaluate various study designs and methods of data analysis.
4. To be able to write and present a scientific report
5. To complete own viable research proposal emphasizing conceptualization of the problem

Course content

1. Introduction to research
2. Research designs
3. Research data collection and analysis
4. Informatics
5. Scientific research proposal writing
6. Research management

Course Delivery

1. Lectures and discussions
2. Tutorials
3. Seminars
4. Problem-based approaches and practical sessions.
5. Internet-based research

Assessment methods

1. Class assignments and exercises
2. Module test
3. Final university exam

Suggested reading list

1. Sylvia Wassertheil-Smoller. (2004). Biostatistics and Epidemiology: A Primer for Health and Biomedical Professionals. Journal of the Royal Statistical Society
2. James F. Jekel, David L. Katz, and Joann G. Elmore. (2007). Epidemiology, Biostatistics and Preventive Medicine. 3rd edition. Saunders.
3. Curtis L. Meinert. (2004). Clinical Trials: Design, Conduct, and Analysis (Monographs in Epidemiology and Biostatistics. Volume 8. Oxford University Press. New York and Oxford.
4. Benjafield, J. G. (1994). Thinking Critically About Research Methods. Boston, MA: Allyn and Bacon.
5. Bordens, K. S., & Abbott, B. B. (2010). Research Design and Methods: A Process Approach (8th ed.). Boston: McGraw-Hill.
6. McBurney, D. H., & White, T. L. (2009). Research Methods (8th ed.). Belmont, CA: Wadsworth/Thomson Learning.
7. Flick, U. (2009). An Introduction to Qualitative Research (4th ed.). Thousand Oaks, CA: Sage Publications.
8. L. Shi. (1997). Health Services Research Methods. Albany, New York: Delmar.
9. J. Sieber. (1992). Planning Ethically Responsible Research: a Guide for Students and Internal Review Boards. Newbury Park, California: Sage.
10. Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, Institute of Medicine. (1995). On Being a Scientist: Responsible Conduct in Research. Washington, D.C.: National Academy Press.
11. Paul G. Chapin. (2004). Research Projects and Research Proposals A Guide for Scientists Seeking Funding.

COURSE NAME: SEMINAR SERIES I (NEW)

Course description

The Seminar series are mandatory for all MSc students at Makerere University. It provides an opportunity for students to showcase their latest research and /or skills at critiquing scientific research. The series emphasizes the applications of theoretical and emipirical tools in the assessment of issues surrounding infectious diseases management. The seminar series runs through the two academic years on a day chosen as appropriate by the program coordinator. The seminars are open to the public and mandatory to all IDM students, paper reviewers and their academic supervisors.

Course objectives

1. To provide students with an opportunity to learn strategies to develop the practical academic skills and personal attributes needed in scientific presentations

2. To offer students the opportunity to interact and ask questions related to the topics of their interest hence enhancing their knowledge.

Learning outcomes

1. To demonstrate different practical academic skills and personal attributes needed in scientific presentations

2. To be able to practically interact and ask questions related to the topics of interest.

Course content

The student will make one (1) seminar presentation, in a semester, to the audience using a presentation technology chosen by the Program Coordinator at the start of the semester. The scientific material to critique will be given to reviewers at least a week before the student's presentation. It is encouraged that students choose material related to their tracks of choice. The material may be;

1. The student's field report

2. Previous dissertation in an IDM related field

3. Current trends in IDM e.g. policy issues

4. The student's draft manuscript

5. Published scientific paper in a peer-reviewed journal

6. Any other material as identified fit by the program coordinator.

Course delivery

Scientific presentation with a technology determined by the program coordinator at the beginning of the semester

Assessment methods

The reviewers will grade the student based on;

1. Presentation skills

2. Relevancy of the material

3. Ability to critique the science and methods

Suggested reading list

1. Kate L. Turabian. 2013. A Manual for Writers of Research Papers, Theses, and Dissertations, Eighth Edition: Chicago Style for Students and Researchers. University of Chicago Press

2. Wendy Laura Belcher. 2009. Writing Your Journal Article in Twelve Weeks: A Guide to Academic Publishing Success. SAGE Publications, Inc.

3. Craswell, G. 2005. Writing for Academic Success. London: Sage Publications

4. Crème, P. and Lea, M.R. 2008. Writing at University: A Guide for Students. Maidenhead: Open University Press.

5. Gill Marshall. 2005. Critiquing a research article. Radiography, Volume 11, Issue 1, 55 – 59.

6. How to read a scientific paper (biology): http://www.biochem.arizona.edu/classes/bioc568/papers.htm

7. Finding and reviewing appropriate scientific articles. This site will help you select up-to-date and relevant articles for your review (biology): http://www.stanford.edu/~siegelr/readingsci.htm

COURSE NAME: INTRODUCTION TO BIOETHICS (NEW)

Course description

This course explores the fundamental moral issues that arise in medicine, health, and biotechnology. These issues usually intersect with issues of religious, racial and gender equality, as well as policies affecting some vulnerable populations and communities. The course is intentioned to introduce students to the range of issues that define bioethics, together with core concepts and skills and their relation to infectious disease management practice.

Objectives

1. To know the common fundamental ethical questions that underlie contemporary biomedical practice; develop skill in analyzing and clarifying key concepts such as health, disease and disability
2. To learn how to critically assess the health-care implications of different ethical outlooks; and to explore how citizens can reasonably resolve controversial bioethical issues in a mutually respectful way.
3. To understand the ethical questions surrounding clinical and veterinary practice
4. To understand some of the major components and drivers of the drug development process and associated ethical issues
5. To know the professional responsibilities and rights of scientists, the rights of study participants, and the appropriate role of the state in research

Learning outcomes

1. To identify the common fundamental ethical questions that underlie contemporary biomedical practice; develop skill in analyzing and clarifying key concepts such as health, disease and disability.
2. To critically assess the health-care implications of different ethical outlooks; and to explore how citizens can reasonably resolve controversial bioethical issues in a mutually respectful way.
3. To illustrate the ethical questions surrounding clinical and veterinary practice
4. To demonstrate how some of the major components and drivers of the drug development process are associated with ethical issues.
5. To demonstrate relationship between the professional responsibilities and rights of scientists, the rights of study participants, and the appropriate role of the state in research.

Couse content

1. Bioethical theory, definition of terms and history of Bioethics
2. Philosophy of bioethics
3. Law and Bioethics
4. Introduction to clinical and veterinary ethics
5. Global bioethics and policy
6. Ethics and the Pharmaceutical Industry
7. Research ethics
8. Financing of interventions and ethics
9. Public Health Ethics: Coercion and Persuasion
10. Ethical dilemmas in medical and veterinary practice

Course Delivery

6. Lectures and discussions
7. Tutorials
8. Seminars
9. Problem-based approaches
10. Internet-based research

Assessment methods

4. Class assignments and exercises
5. Critiquing of bioethical issues in publications
6. Module test
7. Final university exam

Suggested reading list

1. Robert Baker. 2013. Before Bioethics: A History of American Medical Ethics from the Colonial Period to the Bioethics Revolution. Oxford University Press (UK)
2. Gregory Pence. 2010. Medical Ethics: Accounts of Ground-Breaking Cases. McGraw-Hill
3. Helga Kuhse and Peter Singer. 1999. Bioethics: An Anthology. Wiley-Blackwell.
4. Ronald Munson. 2007. Intervention and Reflection: Basic Issues in Medical Ethics. Wadsworth Publishing Company.
5. American Veterinary Medical Association. 2004. Principles of Veterinary Medical Ethics. Encyclopedia of Bioethics
6. Tom L. Beauchamp and James F. Childress. 2001. Principles of Biomedical Ethics. Oxford University Press, USA
7. Robert Orr. 2001. Medical Ethics and the Faith Factor: A Handbook for Clergy and Health-Care Professionals. William B. Eerdmans Publishing Company
8. Edmund D. Pellegrino and Jean Bethke Elshtain. 2007. Biotechnology And The Human Good. Georgetown University Press.
9. Fox MW. 2006. Principles of veterinary bioethics. J Am Vet Med Assoc. 229(5):666-7.
10. URL: http://guides.library.jhu.edu/bioethics

COURSE NAME: HEALTH INFORMATION SYSTEMS AND DATABASE MANAGEMENT (NEW)

Course description

With the increased use of information systems in the veterinary, medical and infectious disease management, there is a need for management of data and information related to IDM. This sector is currently driven by IT and data. The systems such as HMIS, UDHS and other data systems are the pillar of infectious disease management. Management of data is one of the key functionality of any health and veterinary information management system. Management of data and information is extremely useful for other veterinary or healthcare functionalities such as clinical trial, disease eruptions and drug interaction. The infectious disease managers need to actively handle data at every decision making point. The aim of this course is to introduce the basic concept of data and information, and how it is used in healthcare information systems by professionals such as veterinarians, medics or administrators. This course calls for skills in research and statistical methods.

Course objectives

1. To understand the different types and structures of data bases used in veterinary and medical health systems
2. To learn how to navigate the different databases used in veterinary and medical fields.
3. To learn how to utilize data bases by developing objectives based on existing data
4. To learn how to extract data from data bases and analyze it along developed objectives
5. To understand the basics of data base administration

Learning outcomes

1. To define the different types and structures of data bases used in veterinary and medical health systems
2. To demonstrate how to navigate the different databases used in veterinary and medical fields.
3. To demonstrate how to utilize data bases by developing objectives based on existing data
4. To extract data from data bases and analyze it along developed objectives
5. To apply the basics of data base administration

Course content

1. Overview and role of databases in veterinary and human healthcare
2. Access and navigation of common databases in veterinary and human health
3. Basics of Database Administration
4. Health informatics databases: Public health data (e.g. CDC database, WHO database, Partners); GIS Health data (e.g. Virginia Rural Health Resource Center, Singapore iHealth iPhone application) and Clinical trial database
5. Use of veterinary and human health data bases in research
6. How to develop objectives out of existing data
7. Practical secondary data analysis

Course Delivery

1. Lectures and discussions
2. Tutorials
3. Seminars
4. Problem-based approaches and practical sessions.
5. Internet-based research

Assessment methods

1. Class assignments and exercises
2. Module test
3. Final university exam

Suggested reading list

1. Susanne Prokscha. 2011. Practical Guide to Clinical Data Management, Third Edition. CRC Press.
2. LaTour, Kathleen M., & Maki, Shirley Eichenwald. 2010. Health information management concepts, principles, and practice. Chicago, Illinois: American Health Information Management Association.
3. Stansfield S. 2005. "Structuring information and incentives to improve health". *Bulletin of the World Health Organization*, 83(8):562.
4. Ministry of Health, Government of Uganda. 2010. The Health Management Information System. Health Unit Procedure Manual. Ministry of Health Resource Centre.

5. Peter Kintu, Miriam Nanyunja, Amos Nzabanita and Ruth Magoola. 2005. Development of HMIS in poor countries: Uganda as a case Study. Health Policy and Development Journal, Vol. 3, No. 1, April, 2005, pp. 46-53
6. Mervat Abdelhak (Editor), Sara Grostick and Mary Alice Hanken. 2000. Health Information: Management of a Strategic Resource. Saunders, Philadelphia, PA

COURSE NAME: ADVANCED MICROBIOLOGY AND DIAGNOSIS (NEW)

Course description

The course focuses on the in-depth knowledge of microbes and viruses. The emphasis will be put on the morphological and genetic make-up of microbes and viruses; their interactions with the human and animals, environment and their implications and applications in disease.

Course goal

Students successfully completing this course will be able to understand a fundamental working knowledge of the principles of microbiology and provide an understanding of how these principles are applied implications and applications of the discipline.

Course objectives

This course will provide the students with:

8. Advanced knowledge, understanding, and critical judgment appropriate for the biomedical profession in microbiology
9. Details of the structure, biochemical activities, antigenic structure and pathogenic mechanisms of microbes in order to be able to detect and diagnose the associated infections.

10. Skills for biotechnological applications uses of the organisms.

11. Utilize the latest information in scientific microbiological methods.

Learning objectives

8. Demonstrate advanced knowledge and understanding of microorganisms in relation to: (i) their nature and classification/taxonomy; (ii) mechanisms of microbial pathogenesis and the outcomes of infection.
9. Distinguish between and to critically assess the classical and modern development of therapeutic agents for the prevention of microbial diseases
10. Clearly distinguish the role of environmental organisms in nature and those involved in biotechnological processes by relating to their metabolic or physiologic capabilities
11. Carry out a range of advanced skills and laboratory techniques, including isolation and identification of microorganisms; purification and characterization of specific microbes.

Course outline

Topic	Content
Microbial structure	• Ultrastructural organisation of a bacteria cell • Fungal cell ultrastructure • Virus structure and function

Microbial Classification	• Introduction to Systematics, phenetic and phylogenetic taxonomy, molecular chronometers (bacteria, fungi and viruses)
Microbial physiology	• Microbial ecology • Microbial genetics • Microbial metabolic processes
Microbial importance	• Microbial pathogenesis, diseases • Methods of studying or establishing the pathophysiological properties
Microbial drug resistance	• Management of microbial infections • Mechanisms of drug resistance • Methods of evaluation or detection of drug resistance, phenotypic and molecular techniques in detections

Microbial characterisation and detection methods	• Microbiological detection and/or isolation, identification, preservation and maintenance
	  ○ Conventional microbiological techniques
	  ○ Molecular diagnostic methods

Microbial applications	• Application in food and beverages industry • Chemical and pharmaceutical Industrries • Environmental protection • Biological disease control

Course Delivery and mode of assessment

- Lectures and discussions
- Tutorials
- Seminars
- Practicals

Internet-based research

Course assessment consists of course work and assignments (30%); evaluation of seminar presentations (10%) and a written examination (60%) at the end of the 1st semester.

Reference materials

1. Brock Biology of Microorganisms by Madigan, M. T., Martiniko, J. M. and Parker J.
2. Bacterial pathogenesis: A molecular approach by Salyers B. A. and Whitt, D. D.
3. Molecular biology of the cell by Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K. and Walter, P.
4. Genetics of bacteria by Scaife, J., Leach, D. and Galizzi, A.
5. Diagnostic Virology Protocols by Stephenson, J. A., and Warnes, A.
6. Diagnostic Molecular Microbiology: Principles and Applications by Persing, D. H., Smith, T. F. S., Tenover, F. C. and White, T. J.
7. Introduction to Modern Virology by Dimmock, Easton and Leppard
8. Principles of Virology Molecular Biology, Pathogenesis and Control by Flint, S. J., Enqinst, L. W., Krug, R. M., Racaniello, V. R. and Skalka, A. M.
9. Methods for General and Molecular Bacteriology by Gerhardt, Murray, Wood and Krieg

COURSE NAME: CONFLICT AND HEALTH

Course description

This module builds up the skills of participants in conflicts recognition, resolution and control in order to restore fully functional health systems. It also familiarizes participants with the identification of possible conflict foci.

Objectives

1. To equip students with knowledge on causes of conflicts.
2. To equip students with knowledge on the impact of conflicts on health services and spread of infectious diseases and zoonoses.
3. To impart into students skills necessary for conflict resolution and management.

Learning outcomes

After successful completion of this module, the students will be able to;

1. Know types and causes of conflicts.
2. Understand the impact of conflict on health systems and spread of infectious diseases and zoonoses.
3. Understand mechanisms of conflict resolution.
4. Assist in the process of peace management.

Course content

1. Definition of conflicts.
2. Conflict process.
3. Causes of conflicts (ideological, natural resources, ethnic etc)
4. Types of conflicts.
5. Conflicts and spread of animal diseases and zoonoses and impact to health systems, health of the displaced and non-displaced populations of animals and humans.
6. Effects of conflict on infectious disease management.
7. Mechanisms of conflict resolution and management (litigation, arbitration, reconciliation, mediation, collaborative and traditional laws etc) and restoration of health services.
8. Factors that affect resolution of conflicts.
9. Characteristics of well and poorly managed conflicts and examples.
10. Causes and management of conflicts in pastoral African communities.

Course delivery

1. Lectures and discussions
2. Tutorials/seminars
3. Case studies and presentations
4. Internet-based research

Reading list

1. Howard, N., Sondorp, E., & Ter Veen, A. (2012). *Conflict and Health*. McGraw-Hill International.
2. Banatvala, N., & Zwi, A. B. (2000). Conflict and health: Public health and humanitarian interventions: Developing the evidence base. *BMJ: British Medical Journal*, *321*(7253), 101.
3. Internet resources

COURSE NAME: MONITORING AND EVALUATION (NEW)

Course description

The Monitoring and Evaluation course aims to introduce the rationale for as well as strengthen capacity in management, monitoring and evaluation of health system. It's a response to the demand for skilled personnel who can accurately measure outputs and outcomes of its interventions as a way of enhancing evidence-based decision-making. Scarcity of such skills amongst local practitioners has been basis for sourcing these skills internationally which becomes too expensive to manage diseases in the region.

It aims to build qualitative and quantitative skills in formulating, managing, monitoring, and evaluating health interventions.

Objectives

1. To understand the basic M&E terms and concepts
2. To provide learner with knowledge and skills that you can use in managing interventions within the public sector.
3. To know the indicators and measurements used in monitoring health interventions
4. To understand the different methods and strategies of management of data collection
5. To learn the evaluation design and sample design
6. To know and relate generic M&E concepts to the public sector

Learning outcomes

1. To describe the basic M&E terms and concepts
2. To be able to apply knowledge and skills in managing interventions within the public sector.
3. To apply the common indicators and measurements used in monitoring health interventions
4. To deploy the different methods and strategies of management of data collection
5. To apply the evaluation design and sample design
6. To know how generic M&E concepts related to the public sector

Course content

1. Introduction, overview and definition and application of Monitoring and evaluation terms and concepts in reference to infectious disease management and health and veterinary systems
2. Types of M&E
3. Baseline surveys for M&E
4. Inception reports for M&E
5. Systems model as related to M &E
6. Log frame as applied to M&E
7. Establishing M&E Systems
8. Data collection, analysis and interpretation for M&E
9. M&E reports and communication of findings
10. Challenges and opportunities in M&E

Course Delivery

1. Lectures and discussions
2. Tutorials
3. Seminars
4. Problem-based approaches
5. Internet-based research
6. Practical sessions

Assessment methods

1. Practical assignments to develop M&E plans for a given intervention
2. Critiquing existing M&E systems
3. Class exercises
4. Module test
5. Final university exam

Suggested reading list

1. JC McDavid and LRL Hawthorn. 2006. Program Evaluation & Performance Measurement: An Introduction to Practice. SAGE Publications
2. Jody L. Fitzpatrick, James R. Sanders, Blaine R. Worthen. 2010. Program Evaluation: Alternative Approaches and Practical Guidelines. Pearson; 4 edition.
3. John W. Creswell.2013. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. SAGE Publications, Inc; 4th edition4th Edition
4. G. Jayanthi, Janet Geddes, Utpal Moitra & Ashis Mondal. 2008. A Handbook on Using Participatory Monitoring and Learning Tools. Academic Foundation.
5. Kathryn E. Newcomer, Harry P. Hatry, Joseph S. Wholey. 2010. Handbook of Practical Program Evaluation. Jossey-Bass; 3 edition.
6. Joy A. Frechtling. 2007. Logic Modeling Methods in Program Evaluation. Jossey-Bass; 1 edition.

7. James C. McDavid and Laura R. L. Hawthorn. Program Evaluation and Performance Measurement: An Introduction to Practice. Sage, 2nd edition.
8. Robert K. Yin. 2013. Case Study Research: Design and Methods. SAGE Publications, Inc; Fifth Edition

COURSE NAME: ADVANCED BIOSTATISTICS (NEW)

Course description

The course is designed for IDM students wanting broader and specialized skills in the field of biostatistics and informatics. It is a requirement that the student is grounded and has basic experience with design, collection, management, univariable and bivariable analysis, interpretation and presentation of data as covered in Biostatistics I. This course provides knowledge of multivariable analysis in terms of stratified data analysis, linear regression, logistic regression and analysis of survival data.

Objectives

1. To attain specialized understanding of advanced statistical methods and to apply them to disease management endeavors, such as data management, statistical analysis, interpretation, and presentation of analytical results.
2. To know stratified analysis, linear regression, logistic regression and survival analysis techniques to relevant data sets.
3. To understand appropriate biostatistical methods and applications to support research and evaluations in the core areas of health research and practice like epidemiology, health systems management, policy and outcomes research.
4. To know how to translate a study's scientific question or aims into testable statistical hypotheses and propose and apply appropriate statistical methods to test those hypotheses.
5. To know how to test and interpret models for continuous outcome data (normal linear model), categorical outcome data (logistic and Poisson regression), and time-to-event data (Cox regression).
6. To demonstrate knowledge of the issues of bias, error, confounding, effect modification, sampling, and generalizability and how they relate to the interpretation of study results.
7. To learn how to use computer software for data entry and data base management and for summarizing, analyzing and displaying research results.
8. To know how to critically review and interpret the scientific and statistical methods presented in public health and medical literature to identify strengths and weaknesses, and identify potential biases in these studies.

Learning outcomes

1. To demonstrate specialized understanding of advanced statistical methods and to apply them to disease management endeavors, such as data management, statistical analysis, interpretation, and presentation of analytical results.
2. To apply stratified analysis, linear regression, logistic regression and survival analysis techniques to relevant data sets.
3. To select appropriate biostatistical methods and applications to support research and evaluations in the core areas of health research and practice like epidemiology, health systems management, policy and outcomes research.
4. To translate a study's scientific question or aims into testable statistical hypotheses and propose and apply appropriate statistical methods to test those hypotheses.
5. To test and interpret models for continuous outcome data (normal linear model), categorical outcome data (logistic and Poisson regression), and time-to-event data (Cox regression).
6. To apply knowledge of the issues of bias, error, confounding, effect modification, sampling, and generalizability and how they relate to the interpretation of study results.
7. To demonstrate how to use computer software for data entry and data base management and for summarizing, analyzing and displaying research results.
8. To critically review and interpret the scientific and statistical methods presented in public health and medical literature to identify strengths and weaknesses, and identify potential biases in these studies.

Course content

1. Stratified analysis of disease / health data
    - Definition of terms in stratified analysis
    - Confounding and Interaction
    - When to Use Stratification / Stratification Considerations
    - Stratification Procedure
    - Stratified analysis techniques
    - Statistical tests for stratified analysis
    - Challenges and solutions to stratified analysis

2. Linear regression analysis
    - Definition of terms
    - Simple linear regression
    - Multiple linear regression
    - Statistical software for linear regression
    - Linear regression as applied to multivariable analysis
    - Assessing for confounding and interaction using linear regression
    - Interpretation of linear regression model outputs

3. Logistic regression analysis
    - Definition of terms
    - Simple logistic regression
    - Multiple logistic regression
    - Statistical software for logistic regression

- Logistic regression as applied to multivariable analysis
- Assessing for confounding and interaction using logistic regression
- Goodness of fit tests
- Interpretation of logistic regression model outputs

4. Survival analysis
    - Definition of terms
    - Estimating the survivor function; Kaplan-Meier estimates
    - Comparison of groups: Log-rank
    - Cox proportional hazards model
    - Model-checking procedures

Course Delivery

1. Lectures and discussions
2. Tutorials
3. Seminars
4. Problem-based approaches
5. Internet-based research
6. Practical sessions

Assessment methods

1. Practical assignments
2. Critiquing of statistical methods and outputs
3. Class exercises
4. Module test
5. Final university exam

Suggested reading list

1. Norman R. Draper and Harry Smith. 1998. Applied Regression Analysis (Wiley Series in Probability and Statistics). Wiley-Interscience; Third edition
2. Alan Agresti. 2007. An Introduction to Categorical Data Analysis. Wiley-Interscience; 2 edition
3. Angela M. Dean and Daniel Voss. 2000. Design and Analysis of Experiments. Springer; Corrected edition
4. Kleinbaum, David G. and Klein Mitchel. 2010. Logistic Regression. A Self-Learning Text. Springer; 3rd edition.
5. Kleinbaum, David G. and Klein Mitchel. 2011. Survival Analysis: A Self-Learning Text. Springer; 3rd edition.
6. David G. Kleinbaum, Lawrence L. Kupper, Keith E. Muller, Azhar Nizam. 1997. Applied Regression Analysis and Multivariable Methods. Duxbury Press; 3 edition
7. Moyses Szklo and Javier Nieto. 2012. Epidemiology: Beyond the Basics. Jones & Bartlett Learning; 3 edition.
8. David W. Hosmer Jr., Stanley Lemeshow and Rodney X. Sturdivant. 2013. Applied Logistic Regression. Wiley; 3 edition.

COURSE NAME: SEMINAR SERIES II (NEW)

Course description

The Seminar series are mandatory for all MSc students at Makerere University. It provides an opportunity for students to showcase their latest research and /or skills at critiquing scientific research. The series emphasizes the applications of theoretical and emipirical tools in the assessment of issues surrounding infectious diseases management. The seminar series runs through the two academic years on a day chosen as appropriate by the program coordinator. The seminars are open to the public and mandatory to all IDM students, paper reviewers and their academic supervisors.

Course objectives

1. To provide students with an opportunity to learn strategies to develop the practical academic skills and personal attributes needed in scientific presentations
2. To offer students the opportunity to interact and ask questions related to the topics of their interest hence enhancing their knowledge.

Learning outcomes

1. To demonstrate different practical academic skills and personal attributes needed in scientific presentations
2. To be able to practically interact and ask questions related to the topics of interest.

Course content

The student will make one (1) seminar presentation, in a semester, to the audience using a presentation technology chosen by the Program Coordinator at the start of the semester. The scientific material to critique will be given to reviewers at least a week before the student's presentation. It is encouraged that students choose material related to their tracks of choice. The material may be;

1. The student's field report
2. Previous dissertation in an IDM related field
3. Current trends in IDM e.g. policy issues
4. The student's draft manuscript
5. Published scientific paper in a peer-reviewed journal
6. Any other material as identified fit by the program coordinator.

Course delivery

Scientific presentation with a technology determined by the program coordinator at the beginning of the semester

Assessment methods

The reviewers will grade the student based on;

1. Presentation skills

2. Relevancy of the material
3. Ability to critique the science and methods

Suggested reading list

1. Kate L. Turabian. 2013. A Manual for Writers of Research Papers, Theses, and Dissertations, Eighth Edition: Chicago Style for Students and Researchers. University of Chicago Press
2. Wendy Laura Belcher. 2009. Writing Your Journal Article in Twelve Weeks: A Guide to Academic Publishing Success. SAGE Publications, Inc.
3. Craswell, G. 2005. Writing for Academic Success. London: Sage Publications
4. Crème, P. and Lea, M.R. 2008. Writing at University: A Guide for Students. Maidenhead: Open University Press.
5. Gill Marshall. 2005. Critiquing a research article. Radiography, Volume 11, Issue 1, 55 – 59.
6. How to read a scientific paper (biology): http://www.biochem.arizona.edu/classes/bioc568/papers.htm
7. Finding and reviewing appropriate scientific articles. This site will help you select up-to-date and relevant articles for your review (biology): http://www.stanford.edu/~siegelr/readingsci.htm

COURSE NAME: DISSERTATION (NEW)

Course description

The dissertation is an independent piece of research where students take a great deal of responsibility for their own learning. It demands the use of communication, information-seeking and intellectual skills. A dissertation or final year project, as a form of assessment differs from other module assessments. The expectation is that the student, takes responsibility for their own learning and produce a literature review, choose methods for undertaking a study, write up findings and discuss the outcomes as well as conclude and recommend.

Course objectives

1. To identify your own area of research interest.
2. To explore the area of research interest in depth.
3. To learn how to define your own research questions and objectives.
4. To experience the process of producing knowledge.
5. To learn how to manage a research project from beginning to end.
6. To consolidate your communication, information-seeking and intellectual skills.

Learning outcomes

1. To able to identify a specific research topic in the area of interest.
2. To demonstrate adequate skills in literature review around the topic of interest.
3. To frame your own research questions and objectives.
4. To demonstrate capacity and knowledge of the process of producing knowledge.
5. To manage a research project from beginning to end.
6. To demostrate communication, information-seeking and intellectual skills.

Course content

The students are required to formulate a clear question that the dissertation seeks to answer; review the literature in the field relating to the question; engage in independent research in addressing this question; justify whatever methods are chosen to undertake the research and present and discuss the findings, whilst demonstrating how they relate to the original question. Therefore, the student must thoroughly cover the following;

1. Introduction: The field of study, the research question, the hypothesis (if any) or, more generally, the research question that is to be investigated. It should also include a summary of the contents and main arguments in the dissertation.
2. Literature Review: Usually, this comes immediately after the introductory chapter. This may be more than one chapter, but should certainly be written in sections. This should include previous work done on the field of study and anything that you consider to be relevant to the hypothesis or research question and to its investigation. It will include a large number of references to the literature in your chosen area.
3. Methodology: This section should include an account of the research questions and/or hypotheses to be investigated, relevant methods of investigation and an argument for why student thinks these methods are the most appropriate ones for the question and for the circumstances. Students should consider the benefits of the chosen method as well as identifying any disadvantages and how they overcame them. Ethical issues and the ways in which students dealt with them should be noted. This section should also discuss any variations from the original fieldwork plan, and should conclude with a reflection on the experience of doing fieldwork.
4. Findings / Results: This section should present the main findings of the research together with an account of the strengths and weaknesses of your data relative to the research question/hypothesis. Students may also wish to include an evaluation of any difficulties they encountered in collecting and analysing data, together with an assessment of how this affected the plan of research.
5. Discussion: This chapter must relate the findings to the theoretical/policy discussion in the literature review. They should not introduce any new literature at this stage.
6. Conclusions and recommendations: An overall assessment of what the student found out, how successful they were and suggestions for future research.

Course delivery

1. Practical and participatory sessions on the course content

2. Guidance from academic supervisors and peers
3. Presentation of concepts, proposals and dissertations scientific community

Assessment methods

This follows guidelines by the Makerere University Directorate of Graduate Research and Training (MakDGRT). These involve;

1. Internal examination
2. External examination
3. Viva voce / dissertation defence before panel appointed by the MakDGRT

Suggested reading list

1. Rudestam, K. E. and Newton, R.R. 2001. *Surviving Your Dissertation. A Comprehensive Guide to Content and Process.* 2nd ed., London, Sage.
2. Allison, B. (2004). The student's guide to preparing dissertations and theses. 2nd ed. London: RoutledgeFalmer.
3. Ball, S. (2012). The complete guide to writing your dissertation: advice, techniques and insights to help you enhance your grades. Oxford: How To Books.
4. Berry, R. (2004). The research project: how to write it. 5th ed. Abingdon: Routledge.
5. Biggam, J. (2011) Succeeding with your master's dissertation: a step-by-step handbook. 2nd ed. Maidenhead: Open University Press. 808.066 BIG & e-book
6. Blaxter, L, Hughes, C. & Tight, M. (2010) How to research. 4th ed. Maidenhead: Open University
7. Aveyard, H., Sharp, P. & Woolliams, M. (2011) *A beginner's guide to critical thinking and writing in health and social care.* Maidenhead: Open University Press.
8. Aveyard, H. (2010) *Doing a literature review in health and social care: a practical guide.* 2nd ed. Maidenhead: McGraw-Hill Open University Press. 362.1 AVE & e-book
9. Bell, J. (2010) *Doing your research project: a guide for first-time researchers in education, health and social science*. 5th ed. Maidenhead: Open University Press. 370.72 BEL & e-book
10. Gimenez, J. (2011) *Writing for nursing and midwifery students.* 2nd ed. Basingstoke: Palgrave Macmillan.
11. Bryman, A. (2012) Social research methods. 4th ed. Oxford: Oxford University Press. 300.72 BRY
12. Bui, Y.N. (2009). How to write a master's thesis. Thousand Oaks, Calif., SAGE. 808.066 BUI
13. Creswell, J. W. (2014). Research design: qualitative, quantitative, and mixed methods approaches. 4th ed. London: SAGE.
14. Gustavii, B. (2008) *How to write and illustrate a scientific paper.* 2nd ed. Cambridge: Cambridge University Press.
15. Hall, G. M. (2008) *How to write a paper.* 4th ed. Oxford: Wiley-Blackwell.
16. Kirkman, J. (2005) *Good style: writing for science and technology.* 2nd ed. Abingdon: Routledge.
17. LeBrun, J. (2007) *Scientific writing: a reader and writer's guide.* Singapore: World Scientific.

COURSE NAME: ADVANCED EPIDEMIOLOGY (NEW)

Course description

The course aims at providing the students with knowledge and skills in spatial statistical approaches, intervention studies and randomized control trials. These skills are important in infectious disease control and forecasting. This course will also enhance the ability of students to set up and execute various complex epidemiology studies and also interpret the findings of similar studies.

Course objectives

1. Expose the students to advanced epidemiology designs for addressing medical/public health questions
2. Identify and discuss factors important for defining an intervention group and a control group.
3. Understand ingredients in the sample size determination for more complex designs.
4. Introduce the students to spatial point pattern analysis for infectious disease detection
5. Expose the students to geostatistics models, aerial data analysis and mapping

Learning outcomes

At the end of the course students should be able to:

1. Critique the various epidemiology designs used to collect information on infectious diseases
2. Set up representative intervention and control groups for studies executed
3. Choose samples which are representative and powered for scientific interpretation
4. Execute spatial analysis and interpret models obtained from spatial research

Course outline

Lesson 1: Nested studies

Lesson 2: Intervention studies

Lesson 3: Randomized control trials

Lesson 4: Epidemiologic modelling for infectious disease

Lesson 5: Introduction to Spatial analysis

Course delivery

The course will be delivered using lectures, tutorials, practical sessions and field excursions.

Reading list

1. Lawrence M. Friedman, curt Furberg and David L. DeMets (2010): Fundamentals of Clinical Trials. Fourth Edition. ISBN-978-1-4419-1585-6, e-ISBN- 978-1-4419-1586-3
2. Oleckno WA. Long Grove (2002): Essential epidemiology. Principles and applications, Illinois: Waveland Press. 5th Edition. ISBN- 13:978-0-7637-6622-1, 10:0-7637-6622-4.
3. Clinical Trials: A Methodologic Perspective (2nd Edition), by Piantadosi, ISBN-13: 978-0471727811
4. N. A. C. Cressie. Statistics for Spatial Data. Wiley, New York,, revised edition, 1993.
5. Peter J Diggle and Peter J Diggle. Statistical analysis of spatial point patterns. 1983.

6. P.J. Diggle, R. A. Moyeed, and J. A. Tawn. Model-based geostatistics. Applied Statistics, 47:299–350, 1998.
7. Dirk Pfeiffer, Timothy Robinson, Mark Stevenson, Kim B Stevens, David J Rogers, and Archie CA Clements. Spatial analysis in epidemiology. Oxford University Press New York, 2008.
8. Brian D Ripley. Modelling spatial patterns. Journal of the Royal Statistical Society. Series B (Methodological), pages 172–212, 1977.
9. David J Strauss. A model for clustering. Biometrika, 62(2):467–475, 1975.
10. L.A. Waller and C.A. Gotway. Applied spatial statistics for public health data, volume 368. Wiley-Interscience, 2004.

COURSE NAME : INFECTIOUS DISEASE MANAGEMENT IN DISASTERS AND EMERGENCIES (NEW)

Course Description

This course is designed to contribute to the development of student competency, at an awareness level, in preparing for and responding to all-hazard events--both natural and man-made. The course aims to provide a wide-ranging introduction to the field's core competencies. The course will look at the purpose, history, organization, functions, tools, and activities used in the field.

Course Objectives

1To introduce the students to concepts of emergency preparedness, response and recovery

2 To establish the process of setting up a community disaster plan

3 To identify institutions which are involved in disasters and how they are coordinated

4 To expose the students to the communication strategy during an emergency

5 To create awareness about the role of the first responders in the community

Learning outcomes

Upon completion of this course, students will be able to:

1. Define public health emergency preparedness, response, and recovery
2. Describe the purpose of the National Response Framework
3. Describe the concept of chain-of-command
4. List the actions that support a national response
5. Describe why effective communication is important in preparing for, responding to, and recovering from emergencies and disasters
6. Apply preparedness, response, and recovery concepts to specific case studies
7. Outline actions that contribute to the physical or psychological safety of responders.

Course outline

1. Introduction to Course
2. NIMS and ICS
3. National Response Framework
4. Communication
5. Crisis and Risk Communication
6. Surveillance and Investigation
7. Hazard, Vulnerability, and Risk Assessment
8. Planning and Improvement
9. Leadership and Decision Making
10. Vulnerable Populations
11. Psychological Aspects of Emergencies and Disasters
12. Worker Health, Safety, Resilience
13. Legal Issues

Course delivery

A variety of assignments, including presentations, will serve as a basis for learner participation and problem-solving. The various components of the course will be delivered using lectures, tutorials, and practical sessions and are intended to stimulate interactions among learners.

Reading list

Public Health Management of Disasters, The Practice Guide. Third Edition, Linda Young Landesman, 2012, American Public Health Association, ISBN 978-0-87553-004-8.

COURSE NAME: ECOSYSTEM HEALTH (Harmonized from MSc. Veterinary public health)

Course Description

This module covers the causes and forms of disruptions of ecosystems health, means of assessing and mitigating ecosystems hazards.

Learning Objectives

The student should have learnt to:

1. Examine concepts governing integrity and disruption of ecosystem health
2. Assess and evaluate ecosystem risks
3. Identify and implement ecosystem mitigation measures

Learning Outcomes

The student should be able to:

1. Identify risk factors to ecosystems health
2. Design mitigation measures based on existing approved/acceptable ecosystem practices
3. Assess for hazards leading ecosystem disruptions

Course content

1. Introduction to Ecosystems Health
2. Ecosystem Disruption

3. Occupational health
4. Ecosystem Assessment
5. Principles of Ecosystem mitigation measures

Course delivery

The course will be delivered using lectures, tutorials, practical sessions and field excursions.

Reference List

3. Howard Frumkin. (2005). Environmental Health: From Global to Local. Jossey-Bass. ISBN-10: 0787973831
4. Stephen Palmer. (2002). E.coli: Environmental Health Issues of VTEC 0157. Taylor & Francis. ISBN-13: 978-0415235952
5. FAO, Daniele Manzella and Jessica Vapnek. (2007). Development of an Analytical Tool to Assess National Biosecurity Legislation. Food & Agriculture Org. ISBN-10: 9251058717
6. Ming-Ho Yu. (2007). Environmental Toxicology: Biological and Health Effects of Pollutants, Second Edition. 2nd edition. CRC Press. ASIN: B000Q35TMK
7. Dade W. Moeller. (2004). Environmental Health: 3rd Edition. Harvard University Press. ISBN-10: 0674014944
8. Jim McLauchlin and Christine LittleHobbs. (2007). Food Poisoning and Food Hygiene. 7th edition. A Hodder Arnold Publication. ISBN-10: 0340905301
9. Chesworth. (1996). Food Hygiene Auditing. Springer. ISBN-13: 978-0834216808
10. Blumenthal, D. S., and Ruttenber, A. J. (1995). Introduction to environmental health. Second Edition. New York: Springer. ISBN 0826139019, 9780826139016
11. Lippmann, M. (Ed.). (1992). Environmental toxicants: Human exposures and their health effects. New York: Van Nostrand Reinhold. ISBN: 978-0-471-79335-9 (cloth)
12. Moeller, D. W. (1997). Environmental health (Revised edition.). Cambridge: Harvard University Press. ISBN 0-674-01494-4 (alk paper)
13. Moore, G. S. (1999). Living with the earth: Concepts in environmental health science. Boca Raton: Lewis Publishers. ISBN 0849379989, 9780849379987
14. Nadakavukaren, A. (2000). Our global environment: A health perspective (fifth edition.) Prospect Heights: Waveland Press, Inc. ISBN 1577666860, 9781577666868
15. Philp, R. B. (2001). Ecosystems and Human Health: Toxicology and Environmental Hazards Lewis Publishers. ISBN 1566705681, 9781566705684
16. Yassi, A., Kjellstrom, T., de Kok, T., Guidotti, T. L. (2001). Basic environmental health. New York: Oxford University Press. ISBN: 978-0-19-513558-9

Appendix D.1. CIMTRADZ Policy Briefs

A Decade of Foot and Mouth Disease (FMD) Vaccination Failure in Uganda: Recommendations for effective FMD Control

International Infectious Disease Management Perspectives

Policy Research Brief

January 2013

A Decade of Foot and Mouth Disease (FMD) Vaccination Failure in Uganda: Recommendations for effective FMD Control

Micheal Muleme, Robert Barigye, Margaret L. Khaitsa, John David Kabasa, Jovia Musubika and Chrisostom Ayebazibwe

Statement of Issue; Foot-and-Mouth Disease (FMD) is a highly contagious viral disease of wild and domestic cloven-hoofed animals. FMD outbreaks can be controlled by ring vaccination and restriction of animal movements in affected districts. If used strategically, vaccination can create a barrier between infected and disease free areas, provided there is a match between the types of virus used to make vaccines and those causing outbreaks. However, restriction of animal movements and vaccination of cattle after outbreaks have not successfully controlled FMD in Uganda, where outbreaks occur every year in Uganda's 11.4 million cattle. This normally leads to serious socio-economic consequences due to marked loss in production and/or death of affected animals as well as interference with marketing of livestock products; a major hindrance to international trade.

Background; The current global burden of FMD is concentrated in Asia, Africa and South America, which mirrors low economic development as well as lack of infrastructure and resources to control the disease. FMD is caused by a virus and is transmitted mainly by contact but wind spread has been recorded. The virus that causes FMD has many types which are different and **each type of virus requires a specific type of vaccine to be controlled**. Affected animals mainly show signs of blisters on the mouth, soft skin of the feet and udder of cattle, sheep, goats and other cloven-hoofed animals. The Central region reports the highest number of FMD outbreaks: It is estimated that **34% of outbreaks that occurred in Uganda from 2001 to 2010 were in the central region**. This was followed by the Eastern region (19%), South-western (17%), Western (13%), Northeastern (3%) and Northwestern region (1%).

Post-outbreak vaccination followed a similar trend with 43% of all vaccines distributed to the central region, 35% to the South western, 9% Western, 7% Eastern, 3% Northern, 1% Northeastern and 0.3 % Northwestern.

Factors affecting the effectiveness of FMD control Programs in Uganda; the percentage (10.3%) of cattle vaccinated in districts that report outbreaks is far lower than the recommended vaccination of 72% of susceptible animals around the area of outbreak to build protection and prevent further spread of the disease.

The small ruminants and pigs are not included in vaccination programs to control outbreaks. These could be a source of FMD for cattle.

The long time (8 weeks average) taken to respond to outbreaks through vaccination, moreover it is recommended that vaccination of animals around outbreak areas should be done within 5 days from when the disease is reported.

Laboratory confirmation of the specific type of the virus causing FMD is limited. For instance, it is usually done done for only 9 out of the 121 outbreaks.

High cost of FMD vaccines and associated transportation as well as tax costs. The cost of FMD vaccines ranged from **$58,000 in 2003 to $1,088,820 in 2009.**

Policy Recommendations; Animal check points should be established at all entry points .i.e. in Rakai, a border district in the Central region and most districts in the Eastern, Western and South-western region who reported high number of FMD outbreaks because of the free movement of animals across Uganda's porous borders.

Vaccination of animals at entry points should be enforced especially before high risk seasons for example towards the draught period

.

Regular surveillance of all animal species (at least once a year) to ascertain the type of FMD virus in animal populations should be introduced

Mandatory reporting of FMD outbreaks should be enforced and should involve;

- Increased training of para-vets in FMD identification.
- Increased farmer sensitization about the disease and its implications
- An improved disease reporting system at all levels of veterinary service provision.

Capacity Building in both human and infrastructural and collaboration with manufacturing plants to ease matching of vaccine with viruses causing outbreaks in the animal populations should be promoted.

For effective response to outbreaks, policies should cater for the following;

- Continuous availability of FMD vaccines
- Establishment of a rapid response team to implement immediate control of FMD outbreaks
- Private-government partnerships to have an FMD vaccine development plant. This reduces both the costs of transporting the vaccines and the time delay before vaccination due to importation of vaccines
- Vaccination of recommended percentage of animals in affected districts
- Monitoring of the protection produced after vaccination

Summary; Effective FMD control should involve human and infrastructural capacity building for regular identification of the FMD virus types causing outbreaks; matching of the virus types with vaccines produced; vaccination of the recommended percentage of animals in districts; monitoring of protection produced after vaccination; and establishment of disease free zones and animal check points to limit disease transmission.

Sources Consulted:

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Appendix D.2. CIMTRADZ Policy Briefs

Prevention and Control of the Deadly Ebola Haemorrhagic Fever in Uganda

International Infectious Disease Management Perspectives

Policy Research Brief

March 2013

Prevention and Control of the Deadly Ebola Haemorrhagic Fever in Uganda

Rachael Gemmeda Margaret L. Khaitsa, Jovia Musubika and Joseph F. Wamala

Statement of Issue; Ebola Haemorrhagic Fever (EHF) is an emerging zoonosis (passed on from animals to humans). It is one of the most deadly haemorrhagic fevers. The number of people that die from EHF over a given period of time ranges from 34% to 88%. EHF has limited treatment options with no vaccine. Wildlife-human interface, the ability of the virus to infect multiple hosts and the use of primates (mammals that are humankind's closest biological relatives) as food sources contributed to the emergence of EHF. The disease is characterized by high death rates and it causes social anxiety.

Background; EHF was discovered in 1976 in the Democratic Republic of Congo (DRC) around the River "Ebola" which it is named after. It has five sub-types, namely; Ebola Zaire (DRC), Ebola Sudan (Sudan), Ebola Ivory Coast (Ivory Coast), Ebola Bundibugyo (Uganda), and Ebola Reston (Reston, USA), all named after places where the sub types were first reported.

In Uganda, the first outbreak was reported in 2000 in the districts of Mbarara, Gulu and Masindi. From then to July 2012, Ebola claimed 280 lives in Uganda, including the 16 lives that were claimed in the latest outbreak in Kibale district. EHF occurs along humid rain forests in central and eastern Africa and could be due to the entry of people to the tropical rain forests where a variety of floras and faunas exist, that may serve as reservoirs of the disease

Factors Associated with EHF; the movement of animals and people is one of the most important factors in the spread of Ebola. The manner in which the virus transmits from the reservoir to humans or to primates is not known although it has been observed that contact with infected primates transmits the virus to humans and the outbreak in primates is followed by an outbreak in humans. It is transmitted from person to person through contact with blood, tissue, body fluids, and secretions of infected persons, and also through contaminated needles and fomites [inanimate (meaning they cannot move themselves) objects which can possibly harbour infectious organisms.

Despite previous studies conducted on Ebola, there is still no approved treatment or vaccine for EHF. The EHF outbreak in Uganda of 2007/8 occurred in Bundibugyo district, which is home to Semiliki National Park. The risk factors associated with acquiring EHF were attending funerals, having physical contact with suspected cases and visiting hospitals prior to illness. EHF outbreaks have some patterns of occurrence in terms of weather conditions, with most outbreaks occurring during the rainy season.

Until today the way the virus resides in the environment between outbreaks is unknown, although it is suspected that its natural reservoirs are some species of fruit bats. The incubation period of the disease varies from 2 to 21 days. Clinical manifestations include sudden onset of fever, weakness, headache, vomiting, diarrhoea, internal and external bleedings. The virus infects cells of the blood vessels and the heart, kidney, liver, spleen and lymph nodes. After which, the virus replicates at a very high rate. Patients who recovered from EHF had detectable levels of antibodies for a few years. After recovery, they continue to have health problems such as weight loss, weakness, auditory and mental problems

Policy Recommendations; There should be support for extensive research, which is needed to make evidence based public health interventions. Detailed knowledge should be generated to enable a better understanding of the pathogens, the natural history of the diseases, their pathogenesis and their epidemiology. The generation of that basic knowledge will help in developing vaccines, diagnostic tools and guidelines for management and control of those diseases

There should be cooperation between public health and the animal health sectors in Uganda. Communication between the two sectors can help detect, control and monitor zoonotic diseases.

Laboratories in the field of public health and animal health should work together by sharing expertise and technologies.

Organisations involved in the response to the Ebola outbreak should transfer capacity to national and district authorities to sustain the essential functions, including enhanced surveillance and response, psychosocial support and infection prevention and control in health care facilities.

Government should commit funds to improve the infrastructure of health facilities country wide so that they are in a better position to handle outbreaks. They should be equipped with basic facilities including protection for health workers. Lack of personal protective equipment has exposed health workers to the deadly virus leading to deaths.

All contacts of probable and confirmed cases must be followed up daily and must complete the recommended 21 days of monitoring for any possible signs or symptoms of Ebola before they are released from isolation.

The Ebola isolation facilities in Kibaale District Hospital and at Mulago National Referral Hospital in Kampala and throughout the country should always remain on stand-by for receiving any suspected cases.

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Appendix D.3. CIMTRADZ Policy Briefs

Merging of two forms of Human African Trypanosomiasis in Uganda: An Intervention to rid Uganda of Sleeping Sickness

International Infectious Disease Management Perspectives

Policy Research Brief

February 2013

Merging of two forms of Human African Trypanosomiasis in Uganda: An Intervention to rid Uganda of Sleeping Sickness

Herbert Mukiibi, Charles Waiswa, Peter Waiswa, Enock Matovu, Susan Olet, Margaret L. Khaitsa, David J. Kabasa and Jovia Musubika

Statement of Issue: Human African Trypanosomiasis (HAT) or Sleeping sickness is a neglected tropical disease. It occurs in 37 sub-Saharan African countries where health systems are weak or non-existent. It affects 50,000 to 70,000 people a year and can be fatal if left untreated. HAT occurs in both the acute and chronic form, with the acute form common in the southern and eastern African countries and the chronic form common in central and western African countries. Uganda is the only country in Sub-Saharan Africa in which both forms of the disease occur. The acute form occurs mainly in the north western part, while the chronic form occurs in the central and eastern parts of the country. There is evidence indicating that merging of the two disease forms is beginning to occur in Uganda due to absence of targeted intervention. This merge could make the treatment of HAT problematic and difficult.

Background: HAT is transmitted by tsetse flies, whose habitant is bushes made of shrubs. Tsetse flies become infected for life with the germ that causes the disease as they feed. Kaberamaido and Dokolo are the two newly affected districts by HAT in Uganda. Efforts have been made to control HAT in Uganda. Two phases of intervention through the Stamp Out Sleeping Sickness (SOS) Campaign were conducted. The first was in 2006 when the 2 forms of the disease threatened to merge and also in 2010 following outbreaks of the disease in Otuboi Sub County, Kaberamaido District. The SOS campaign was a combined effort of the Ministry of Agriculture Animal Industries and Fisheries (MAIIF), COCTU, Makerere University, University of Edinburgh, Veterinary Pharmaceutical companies, a private sector donor and local livestock owners. It involved the Use of combined methods i.e. block treatment, restricted application of insecticide and follow-up. A study conducted to evaluate the impact of SOS Campaign on the HAT status in Otuboi Sub County revealed the maintenance of low numbers of clinical HAT cases from 2006 to 2008. This would probably suggest that the SOS intervention could have caused endemic stability of HAT in Otuboi Sub County but did not eradicate the disease.

Factors Associated with HAT: HAT is caused by infection with one of two parasites: *Trypanosoma brucei rhodesiense* or *Trypanosoma brucei gambiense*. Cattle are the main reservoir for *T.b. rhodesiense* while *T.b. gambiense* is not considered zoonotic as it is possible to isolate it from animal hosts. Active screening and treatment of human cases can eliminate transmission. The transmission of HAT occurs mainly in rural areas, creating particular problems for patients to access health care. It also makes it difficult for control campaigns to have an effective outreach It also prevents effective assessment of the burden of infections, which hinders efforts to collect data of for instance; how many people are at risk, how many are infected, and what the impact of the disease is on the social environment.

Policy Recommendations: A multi-sectoral approach is necessary for controlling HAT; with persistent surveillance of those areas/people at risk. This surveillance should be strengthened through the establishment of a team to participate in active case-finding and another to engage in passive surveillance, with a well-facilitated link between research and control. In case of detection, there must be effective treatment. For the livestock, there must be selective or mass treatment including vector control activities.

There is need to develop a strong and successful advocacy programme that ensures access to diagnosis and treatment and availability of funds and drugs to support the field practitioners.

Elimination of the disease as a public health problem requires the government to take a leading role in the eradication of tsetse flies through activities like stakeholder sensitization on the ethical duty of embarking on the process of HAT elimination. If there are no such efforts, it is most likely that there will be stagnation in control and surveillance

Government must be committed to the provision of adequate funding for effective implementation. "Elimination" does not necessarily imply “eradication”, meaning that the Ministry of Health must take the ownership of sustaining elimination by integrating HAT surveillance in their services while maintaining research based on public health objectives, not necessarily on the burden caused by the disease.

There is therefore need for continuous efforts involving provision of funds for HAT control and the capacity to react rapidly according to the analytical results of the surveillance outcome.

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Appendix D.4. CIMTRADZ Policy Briefs

Hepatitis B and Hepatitis C Co-infections among HIV Patients: A Call for integration of HBV and HCV interventions into HIV Prevention and Control Programs

International Infectious Disease Management Perspectives

Policy Research Brief

February 2013

Hepatitis B and Hepatitis C Co-infections among HIV Patients: A Call for integration of HBV and HCV interventions into HIV Prevention and Control Programs

Annet Kyomuhangi and Jovia Musubika

Statement of Issue; Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV), are the 3 most common and chronic viral infections all over the world. They share similar routes of transmission, meaning that it is possible for one to be infected with HIV and HCV and/or HBV at the same time. Despite the negative impact of HBV and HCV co-infections on mortality and morbidity rates among HIV-infected individuals, detailed information on the prevalence of HCV/HIV and HBV/HIV co-infection in Uganda is lacking. Although vaccination against HBV is becoming available, integration of treatment and diagnosis in HIV programs has not been achieved. This lack of prevention strategies is partially due to high costs associated with these interventions. In Uganda's Mulago National Referral Hospital, the prevalence of HBV and HCV was13% and 10%, respectively, among 100 HIV patients that were tested in a study carried out in 2012.

Background; 2 billion people are estimated to be infected with HBV worldwide; 350 million of these have chronic HBV. In Uganda, HBV infections exist, with the highest prevalence of 23.9% having been reported in the northern part of the country. The prevalence in other parts of the country ranges from 3.8% to 10%.Most of the HBV transmission in Africa occur in childhood, with the exact mode of transmission not well understood. It probably involves infection through saliva or traces of blood, as well as through unsterile needles and other possible vehicles. In low endemic areas, HBV infection is acquired through unprotected sex and drug use.

Studies show that the risk of HCV sexual transmission in heterosexual, monogamous relationships is extremely rare or nil. The risk of transmission from mother to child is about 6% in women who are HCV RNA positive at the time of delivery. The majority of HIV infections are acquired through unprotected sexual relations. In developed countries, the risk of female to male transmission is 0.04% per act while that of male to female transmission is 0.08% per act. These values are 4 to 10 times higher in low income countries. Randomized controlled trials have shown that male circumcision reduces the risk of female to male sexual transmission by about 60%.

Factors associated with HIV, HCV and HBV:

- HBV/HCV co-infections **increase the risk of liver damage** from the use of antiretroviral medication.
- Liver disease caused by chronic HBV and HCV is an **emerging cause of illness and death** among HIV infected individuals
- Patients with chronic HBV and HCV co-infected with HIV are more likely to **die of liver-related diseases** compared to patients solely infected with HIV.
- HIV patients co-infected with HBV and/or HCV have a **more rapid progression to AIDS.**
- In HIV/HCV co-infected pregnant women the risk of transmission of HCV to the foetus rises to 25%

Policy Recommendations; The prevention of HBV and HCV in HIV positive persons deserves to be a national priority in health promotion. An agreed strategic approach must be developed by the Ministry of Health, and relevant bodies in Uganda in which integration of HBV and HCV prevention, and treatment programs into the current HIV programs in Uganda is given consideration.

The Public must be sensitized about the existence of these co-infections, their dangers and how they can safe-guard themselves.

There should be comprehensive and continuous surveillance and reporting of HIV/HCV/HBV co-infection data by all hospitals in the country with assistance from the Ministry of Health. It should

further be developed with co-infection data regularly reported.

It is important that all people diagnosed with HIV are annually screened for both HBC and HBV infection and this should be required of all relevant health service providers in the country.

Treatment should be available and provided consistently across the country to co-infected patients. Screening programs for HBV and HCV among HIV infected persons should be designed (at least every 6 months) so that treatment is not delayed in case of co-infections.

There is need to re-set research priorities in the Ugandan health sector to include HIV/HBV and/or HCV co-infections. The research should look into the reasons for these co-infections amongst HIV positive persons. A nationwide survey to determine the infection burden of HIV/HBV and/or HCV and the social and psychological impacts associated with it must be carried out.

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Appendix D.5. CIMTRADZ Policy Briefs

Contagious Bovine Pneumonia (CBPP) outbreaks in Uganda, 1950 - 2011

International Infectious Disease Management Perspectives

Policy Research Brief

September 2013

Contagious Bovine Pneumonia (CBPP) Outbreaks in Uganda, 1950-2011.

Marvin A. Ssemadaali, Samuel Majalija, Robert Mwebe, Abel Ekiri, Susan Olet, and Margaret L. Khaitsa

Statement of Issue: Contagious Bovine Pleuro-Pneumonia (CBPP) is one of the most economically serious diseases of cattle in Uganda. It is a respiratory disease caused by a bacterium, and has been identified as the second most important trans-boundary disease in Africa after Rinderpest. It is also listed among the few notifiable bacterial diseases that must be reported to the World Organization for Animal Health (OIE). It causes high mortality rates and reduced productivity, leading to annual estimated losses of 3.7 million euros. Such financial losses incurred by livestock farmers threaten both their food security and livelihoods.

CBPP is a widespread trans-boundary cattle disease in the Sub-Saharan Africa. Transmission of CBPP is mainly through direct contact between diseased and healthy animals at water holes, dip tanks, markets and communal grazing areas. This leads to inhaling of contaminated aerosols and droplets from infected coughing cattle. Therefore, it is critical to understand the current situation so as to improve on the control and eradication strategies for this disease, hence providing the population with a stable food security.

Background: The first case of CBPP in Uganda was reported in 1956 in the Karamoja region. It remained concentrated in that region until the early 1990s when it spread to southern and central Uganda, with 84.2% of the samples at the National Animal Diagnostic Laboratory (Entebbe) testing positive in 1996.

The spread of the disease is mainly attributed to the extensive illegal movement of cattle within the country and from neighboring countries. This illegal movement is mainly due to search of better trade, pastures and water during droughts. Additionally, chronically infected and symptomless animals play an important role in the persistence and spread of the disease since they are difficult to detect.

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Risk Factors associated with CBPP: Illegal movement of cattle is the highest risk factor for the spread of CBPP; movement of cattle from affected areas into new unaffected areas can lead to spread of the disease. For instance, between 1964 and 1966, CBPP outbreaks in Uganda were due to cattle introduced from Sudan, and most recently in 2006, the outbreaks in western Uganda were caused by cattle from Tanzania.

Contact with infected animals in livestock markets and communal grazing areas, where cattle from different places are collected in one place for trade and grazing respectively. These practices occur in both Eastern and Western Uganda where animals move from the neighboring CBPP-affected countries, e.g. Tanzania, Rwanda, South Sudan and Kenya. Infection may also occur when farmers move their cattle for mating to neighboring herds, since artificial insemination is still unpopular in these countries.

The ineffective vaccination programs and failure of the available vaccines to confer a long lasting immunity. This can be evidenced by the poor vaccination programs during years of political instability in the country, especially between 1970 and 1990. By 1995, new cases of the disease were reported in Southern Uganda, where it had not been reported before, from the endemic Karamoja region. This also helps to explain the highest CBPP prevalence in 1996.

CBPP control challenges have also been attributed to the reluctance of cattle owners to fully participate in the vaccination programs resulting in poor vaccine effects, and this is mainly due to post- vaccination effects to the cattle.

Existing Policies: The current policy advocated by Africa Union – Inter-African Bureau Animal Resources (AU-IBAR) for the control of CBPP includes; collection of epidemiological data and information to determine and detect affected communities, effective control of

animal movements from and towards these areas, mass vaccination of cattle regularly for at least five consecutive years, and repeat vaccination of the same cattle each year. However, control strategies that have been undertaken by the Ugandan government, including vaccination, to bring down the levels of new cases reported have not been well assessed or there is little published data showing the impact of these control measures on the trend of the disease.

Policy Recommendations: There is need for the government of Uganda to increase the Animal Ministry budget to help control animal diseases, including CBPP, through proper vaccination programs, animal identification systems and proper control of illegal movement of cattle into and within the country. Also, the introduction of molecular diagnostic techniques for CBPP, such as Polymerase chain reaction (PCR) and Loop Amplification method (LAMP), which can be applied in the field, will help in early detection of the disease. Additionally, since CBPP is a trans-boundary disease, there is need to strengthen regional control programs and surveillance systems. The development of a new vaccine with long lasting immunity and less post-vaccinal reactions would be essential, including; sensitization of cattle farmers about the benefits of vaccination of their animals, so that they fully participate in the CBPP control programs.

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Appendix D.6. CIMTRADZ Policy Briefs

Lessons Uganda can learn from the U.S. in control of anthrax outbreaks

International Infectious Disease Management Perspectives

Policy Research Brief

September 2013

Lessons Uganda can learn from the US in control of anthrax outbreaks

Tendo David, Abel Ekiri, Samuel Majalija, Margaret Khaitsa

Statement of Issue: Anthrax is one of the oldest infectious zoonotics with the widest host range (Beyer & Turnbull, 2009). It affects a wide range of species (Beyer & Turnbull, 2009) including humans although cattle, sheep, goats, horses, and swine as well as wild life are primarily affected (Fasanella et al., 2010). Infectious diseases are among the emerging global threats to both developed and developing countries. Issues related to global health have attracted the attention of many global leaders and health policy makers. The disease is endemic throughout Africa, causing considerable livestock and wildlife losses and sometimes fatal infection in humans(Hampson et al., 2011).

Background: Anthrax is a highly fatal zoonotic bacterial infection that can lead to significant public health consequences. A single anthrax outbreak can claim hundreds of life. It is caused by *B .anthracis* (Han et al., 2006; Wang, 2008) whose spores are a potential biological weapon (Atlas, 2002). The largest outbreak of inhalational anthrax occurred in Russia following accidental release of *B .anthracis* spores from a military facility were over 60 people died (Meselson et al., 1994)

Because of its ability to form spores which can survive for decades even in harsh environments and the possibility to formulate powders from it; it is considered a potential biological weapon and it can pose danger if terrorists make use of it (Inglesby et al., 1999). Research by Dr. David Tendo about anthrax outbreaks in Uganda reveals a general increase in anthrax outbreaks over the years from 1954-2010.The years 2000-2010 had the highest number of anthrax outbreaks (n=6), followed by 1956-1966 (n=5), 1967-1977 (n=2), 1978-1988 (n=2), and

Current control measures for anthrax outbreaks in Uganda:

A multi-stakeholder group of partners was set up in Uganda following the 2010 anthrax outbreak that occurred in Queen Elizabeth National Park (Response Strategy, 2013). It is hoped that the work by this Task force may help to respond to further anthrax outbreaks (Response Strategy, 2013).

The Uganda national disease outbreak task force is dealing with anthrax outbreaks with the following organizations taking lead:- Uganda Wildlife Authority (UWA), Ministry of Agriculture Animal Industry and Fisheries (MAAIF), which leads in vaccination of livestock; Center for Disease Control (CDC) in the diagnosis of anthrax in people and animals; Ministry of Health (MOH) in the treatment of people; Conservation Through Public Health (CTPH) in community sensitization, Makerere university in research and diagnosis and African Field Epidemiology Network (AFENET) in coordinating and linking the National Task Force(NTF) with potential donors (Response Strategy, 2013).

Situation in the United States

In the US, there has been a general decline in the annual cases of anthrax; from 200 cases in the early 1900's to no cases since 1992(CDC, 2001).This could be attributed to the effective control and preventive measures applied in the US. These measures can also be employed in Uganda to control anthrax outbreaks. Some of these measures have been molded into policy recommendations that can assist Uganda in effective control and prevention of Anthrax outbreaks.

Policy Recommendations:

1. Control of anthrax requires the Ugandan government to adopt strong and systematic quality control programmes for the various infectious diseases.
2. The Ministry of Agriculture, Animal Industries and Fisheries (MAAIF) and the Ministry of

Health should strengthen both passive and active surveillance programmes to ensure early detection and control of anthrax

3. Anthrax control programmes should be directly under the concerned ministries (either ministry of Health and or animal industry) not under the chief administrative officer of the affected district to avoid any political influence.
4. The national anthrax task force should be strengthened to effectively control anthrax. They shouldn't only come in during outbreaks; they should have an annual operational plan towards control and prevention of anthrax.
5. The Government of Uganda should prioritize Disease control programs if effective control is to be realized.
6. MOH and MAAIF should continuously educate the public about disease control programs and their role in disease management
7. The Government should invest in: - institutional, infrastructural development and human resource capacity building in management of infectious diseases like anthrax. This includes construction of biosafety level 3 laboratories to effectively handle research on anthrax. With this, we would be able to make our own anthrax vaccines in Uganda

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Appendix D.7. CIMTRADZ Policy Briefs

Effective Control and Prevention of Non-0157 Shiga Toxin Producing Escherichiacoli (STEC) Outbreaks

International Infectious Disease Management Perspectives

Policy Research Brief

October 2013

Effective Control and Prevention of Non-0157 Shiga Toxin Producing *Escherichiacoli* (STEC) Outbreaks

Joshua Isiko, Margaret L. Khaitsa, Samuel Majalija, J.D. Kabasa and Teresa M. Bergholz

Statement of Issue: Non-O157 STEC are dangerous but emergingbacteria causing severe illnesses in humans associated with Human Uremic Syndrome (HUS). These bacteria have been associated with several outbreaks worldwide. In a period of seven years from 1990, the US identified 23 outbreaks associated with non-O157 STEC (Grant *et al.,* 2011). Unfortunately, non-O157 STEC are challenging to diagnose and their epidemiology is not well understood (Kristine et al., 2006).

Background: Shiga Toxin Producing Escherichia Coli (STEC) are bacteria that were first recognized as foodborne pathogens causing disease in humans in the early 1980s (WHO, 1998). These bacteria typed into two groups; **O157 STEC** and **non-O157 STEC** affecting both humans and animals. However, most animals (reservoirs) are not affected by these bacteria but carry them asymptomatically in their intestines, which when passed in feces cause contamination in human food and the environment. Previously, only O157 STEC was known to cause disease in humans until recently when non-O157 STEC have become commonly associated with outbreaks with severe human infections. Diseases caused by these bacteria in humans present with bloody diarrhea, fever and Hemorrhagic Uremic Syndrome (HUS) which may result in death. There are over six serotypes of non-O157 STEC reported to cause diseases in humans (WHO, 1998). Non-O157 STEC are commonly transmitted through contaminated foods. The foods may be contaminated from reservoirs including cattle, goats, sheep, chicken and other animals. In the US, non-O157 STEC were recognized as food contaminants in 1994 (USDA, 2012). In our research that used Multi-Locus Sequence Typing (MLST) to characterize 43 non-O157 STEC isolates from cattle, we identified 10 sequence types that have never been documented, which was 33% of the total isolates we tested. This observation underscored the fact that little is known about the genetic diversity of non-O157 STEC, especially those isolated from cattle.

What the US government is doing to reduce non-O157 Shiga Toxin Producing Escherichia coli (STEC) outbreaks:

The US government is strengthening the food safety system of the country. The policy focuses on detection of the big six non-O157 STEC (O145, O103, O45, O26, O111, and O121) in beef products (Kristina, 2012). However, these efforts are challenged by the inability to detect non-O157 STEC. The existing laboratory techniques accurate for **O157 STEC** are not directly applicable for **non-O157 STEC**. Therefore, there is need to improve the ability to detect non-O157 STEC so that post-harvest

detection is possible to cover all the non-O157 STEC known to cause disease. There are six serotypes of non-O157 STEC which are considered adulterants in raw ground beef. Since 2000, these six serotypes have been considered notifiable when detected in human diarrheal cases.

Policy Options:

In addition to non-O157 STEC notification, the US should prioritizeresearch to develop detection techniques and epidemiology of these pathogens. Data obtained from this research will inform policy makers on how to design preventive and control measures applicable in food processing plants and food markets.

Policy Recommendation:

We therefore recommend that the US government puts emphasis on non-O157 byapportioning more funding to conduct research on these bacteria particularly through MLST and use of information about genetic diversity to inform epidemiology.

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Appendix E.1. CIMTRADZ Monographs

Research Fellowships and MS-International Infectious Disease Management Scholarships

Research Fellowships and MS-International Infectious Disease Management Scholarships

CIMTRADZ

Overall Goal. The overall goal of these research grants is to provide opportunities for students in East African communities to further their education. In addition it is a way of developing capacity among students in ECA higher education institutions (HEIs) while fostering lasting partnerships and collaborations.

Objectives. The specific objectives of the research grants and scholarships are comprised: 1) accelerated training of students from ECA in specific areas of expertise 2) collaborative research and training in the Transboundary Animal Diseases and Zoonoses and 3) research resulting peer-reviewed scientific publications.

Participating Universities and Faculty Exchange Activities Conducted. Participating universities from East and Central Africa (ECA) include Makerere University (Uganda), Sokoine University of Agriculture (Tanzania), University of Nairobi (Kenya), Mekelle University (Ethiopia), and National University of Rwanda (Rwanda).

Outcomes and Impacts of Grants Awarded to Fellows and MSM students: Students have been extremely successful after completion of their degrees resulting in peer review publications, joint symposia and conferences, joint grant submissions and awards and career advancement. Also, student interactions with faculty from various higher education institutions has resulted into joint mentorship and exposure to other additional faculty and their research facilities. This monogram summarizes the abstracts that all of the awardees are working on for completion of their degree. .

Abstracts from 4 Fellowships Awardees

Etsay Kebede Assefa

Mekelle University College of Veterinary Medicine, Ethiopia

Contribution of dairy farms for urban, periurban development and environment in the Northern Ethiopia

Introduction: In the world, human population living in urban may grow to about 5 billion (60%) and in Africa to 742 million in the year of 2030. This is supported by the 2.6% annual growth rate in Tigray which rose to 4,314,456 in 2007 and also confounded by growing urbanization. This accelerates food insecurity and how to focus on urban agriculture.

Conclusion: Thus this research was proposed so as to investigate the level of changes created specifically by dairy farming to the development of urban, periurban, environment, and participation decision, in clearly identifying and prioritized constraints as part of livestock subsector at micro level.

Erick Komba

Sokoine University of Agriculture, Department of Veterinary Medicine and Public Health

Occurrence and antimicrobial resistance of thermophilic *Campylobacter* isolated from frozen broiler chicken meats in Morogoro Municipal, Tanzania

Erick V. G. Komba, Msetule Lameck, Robinson H. Mdegela and Sharadhuli I. Kimera

Introduction: Thermotolerant *Campylobacter* spp, particularly *C. jejuni* and *C. coli*, are among the leading causes of human bacterial gastroenteritis worldwide. These bacteria live in poultry and other animals' intestinal tracts without causing disease symptoms. Improper handling of carcasses during slaughter increases the chance of contaminating the outer skin. Poor meat handling in the kitchen and poor storage during refrigeration causes cross contamination. This cross-sectional study examined the occurrence of thermophilic *Campylobacter* in frozen chicken meat in Morogoro Municipality.

Conclusion: This study confirms that in our setting a high frequency of commercial broiler chickens are positive for antimicrobial resistant *Campylobacter* at the time of slaughter. This phenomenon derives in high contamination of carcasses during the slaughter process thereby constituting a substantial public health hazard. Freezing of carcasses does not completely remove this bacterium as seen from this study. Control strategies for these pathogens at flock level are recommended to avoid contamination of the final product. Animal products should be properly handled and thoroughly cooked in order to make sure that safe products are consumed.

Gabriel Tumwine

Makerere University, College of Veterinary Medicine, Animal Resources and Biosecurity

Human brucellosis: Sero-prevalence and associated risk factors in agro-pastoral communities of Kiboga District, Central Uganda

Gabriel Tumwine[1*], Enock Matovu[3], John David Kabasa[2], David Okello Owinyi[2] and Samuel Majalija[2]

Introduction: Brucellosis remains a neglected zoonotic disease amongst agro-pastoral communities where unprocessed milk and milk products are consumed. A cross sectional study was carried out in Kiboga district to determine the seroprevalence and risk factors associated with human brucellosis in communities where livestock rearing in a common practice.

Conclusions: Brucellosis is highly prevalent in Kiboga district, making it an important public health problem and also its level of awareness is low. The transmission risk is aggravated by consumption of unpasteurized milk products more so in rural than urban/per-urban-settings. There is a need to initiate screening and early treatment of infected humans hand in hand with educating the public about risk factors and appropriate preventive measures.

Charles D. Kato

Makerere University, College of Veterinary Medicine, Animal Resources and Biosecurity

Interleukin (IL)-6 and IL-10 are Up Regulated in Late Stage *Trypanosoma brucei rhodesiense* Sleeping Sickness

Charles D. Kato[1], Vincent P. Alibu[2], Ann Nanteza[1], Claire Mugasa[1], Enock Matovu[1*]

Introduction: Sleeping sickness due to *Trypanosoma brucei rhodesiense* has a wide spectrum of clinical presentations coupled with differences in disease progression and severity across East and Southern Africa. The disease progresses from an early (hemo-lymphatic) stage to the late meningoencephalitic stage characterized by presence of parasites in the central nervous system. We hypothesized that disease progression and severity of the neurological response is modulated by cytokines.

Conclusion: Our study demonstrates the role of host inflammatory cytokines in modulating the progression and severity of neurological responses in sleeping sickness. We here demonstrate an up-regulation of IL-6 and IL-10 during the late stage with a significant potential as adjunct stage biomarkers.

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Abstracts from MSM—IDM Awardees

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Kabajurizi W Julia, Makerere University

Comorbidities due to infectious diseases among cancer patients at Uganda Cancer Institute

Introduction: Cancer is a major global public health issue affecting all kinds of people. The burden of cancer is increasing mainly because of the increasing and aging population and increased exposure to risk factors associated with 'westernization'. Comorbidities are associated with increased mortality among cancer patients. A gap still exists over whether this kind of relationship cuts across social economic and demographic boundaries Limited data on the relationship between cancer and comorbidities in developing countries and other age groups is available. This study intends to explore this kind of relationship using the Ugandan context. This study is meant to determine prevalence of co-morbidities due to infectious diseases among cancer patients at Uganda Cancer Institute. Specifically, 1) to determine the proportion of cancer patients that are diagnosed with infectious diseases as comorbidities. 2) To identify the common infectious disease comorbidities among cancer patients. 3) To identify the cancers commonly associated with infectious disease comorbidities.

Expected Results: From preliminary observations, HIV, Tuberculosis and Malaria are the common co-morbidities infectious disease and Kaposi's sarcoma and Non-Hodgkin's Lymphoma are the common cancers.

King, Patrick, Makerere Univesity

Frequency Of Resistance Markers Against Insecticides Used In Control Of Malaria Vector In Different Malaria Transmission Sites In Uganda.

Introduction: Malaria is a major burden for most resource-poor nations in the world with an estimated 198 million cases of malaria and 584,000 deaths reported annually. Most deaths reported to occur among children living in Africa where a child dies every minute from malaria**.** Insecticide resistance in *Anopheles gambiae s.l. and An. arabiensis* (Diptera: Culicidae) vectors threatens insecticide-based control efforts for malaria. The main insecticides on market in Uganda are Permethrins, DDT, Malathion, fenitrothion, bendiocarb and deltamethrine. This study is aimed at assessing the frequency of resistance genes in field-collected *An. gambiae s.l. and An.arabiensis* from Jinja, Kanungu and Tororo – Uganda. This study will fill the knowledge gap in allele frequencies of resistance genes thereby underscoring the need for monitoring insecticide resistance and develop diagnostic tools for early detection of insecticide resistance resistance so as to utilise effectively the limited vector control tools available.

Expected results: High frequencies of resistance genes to the available insecticides will indicate shifted from susceptibility to high resistance to the five insecticide families usually used in public health control programs (organochlorides, pyrethroids, carbamates, organophosphates and carbamates) hence high malaria incidences. This will be a threat to the efficacy of insecticides and therefore need for resistance monitoring programs in order to maintain the use of the currently on market chemical. This will keep malaria incidences high.

Katagwa Moses, Makerere University

Seroprevalence of Hepatitis E Virus in Swine and its associated risk factors to human infection

Introduction: Hepatitis E disease is a major public health concern globally. There are an estimated 20 million hepatitis E infections with over 3 million acute cases and 56600 Hepatitis E Virus related deaths annually. In developing countries where the sanitation conditions are poor, transmission occurs among humans by fecal oral route due to fecal contamination of drinking water whilst in developed countries HEV infections are due to ingestion of undercooked pork or sausages. HEV genotypes 3 and 4 are enzootic in a variety of animals though domestic pigs form the main reservoirs. Humans working in swine slaughterhouses experience occupational contact with infectious swine products like blood, faecal matter and also do consume undercooked pork and this raises a public health concern for zoonosis and food safety but there's no clear data reported in Uganda on the prevalence of HEV in animal reservoirs and swine in particular and its associated risk factors to human infection. The major aim of this study is to determine the seroprevalence of HEV in apparently healthy slaughter pigs at the slaughterhouse and its associated risk factors to human infection in Kampala, Uganda.

Expected results: From pilot study, the prevalence of HEV in pigs is expected to be approximately 20% as compared to previous studies and associated risk factors to human infection will include; eating undercooked pork and exposure to infectious pig products among others.

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Tenda Irene Kibira, Makerere University

Bacterial Quality and Antibiotic Susceptibility of Eggs from Local and Exotic Chicken on Market in Uganda

Introduction: The demand for poultry and poultry products is one growing trend due to income growth, urbanization and dietary benefits such as protein, micronutrients and less cholesterol. The use of antibiotics in poultry management is also on an increase. This has raised health concerns among theconsumes due to the antibiotic residues deposited in eggs and meat of chicken.

Expected results: Salmonella isolates are more likely to be susceptible to tetracycline and resistant to cloxacillin. Other bacterial isolates (*E.coli, Staphylococcus aureus, Pseudomonas aeroginosa*) are more likely to be resistant to chloramphenicol, erythromycin, nalidixic acid.

Matinda Neckyon Mukasa, Makerere University

Food Safety, Knowledge, Attitudes, Meat Handling Practices and Bacterial Contamination of meat at the level of Abattoir Workers, Meat Transporters, and Butchery Shops In Arua Municipal Council Uganda.

Introduction: As the world population continuous to grow and demand for organic and natural food products increases the environment will continue being associated with important international health issues, including food safety. The impact of meat and wild animals and their manure as source of environmental, water and food contamination as well as the direct animal to human transmission of pathogens will have to be taken seriously under consideration by those involved in the food industry in general including producers, regulators public health agencies and consumers. Most food borne illness events happen due to mishandling of foods in ways (e.g. improper handling, inadequate heating etc). There are many upcoming hotels and restaurants and many small businesses dealing in meat related items at Arua Municipal Council. The number of registered butcher shops is 76, hotels 30, about 180 restaurants and many eating joints which use meat as one of their ingredients. In addition to these, there are higher institutions of learning, secondary schools, prison facilities, police barrack, military institutions and homes which depend on meat from Arua municipal abattoir. However sanitation facilities, waste disposal facilities, drainage system and building infrastructure are of poor quality and below standards set by Uganda National bureau of standard. Therefore, this study is designed to assess the food safety knowledge and practices in meat handling by the various actors (abattoir workers, meat transporters and the butcher shop operators), to determine microbial load and both pathogenic and spoilage microorganisms in meat at the abattoir and butchery shops in Arua municipal council.

Methods: All the abattoir workers (68 people), transporters (15 people) and butchery shop workers (228) will be administered with questionnaires to assess their level of knowledge on food safety, handling and likelihood of contamination due to bad practices. Focus group discussions with the various stakeholders in the meat industry in the town to assess their knowledge about food safety practices will be carried out. Swabs from 1cm square space from the surface of the carcass will be collected from the abattoir after slaughter and from randomly selected butchery shops, to determine the level of bacterial contamination, identification of pathogenic bacteria in the samples and identification of spoilage microorganisms in the samples.
Samples will be collected aseptically and stored in polythene bags under 4^0C then transported to the Laboratory for analysis.The results will assist in designing good meat handling practices so that foodborne diseases due meat can be avoided in the town

Mulindwa Daniel, Makerere University

Examining the Knowledge, attitude and practices of Uganda blood transfusion service workers to Global emerging infectious disease threats

Introduction: Blood banks are obligated to provide adequate and safe blood to the community. Blood donation by humans is the major source of blood and blood components for patients and individuals requiring transfusion. Donated blood can be lifesaving for individuals who have lost large volumes of blood from serious accidents, obstetric and gynecological hemorrhages, or surgery and stem cell transplant patients as well as for individuals who have symptomatic anemia from medical or hematologic conditions or cancers. The safest blood donations are found among people who donate their blood voluntarily purely out of altruism and are self-aware of their unsuitability to serve as blood donors where there might be a slightest risk of causing health damage for blood recipients. The use of these lifesaving products may be complicated by infectious and immunological diseases some of which could be life threatening. The risk of transfusion transmissible diseases is highest with the use of blood procured from remunerated donors and careless practices by the health workers. This study aims at improving the workers knowledge about the importance of Emerging and re-emerging infectious diseases in transfusion medicine and to improve workplace infection control practices. The objective of this study is to assess the knowledge, attitude and practices of Uganda blood transfusion service laboratory and field staff to global emerging and re-emerging infectious diseases threats.

Expected results: The participants are expected to have less knowledge about EIDs important in transfusion medicine although they are willing to learn more about these infections due to the work they do. They are expected to know less about the risk factors leading to emergence of EIDs in blood transfusion and are expected to know about infection control practices at their places of work due to the type of job done.

Mayanja Raymond, Makerere University

Bacterial quality of milk and characterization of potentially pathogenic bacteria during transportation to collection centres in Kiboga district

Introduction: Milk is one of the most nutrient rich food substances that is key for the growth and development of an organism but also it is an excellent medium for the growth and transmission of different bacterial pathogens to humans. Bacteria contamination of milk can emanate from a variety of sources like milk handlers, cows with mastitis, milking equipment or deficient hygiene, kiboga district being located in the cattle corridor region was selected as the study research site. A recent study carried out in Kiboga showed that the prevalence of subclinical mastitis in three sub counties was 87.9% over 70% of the dairy cattle screened. The poor roads to transport milk to the collection centers play a big role in the delay of milk to the collection centers and also the lacked knowledge on the ideal milking techniques, milking hygiene and subclinical mastitis. The neglect of milk hygiene will result into milk borne and milk product borne disease outbreaks which account for 2-6% of bacterial foodborne outbreaks reported by surveillance systems from several countries therefore there is need to access bacterial contamination of milk and characterization of potentially resistant pathogenic bacteria along the milk value chain in Kiboga district. The data generated from this study will add value to the current policies on food safety and national drug authority.

Expected Results: Bacterial contamination of milk will be determined and expressed in colony forming units. Identification of common bacterial contaminants of milk like Staphylococcus aureus, E.coli and Streptococcus spp plus the resistance patterns of the potentially pathogenic bacteria will be achieved, lastly Identification of genes associated with resistance among the isolated potentially pathogenic bacteria for example MecA gene and others.

Witto Sarah Gift, Makerere University

Molecular Epidemiology of *Cryptosporidium spp*. and *Giardia spp* in cattle bordering the Lake Mburo National Park

Introduction: *Cryptosporidium spp*. and *Giardia spp* are protozoa known to infect humans and a large variety of animals causing gastro-enteritis. Several species and genotypes have been reported to infect more than one host raising the concern for potential zoonosis. Ruminants particularly cattle are considered to be important biological hosts for *Cryptosporidium spp* and *Giardia spp*. This study aims to determine the molecular epidemiology of Cryptosporidium spp. and Giardia Spp. in cattle as well as assess the role played cattle in the livestock, human and wildlife interface.

Expected results: The prevalence of *Cryptosporidium* and *Giardia* in cattle bordering the LMNP. *Cryptosporidium* and *Giardia* genotypes in cattle to ascertain the role played by cattle in the human, livestock and wildlife interface.

Mr. Emmanuel Musisi, Makerere University

Total Antioxidant Status and Glutathione Levels in Hospitalized HIV-Mono Infected and HIV-TB Co-infected Patients on Highly Active Antiretroviral Therapy

Introduction: HIV and TB infections are highly associated with increased levels of reactive oxygen species and lower levels of antioxidants. This redox imbalance impairs the antioxidant defense system and hence causes oxidative stress. Intervention with HAART may stabilize the antioxidant defense system through viral load reduction and prevention of the antioxidants depletion yet existing data are not clear. Several studies recommend targeted antioxidant supplementation for HIV and TB patients on highly active antiretroviral therapy (HAART) and anti-tuberculosis therapy yet there is little evidence supporting this. A randomized controlled trial justified by the locally generated data on the role of antioxidants on HIV/TB treatment outcomes would provide such evidence. Surprisingly, these data are scarce in most of the East-African countries including Uganda.

Main objective: To generate baseline data on the circulating total antioxidant and glutathione concentration levels among the hospitalized HIV mono-infected and HIV/TB co-infected patients on HAART in order to justify the need for a randomized controlled trial on the role of antioxidants supplementation during HIV and TB medication regimens.

Fred K. Sserwano, Makerere University

The Productivity and Profitability of improved Local Chicken in Peri-Urban and Rural areas of Central Uganda

Introduction: In order to contribute to the sustainability of livelihoods through the introduction of appropriate indigenous poultry production and marketing technologies, it is necessary to assess the productivity and profitability of key improvement interventions employed in local chicken production. In areas of central Uganda, livelihoods within the rural communities hinge predominantly on subsistence agriculture. Local chicken has been used as a key contributor to food and nutrition security. For a sustained livelihood, it is imperative that households are able to provide surpluses to generate income while ensuring that domestic food supplies are secured. Improving the protein nutrition of households and access (physical and financial) to protein food resources at local and regional levels are a necessity. Appropriate and improved strategies in small-scale poultry development that impact on household protein food security and income are therefore required. Therefore a study has been designed to assess the productivity and profitability of local chicken production by undertaking household level economic study on the cost of production for local chicken with special attention to the main production constraints faced, importance and costs of disease control measures, the role labour plays in production costs including issues of gender, feed costs as a component of overall poultry production. The study is also intended to understand and inform on market demands and differences in market acceptance of indigenous chicken versus exotic chicken.

Expected Results: Characterization of emerging local poultry production systems and determination of average flock sizes and composition. Determination of local production parameters in relation to established flock size, clutch size, number of clutches per annum, percentage egg hatchability, percentage chick survivability. Social objectives attached to the use of indigenous chicken products. Purchasing of commercial feeds or formulation to supplement seems to be very rare amongst the respondents. Newcastle being the major disease that wipes out flocks. Traditional herbal remedies used in an attempt to control disease outbreaks and how were made.

Birungi, Brenda, Makerere University

Assessing the knowledge, Beliefs and Effects of Ebola Outbreaks Along the Pig Value Chain in Luwero District, Uganda

Intrroductions: Viral hemorrhagic fevers are potentially a fatal group of emerging diseases. They are among the important public health emergencies of international concern. Ebola has been found in gorillas, chimps, duikers, humans, and recently pigs. The identity of the reservoir species is unclear, although bats are the most likely candidate. Until recently, there was scanty knowledge that pigs could carry Ebola. Based on this, our study aimed at documenting the risk factors and effects of Ebola outbreak along the pig value chain in Luwero District. A cross sectional study was conducted in Luwero district in two sub counties Nyimbwa and

Results: The study revealed Ebola outbreaks had an effect on pig value chain especially on consumption and sales. There was need for sensitization of the pig farming community on Ebola and its effects

Nguna, Joyce, Makerere University

Seroprevalence and Risk Factors Associated With Brucellosis In Livestock And Humans In Makuutu Subcounty, Iganga District

Introduction: Brucellosis is a worldwide contagious and zoonotic bacterial infectious disease caused by *Brucella.* The aim of this study was to establish the seroprevalence of brucellosis in humans and livestock and to establish the risk factors associated with brucellosis in Iganga district, Uganda. A structured questionnaire administered to 451 respondents captured their characteristics, breed of animals reared, occurrence of abortion, risk of brucellosis infection to herd owners and family members. The ELISA test was used to test the 451humans and 696 animals (cattle, goats and sheep) to investigate for the presence of *Brucellosis*.

Results: From the tested 451humans, the results showed that 20 humans were positive for brucellosis antigens giving an overall prevalence. The prevalence of human brucellosis was higher in the males (2.4%) than in the females 9 (2.0%). A combination of communal grazing and tethering management system was mainly used by the respondents. Only 13(2.9%) of animals had ever been vaccinated against brucellosis in the past one year and 438 (97.1%) did not. All the animals used shared males as their method of breeding. The results of the study showed that younger cattle were less infected than adults. All the positives were local breeds. Naitandu B recorded the highest number of positives 3, followed by Naitandu A and Kigulamo that each

Acknowledgement: This monograph was made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the Africa-U.S. Integrated Disease Management Network (AFRUS-IDM) and do not necessarily reflect the views of USAID or the United States Government.

Appendix E.2. CIMTRADZ Monographs

Disease Outbreak Investigation Protocol: Brucellosis Case Study

2.

Disease Outbreak Investigation Protocol:

Brucellosis Case Study

Ejobi,
RoseAnn Miller, Jesca
Nakavuma,

Kaneene & Miller from Michigan State University
Ejobi, Nakavuma, & Kabasa from Makerere
University

MONOGRAPH

Protocol for conducting an outbreak investigation

A. Goals for outbreak investigation

1. Stop the occurrence of disease with or without knowledge of the etiologic agent
2. Establish measures to prevent the disease from occurring in the future

B. Outbreak Investigation Objectives

1. Monitor epidemiological patterns/ disease trends
2. Identify factors responsible for disease occurrence
3. Institute preventive measures
   i. *Information dissemination for future prevention*
4. Research activity to generate hypotheses

C. 10 Steps for Conducting an Outbreak Investigation

1. **Prepare for field work**
   i. Investigation
      a. Scientific knowledge
      b. Supplies
      c. Equipment

   ii. Administration
      a. Agency requirements
      b. Staffing

   iii. Consultation
      a. Define roles & responsibilities

2. **Establish the existence of an outbreak (Define the problem)**
   i. Definition of outbreak: the occurrence of more cases of disease than expected
      a. in a given area or
      b. among a specific group of individuals over a particular period of time

3. **Verify the diagnosis**
   i. Review laboratory results
      a. Ensure proper diagnosis
      b. Rule out laboratory error

   ii. Review clinical findings
      a. Summarize with frequency distributions
      b. Characterize spectrum of illness

   iii. Begin to examine potential exposures of patients with disease

4. **Define & identify (count) cases**
   i. Case definition: A standard set of criteria for deciding whether an individual should be classified as having the health condition of interest

      a. Includes the following:
         1. Specific clinical criteria
            001. Clinical signs, lesions, test results, events (e.g., abortions, deaths)
         2. Restrictions by time, place, host
         3. Must be easily identifiable for classification
         4. Apply consistently to all

      b. Definite case
         1. Laboratory verification

      c. Probable case
         1. Typical clinical signs, without laboratory confirmation

      d. Possible case
         1. Fewer of the clinical signs

e. Loose definition early to find all potential cases: increase sensitivity

f. Tighten definition later when testing hypotheses: increase specificity

ii. Investigation

a. Interviews
1. Often in person or by phone

b. Questionnaire
1. Detailed, closed-ended, pre-coded questions
2. Open-ended questions if little is known about the situation
3. Identifying information
4. Demographic information
5. Clinical information
6. Risk factor information

c. Examine both healthy & sick individuals
1. Take relevant samples from each
2. Check with the lab to determine sample size

d. Examine the premises (if appropriate)
1. Feed & water sources
2. Pastures
3. Storage areas
4. Local geography & geology Building construction (ventilation)
5. Stocking density

5. Perform descriptive epidemiology

i. Outbreak characterization

a. Describe what happened in affected population
1. Trend over time
2. Geographic extent
3. Populations affected

b. Data may suggest nature of exposure & mode of transmission

c. Begin to develop causal hypothesis/es

ii. Time

a. Epidemic curve
1. Visual display of disease magnitude & time trend
2. Describes where you are in epidemic & future trends

b. Deduce period of exposure if agent & incubation period known

c. Make inferences about pattern of disease

6. Formulate a tentative hypothesis/es

7. Evaluate hypothesis/es

i. Compare with established facts

ii. Use analytic epidemiology to conduct risk analysis

8. As necessary, reconsider/refine hypothesis/es & execute additional studies

i. Reconsider exposures, modes of transmission, other links between cases

ii. Refine or modify the hypothesis/es to fit the facts assembled

iii. May need to re-do

9. Implement control & prevention measures

i. One of the primary goals of investigation 1. Implement as soon as possible

ii. Aim at weakest link(s) in chain of infection/intoxication 1. Host-Agent-Environment complex

a. Control the source of the pathogen
b. Interrupt the transmission
c. Control or modify host response to the exposure
d. Develop method for on-going evaluation of control effectiveness

10. Communicate findings

i. Oral briefing for stakeholders: Individual &/or community

a. Clear & convincing
b. Justifiable conclusions & recommendations

ii. Written Report

a. Scientific format
b. Blueprint for action
c. Record of performance
d. Document for legal issues
e. Contribution to knowledge base

Brucellosis Outbreak Field Procedures

1. Initial preparations

a. Order all necessary supplies for sample collection, including protective wear for sample collectors (gloves for handling blood and milk, and gloves, eye shield, and gown for livestock vaginal swabs).

b. Educate sample collectors in safe and sterile sample collection procedures.

c. Have adequate numbers of questionnaires printed for completion in the field.

d. Arrange for sufficient ice and other supplies needed to maintain the cold chain from blood and milk sample collection on the farm to delivery to the laboratory.

2. Administer questionnaires

a. If there are human cases, complete the human case questionnaire for each human case

b. If there are any cattle or goat cases, complete the livestock questionnaire for each herd only

3. Collect samples from humans

a. A trained phlebotomist will collect two blood samples (10 ml each) from each participant by on venipuncture, using Vacutainer® tubes labeled with a unique ID number, and date/time of specimen collection (one SST (red-grey top) for serum collection, and one standard (red top) for whole blood). The whole blood samples will be kept on ice after collection until delivery to the laboratory. Sterile procedures will be used, and a medical kit with alcohol swabs, bandages, antimicrobial agents, personal protective wear, and sharps disposal containers will be present when blood samples are drawn.

4. Collect livestock samples

a. Blood samples

i. Cattle or goats for sample collection will be selected by the sample collector, and manually restrained by the owner and assistants using their conventional restraint practices.

ii. A blood collection site on the jugular vein will be selected, cleaned with alcohol swabs, and two blood samples (10 ml ea) will be collected by one jugular venipuncture using Vacutainer® tubes labeled with herd ID number, animal ID number, animal breed (native, exotic, or crossbred), and date/time of specimen collection (one SST (red-grey top) for serum collection, and one standard (red top) for whole blood). If preferred by the sample collector, the tail vein of cattle will be used for sample collection.

iii. The Vacutainer® tubes will be placed into Whirl-Pak® biohazard transport bags and held on ice until delivery to the laboratory.

b. Milk samples

i. If the animal selected for specimen collection is lactating, a combined milk sample from all four quarters of cattle and both teats from goats will be collected manually, by rinsing the udder area to remove visible dirt, drying each teat with a paper towel, wiping each teat with an alcohol swab, and then manually expressing milk from each teat into sterile 30 ml universal containers labeled with herd ID, animal ID, breed, and date/time of specimen collection. Milk samples will be placed into Whirl-Pak® biohazard transport bags and held on ice until delivery to the laboratory.

ii. For cow milk samples, a portion of the milk will be tested immediately using the milk ring test for brucellosis:

1. Milk (with cream) will be mixed and 1 ml transferred to an 11 x 100 mm test tube; one drop of milk ring antigen will be added, the tube capped, and contents gently mixed by shaking and inverting the tube several times.

2. After incubation for 1 hr at 37°C, the test will be read using a uniform light source. If the blue color in the cream is equal to or greater in intensity to the color of the skim portion of the milk, the test is considered positive. If the color in the cream layer is less than in the skim portion, the test is negative.

3. Should a pooled sample test positive, separate quarter samples will be collected and tested with the milk ring test, using the same approach described above.

c. Vaginal swab samples

i. Any cow or goat that has aborted within the past 3 days will be sampled.

ii. A vaginal swab will be taken by first cleaning the skin around the vagina with a paper towel, next placing the sterile swab inside the vagina and wiping the swab around three times, and sealing the swab in a sterile transport tube with Amies transport medium, labeled with the herd ID number and sample collection date.

iii. Sealed transport tubes will be placed into Whirl-Pak® biohazard transport bags and held on ice until delivery to the laboratory.

d. Abortion materials

i. Any aborted cow or goat materials present on the farm during the sampling visit will be sampled.

ii. A sample of abortion material will be taken by using forceps or other tools to uncover an uncontaminated portion of material, next wiping a sterile swab around the uncontaminated surface three times, and sealing the swab in a sterile transport tube with Amies transport medium, labeled with the herd ID number and date/time of specimen collection.

iii. The sealed transport tubes will be placed into Whirl-Pak® biohazard transport bags and held on ice until delivery to the laboratory.

5. Deliver samples to laboratory

a. All specimens will be held on ice during transportation to the laboratory.

b. Efforts should be made to ensure delivery of samples to the laboratory within 48 hours of sample collection.

Suggested Brucella Screening Tests for Outbreak Investigation

Species	Specimen	Test
Humans	Serum	Royal Tropical Institute (RTI/KIT, Amsterdam, the Netherlands) Immunochromatographic Brucella IgM, IgG Lateral Flow Assay
	Blood (whole or clots)	Bruce-Ladder m-PCR (Garcia-Yoldi et al., 2006; Huber et al., 2009; Mayer-Scholl et al., 2010)
Cattle	Serum	Rose Bengal Serum Agglutination
	Milk	Milk ring test Bruce-Ladder mPCR
	Abortion fluids, materials	Bruce-Ladder mPCR
Goats	Serum	Rose Bengal Serum Agglutination
	Milk	Bruce-Ladder mPCR
		Indirect ELISA (Svanovir Brucella-Ab I-ELISA, Svanova Biotech AB, Uppsala, Sweden)
	Abortion fluids, materials	Bruce-Ladder mPCR

Blood, blood clots, milk, and abortion materials can also be cultured for Brucella.

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HUMAN BRUCELLOSIS OUTBREAK QUESTIONNAIRE

for Study ID participant _____

Interview Date: _____ **Patient Age**: _____ **Gender**: _____

District of residence: _____

Town or village of residence: _____

1. **On what date did symptoms first occur?** _____

2. **Which symptoms did the patient have?** Check all that apply:

   ☐ Fever lasting more than 2 days with no identified cause (e.g., infection, pneumonia)

   ☐ Fever over 38.5°C ☐ Night sweats

   ☐ Fatigue ☐ Anorexia

   ☐ Weight loss ☐ Headache

   ☐ Arthralgia ☐ Generalized aching

3. **What diagnostic tests were used to identify *Brucella* as the cause of disease?**

   _____

4. **Has the patient received any treatment?** ☐ Yes ☐ No

5. **Has the patient recovered?** ☐ Yes ☐ No

   If so, on what date was the patient considered to be recovered? _____

6. **Does the patient have any other illnesses?** Check all that apply:

   ☐ Malaria ☐ Tuberculosis ☐ HIV/AIDS

   ☐ Other health problems: _____

7. **How many persons live in the same household?** _____

8. **Do any other household members have similar symptoms, or have been diagnosed with brucellosis?** ☐ Yes ☐ No

   If so, on what date did their symptoms begin? _____

   If so, on what date did the household member recover? _____

for Study ID participant _____

9. Have you eaten any of the following foods in the last 6 months? (check all that apply)

☐ Raw milk ☐ Sour milk ☐ Undercooked meat

☐ Yoghurt, butter, or other products made from raw milk

10. Where did you get your drinking water in the last month (check all that apply)?

☐ Piped water ☐ Open well ☐ Covered well or borehole

☐ Public tap ☐ Rain water ☐ Bottled water

☐ Surface water (spring, pond, river, etc.)

11. Do you treat your drinking water by any of these methods? (check all that apply)

☐ Boiling ☐ Filtering ☐ Chlorinating ☐ Other methods

12. Does livestock or wildlife have access to any of these water sources? ☐ Yes ☐ No

13. Does your family own the following animals? (check all that apply)

☐ Cattle ☐ Sheep ☐ Goats ☐ Pigs

☐ Other animals, please describe: _____

14. Do you tend to any of these animals? Tending is caring for, feeding or removing waste (check all that apply)

☐ Cattle ☐ Sheep ☐ Goats ☐ Pigs

☐ Other animals, please describe: _____

15. Have any of your family's animals died unexpectedly in the past month? ☐ Yes ☐ No

16. Have any of your family's animals aborted in the past month? ☐ Yes ☐ No

17. Have you assisted with the birthing of any animals in the past month? ☐ Yes ☐ No

18. Did you slaughter or butcher (or assist in slaughtering or butchering) any livestock or domesticated animals in the past month? (check all that apply)

☐ Cattle ☐ Sheep ☐ Goats ☐ Pigs

☐ Other animals, please describe: _____

19. Did you hunt or butcher (or assist in hunting or butchering of) any wild animals in the past month? (check all that apply)

☐ Feral swine ☐ Waterbuck ☐ Buffalo

☐ Other, please describe: _____

LIVESTOCK BRUCELLOSIS OUTBREAK QUESTIONNAIRE

for Study ID Herd _____

Interview Date: _____

1. **Where is your herd currently located?**

   District: _____ **Town or village**: _____

2. **What breed of CATTLE do you own?** (check all that apply, and circle the most important answer)

   ☐ Native breeds ☐ Exotic breeds ☐ Mixed native and exotic

3. **What are their uses?** (check all that apply, and circle the most important answer)

   ☐ Milk only ☐ Meat only ☐ Mixed Use

4. **How many cattle do you <u>currently</u> own?**

Suckling Calves	Weaned calves	Young Stock	Cows	Bulls	Castrated Bulls

5. **Where do you get your cattle?** (check all that apply, and circle the most important answer)

   ☐ Raise your own ☐ From neighbors ☐ From other family members

   ☐ From other sources, please describe: _____

6. **Do you vaccinate your cattle?** ☐ Yes ☐ No

   If so, **describe the type of vaccination and date of last vaccination:**

   _____

7. **Do you use a dip for your cattle?** ☐ Yes ☐ No

   If so, **describe the type of dip and date of last dip:**

   _____

8. **Do you use any veterinary services for your cattle?** ☐ Yes ☐ No

   If so, **describe the type of service and date of last service:**

   _____

for Study ID Herd _____

9. Where do your cattle graze? (check all that apply, and circle the most important answer)

☐ Private grassland ☐ Shared grassland ☐ Not grazed on pasture

☐ Other sources, please describe: _____

9a. Are wildlife present in areas where your cattle graze? ☐ Yes ☐ No

10. Where do you house your cattle? (check all that apply, and circle the most important answer)

☐ In barn or building ☐ Fenced enclosure ☐ Not confined (kept on pasture)

☐ Other, please describe: _____

10a. Are wildlife present in areas where your cattle are housed? ☐ Yes ☐ No

10b. Are other herds present in areas where your cattle are housed? ☐ Yes ☐ No

11. Where do cattle get drinking water? (check all that apply, and circle the most important answer)

☐ Open well ☐ Borehole ☐ Public tap

☐ Rain water ☐ Surface water (spring, pond, river, etc.)

11a. Do wildlife share these water sources with your cattle? ☐ Yes ☐ No

11b. Do other herds share these water sources with your cattle? ☐ Yes ☐ No

12. On what date did the first abortions in cattle occur? _____

13. Where was the herd located when symptoms first appeared?

District: _____ **Town or village**: _____

14. How many pregnant cows were in the herd, and how many abortions occurred in the herd in the past periods?

	One month ago	Two months ago	Three months ago	Four months ago	Five months ago	Six months ago
Number of pregnant cows						
Number of abortions						

15. If you own bulls, have you noticed any cases of swollen testicles? ☐ Yes ☐ No

15a. If so, **when did you fist notice this?** _____

15b. How many bulls have been affected? _____

16. What diagnostic tests were used to identify *Brucella* as the cause of disease?

---

17. What breed of GOATS do you own? (check all that apply, and circle the most important answer)

☐ Native breeds ☐ Exotic breeds ☐ Mixed native and exotic

18. What are their uses? (check all that apply, and circle the most important answer)

☐ Milk only ☐ Meat only ☐ Mixed Use

19. How many goats do you <u>currently</u> own?

Kids	Adult females	Adult males	Castrated males

20. Where do you get your goats? (check all that apply, and circle the most important answer)

☐ Raise your own ☐ From neighbors ☐ From other family members

☐ From other sources, please describe: _____

21. Where do your goats browse? (check all that apply, and circle the most important answer)

☐ Private property ☐ Shared property ☐ Not allowed to roam

☐ Other sources, please describe: _____

21a. Are wildlife present in areas where your goats browse? ☐ Yes ☐ No

22. Where do you house your goats? (check all that apply, and circle the most important answer)

☐ In barn or building ☐ Fenced area ☐ Not confined (kept on pasture)

☐ Other, please describe: _____

22a. Are wildlife present in areas where your goats are housed? ☐ Yes ☐ No

22b. Are other goats present in areas where your goats are housed? ☐ Yes ☐ No

for Study ID Herd _____

23. Where do goats get drinking water? (check all that apply, and circle the most important answer)

☐ Open well ☐ Borehole ☐ Public tap

☐ Rain water ☐ Surface water (spring, pond, river, etc.)

23a. Do wildlife share these water sources with your goats? ☐ Yes ☐ No

23b. Do other goats share these water sources with your goats? ☐ Yes ☐ No

24. On what date did the first abortions in goats occur? _____

25. Where was the herd located when symptoms first appeared?

District: _____ **Town or village**: _____

26. How many pregnant goats in the herd, and how many abortions occurred in the herd in the past periods?

	One month ago	Two months ago	Three months ago	Four months ago	Five months ago	Six months ago
Number of pregnant goats						
Number of abortions						

15. If you own male goats, have you noticed any cases of swollen testicles? ☐ Yes ☐ No

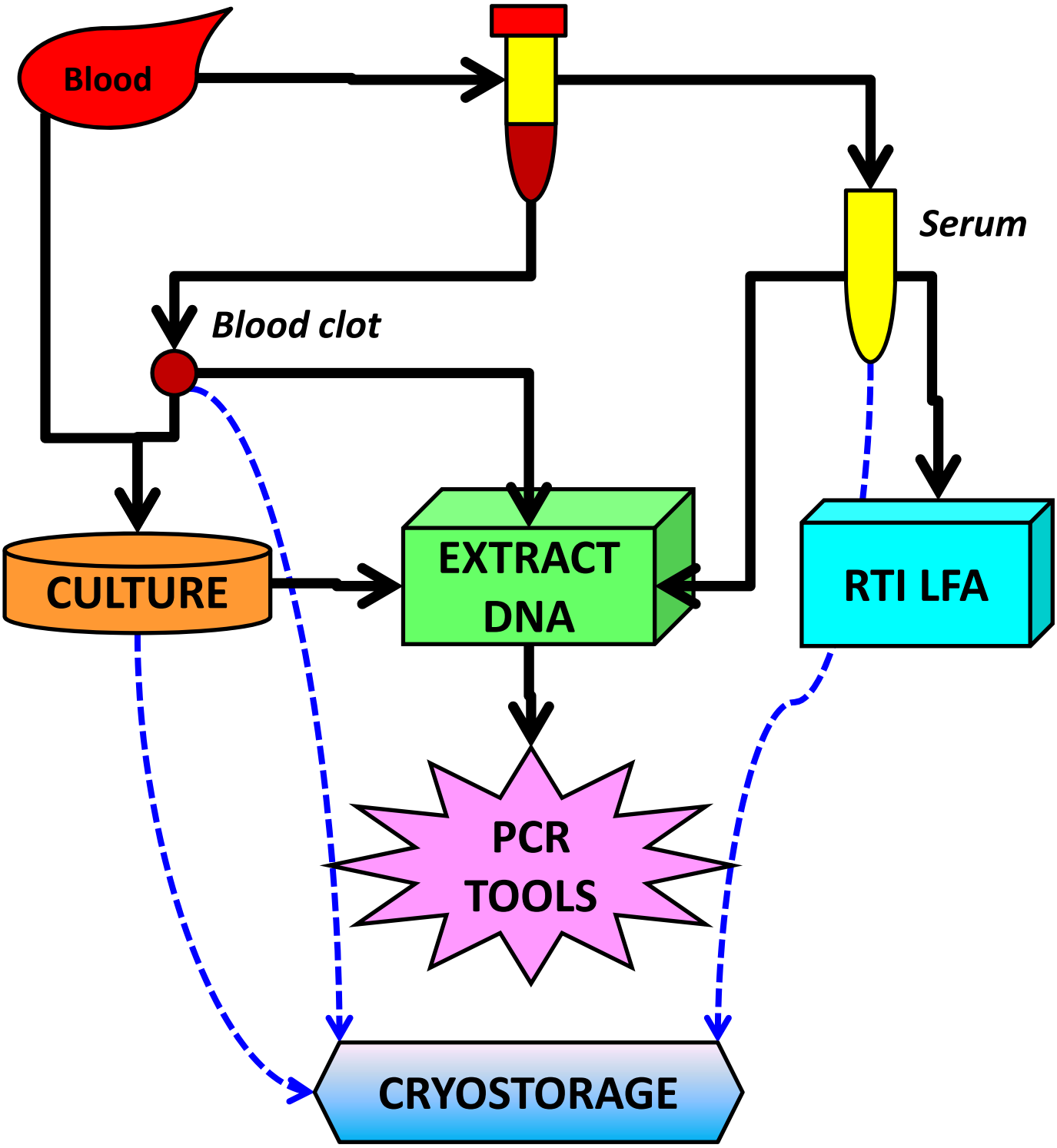
15a. If so, **when did you fist notice this?** _____

15b. How many male goats have been affected? _____

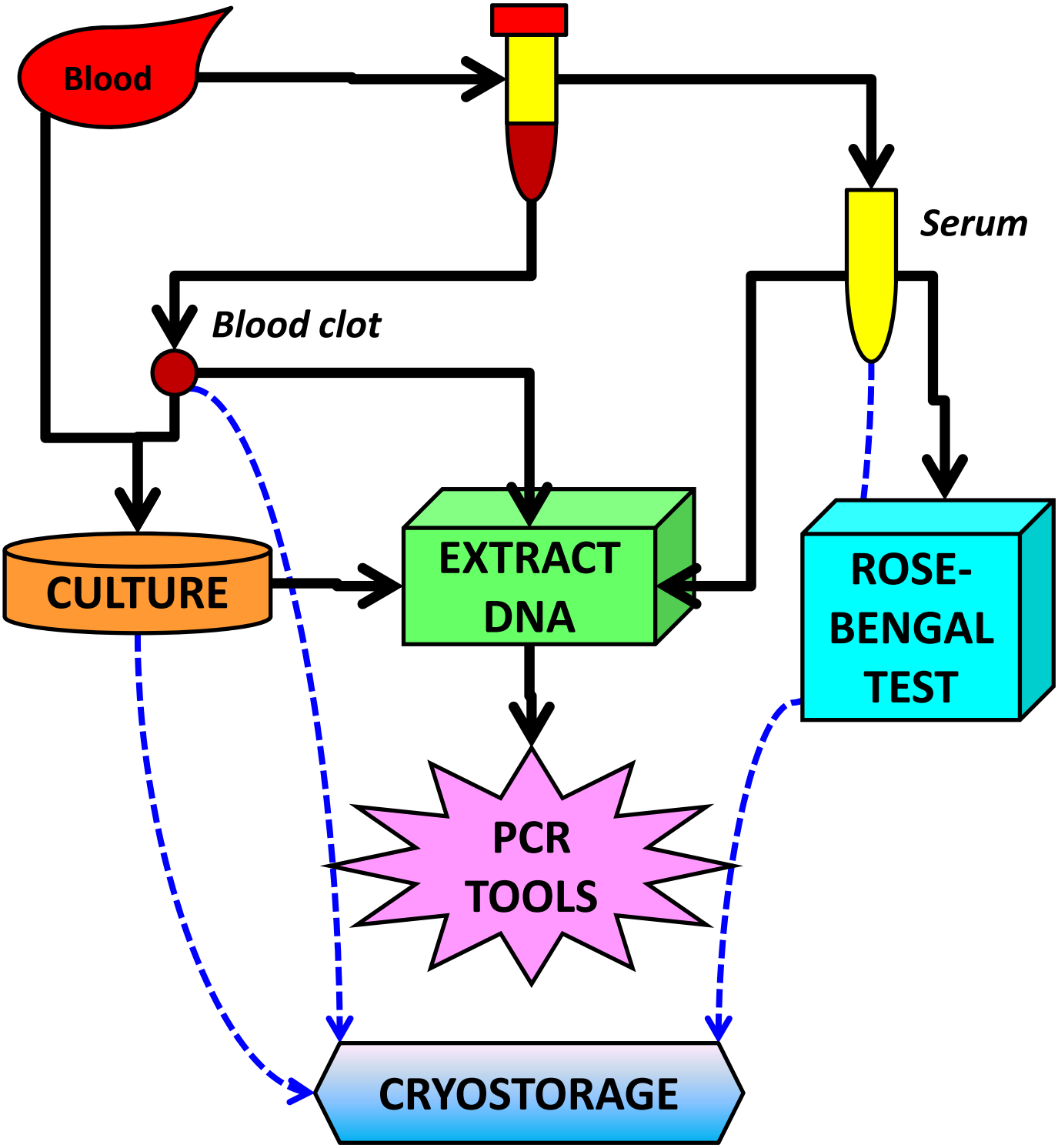
16. What diagnostic tests were used to identify *Brucella* as the cause of disease?

_____

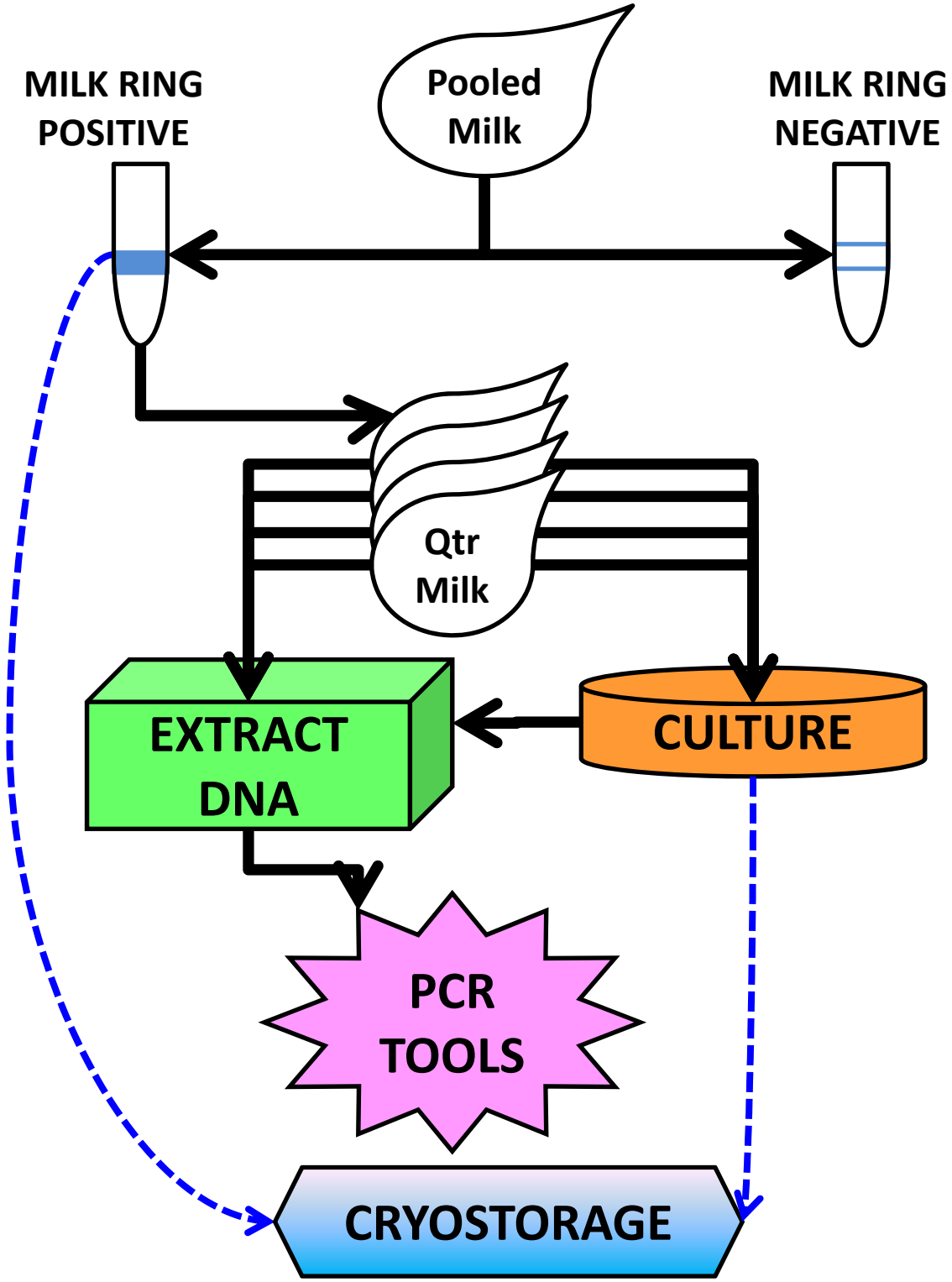
HUMAN BLOOD SAMPLE PROCESSING



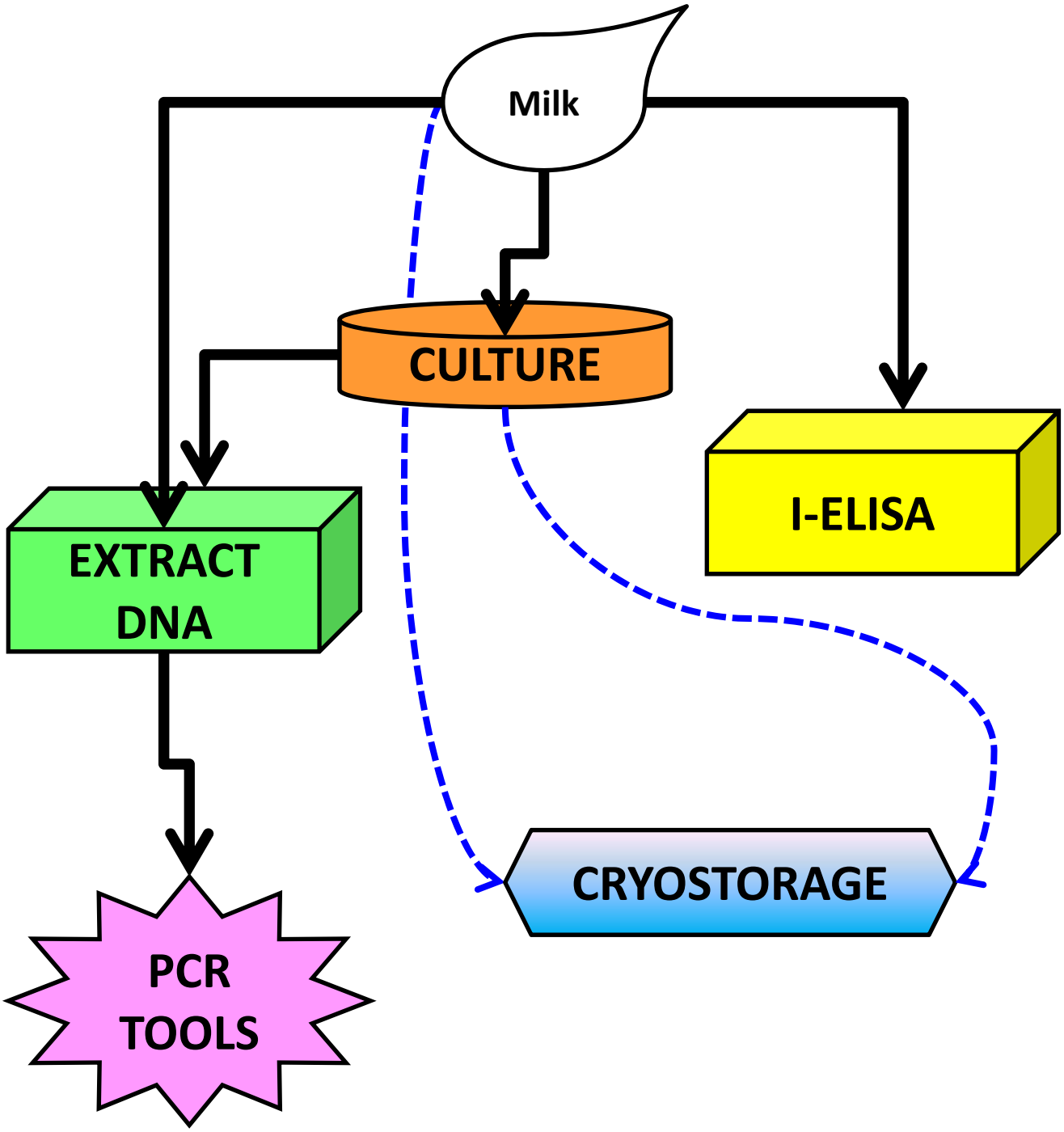
LIVESTOCK BLOOD SAMPLE PROCESSING



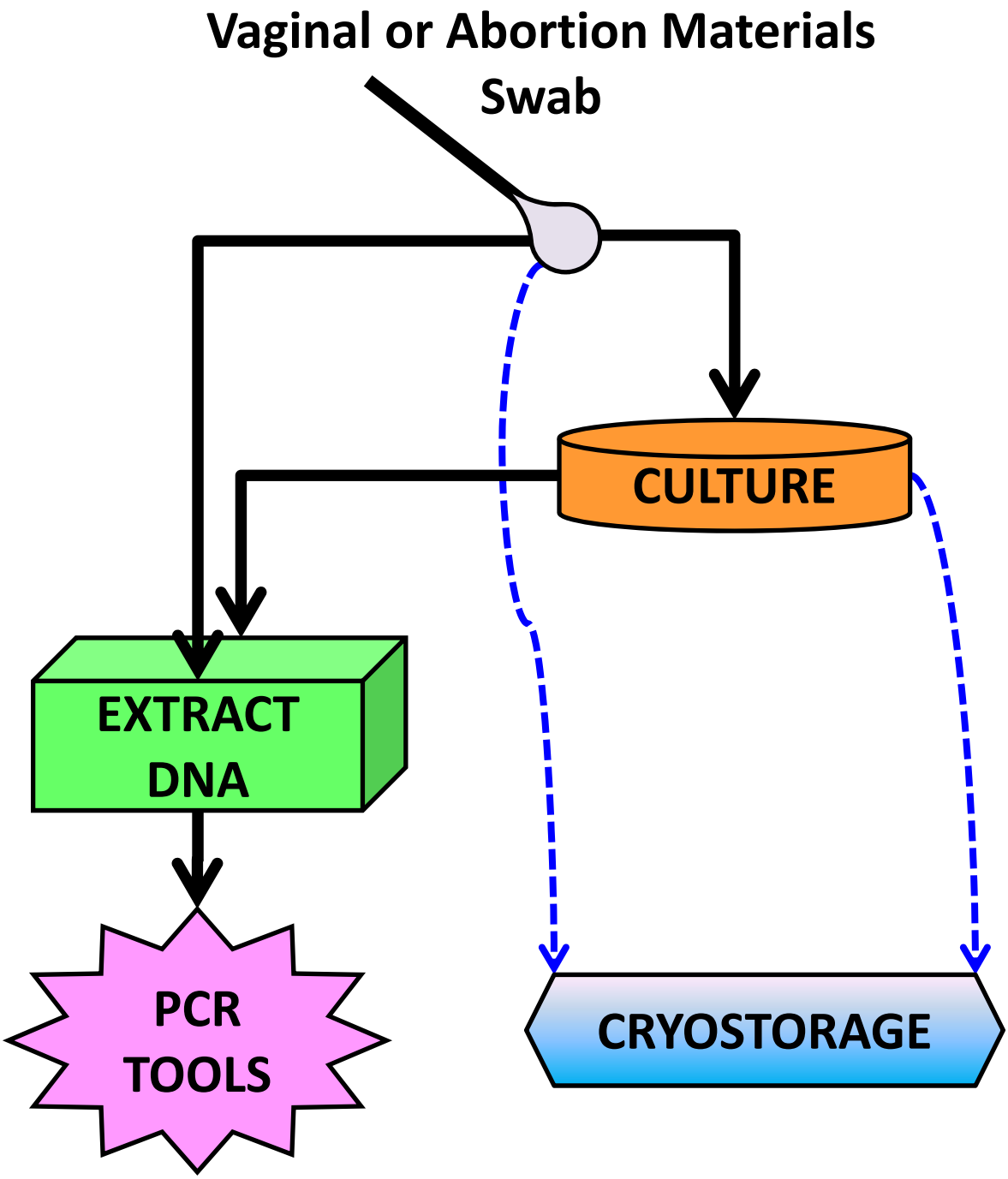
COW'S MILK SAMPLE PROCESSING



GOAT'S MILK SAMPLE PROCESSING



LIVESTOCK SWAB PROCESSING



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Appendix E.3. CIMTRADZ Monographs

Assessment of Human and Animal Disease Surveillance Systems in the East-Central Africa Infectious Disease Hotspot: A Case Study of Uganda

Assessment of Human and Animal Disease Surveillance Systems in the East-Central Africa Infectious Disease Hotspot
A Case Study of Uganda

Assessment of Human Disease Surveillance Systems in the East-Central Africa Infectious Disease Hotspot: A Case Study of Uganda

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OBJECTIVES: This study aimed to assess the extent of human disease surveillance systems in East-Central Africa's infectious disease hotspot using Uganda as a case study.

METHODS: Questionnaires, face-to-face interviews, and site-visits to selected health units in Uganda's four regions were used to describe the types of disease surveillance systems used, diseases and population targeted, and surveillance support infrastructure (laboratories, communication, and data management).

RESULTS: 93%, 76%, 92%, and 83% of surveyed health units carried out disease-specific, syndromic, passive, and active surveillance, respectively. Surveillance in >67% of the health facilities targeted malaria, AIDS, and immunizable diseases, while <16% of the health units carried out surveillance for non-infectious and zoonotic diseases. The majority (99%) of health units reported weekly surveillance data using phones. Only 33% of health units used electronic data management tools. Processing of surveillance data was done by clinical personnel in 55% of the health units.

CONCLUSIONS: Human disease surveillance targeted malaria, AIDS, and immunizable diseases. Non-infectious and zoonotic disease surveillance, establishing electronic data management systems, and training of personnel must be implemented to improve human disease surveillance in Uganda.

A comparative assessment of the animal and human disease surveillance systems in the East-Central Africa infectious disease hot-spot, 2013: A case study of Uganda

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Abstract:

This study aimed to compare the current status of the veterinary surveillance system to that of the human surveillance system as well as to assess the ability of the two systems in dealing with emerging infectious diseases. The human surveillance system in Uganda had a better layed-out structure with health units of all levels (HC II, III, IV hospitals and central units all involved in disease surveillance and laboratory disease detection depending on the resources and skills of the health personnel managing that level of facility. The human health data management was also boasted by an efficient mobile-based data transfer system which was used by 74 out of the 75 health units involved in the study. Conversely, the veterinary surveillance system which has limited functionality and few laboratory infrastructure at units (1 out of 11) below the District Veterinary Office. The veterinary surveillance systems also lacked a real-time data management programs which necessitates the need to improve animal disease laboratory units, data management and recruitment of veterinary personnel at sub-counties. More veterinary health units (64%), however, targeted zoonotic diseases compared to the human surveillance systems (12%) which underscores the need to integrate zoonotic disease surveillance in both human and animal health services. None the less both human and veterinary disease surveillance systems had inadequate data management personnel and were characterized by limited integration of communication and surveillance reports systems generated by human and animal health units.

Acknowledgement: This report was made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the Africa-U.S. Integrated Disease Management Network (AFRUS-IDM) and do not necessarily reflect the views of USAID or the United States Government.

ASSESSING CURRENT SURVEILLANCE SYSTEMS IN UGANDA

Prof. John B. Kaneene

Part 1

INTRODUCTION

Thank you for participating in this survey. By completing this questionnaire, you will provide us with valuable information needed to assess current disease surveillance systems in Uganda.

SECTION 1: TYPES OF SURVEILLANCE SYSTEMS CURRENTLY PRESENT IN UGANDA

Please describe the surveillance systems that you are aware of that have been used in Uganda

Problem–based Surveillance: These are surveillance systems designed to investigate specific disease problems (e.g., tuberculosis, abortions)

1. List any **disease-specific surveillance Programs**: These are Programs for disease outbreaks where a single cause has been identified (e.g., anthrax, Ebola)

   1.1 **Human** surveillance systems:_____

   _____

   1.2 **Animal** surveillance systems: _____

   _____

2. List any **syndromic surveillance Programs**: These are Programs for outbreaks or epidemics of syndromes with no single cause identified (e.g., diarrheal disease, pneumonia)

   2.1 **Human** surveillance systems:_____

   _____

   2.2 **Animal** surveillance systems: _____

   _____

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Passive surveillance: These are surveillance systems designed to passively collect data about trends in disease, and risk factors for disease control and prevention, by using routine methods (e.g., reports of TB from clinics, cattle carcass inspection for disease)

3. List any **passive** surveillance systems for:

   3.1 **Human** surveillance systems:_____

   _____

   3.2 **Animal** surveillance systems: _____

   _____

Active surveillance: These are surveillance systems designed to seek out disease data from selected and targeted groups (e.g., sentinel surveillance for influenza, HIV health surveys)

4. List any **active** surveillance systems for:

   4.1 **Human** surveillance systems: _____

   _____

   4.2 **Animal** surveillance systems: _____

   _____

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SECTION 2: COMPONENTS OF UGANDAN SURVEILLANCE SYSTEMS

Please describe the following components of surveillance systems that you are aware of that have been used in Uganda

Targets for Surveillance Programs in Uganda

5. Please identify **any diseases and syndromes affecting humans** that have been the focus of recent surveillance programs, by placing a check/mark next to all that apply:

   a) _____ Malaria b) _____ Tuberculosis c) _____ HIV/AIDS
   d) _____ Pneumonia e) _____ Dysentery/cholera f) _____ Influenza
   g) _____ Others: please list below:

   _____

6. Please identify **any diseases and syndromes affecting animals** that have been the focus of recent surveillance programs, by placing a check/mark next to all that apply:

   a) _____ Abortions b) _____ Anthrax c) _____ Brucellosis
   d) _____ Diarrhea e) _____ Influenza f) _____ Foot & Mouth Dis.
   g) _____ Others: please list below:

   _____

Please identify the **populations of interest** (or targets) of the aforementioned surveillance Programs, by placing a check/mark next to all that apply:

7. Human populations

7.1 By location: a. _____ Urban b. _____ Rural c. _____ Not by location
7.2 By gender: a. _____ Male b. _____ Female c. _____ Not by gender
7.3 By age: a. _____ Adults b. _____ Children c. _____ Not by age

8. Animal populations

8.1 By type: a. _____ Wild b. _____ Domestic c. _____ Not by type
8.2 By gender: a. _____ Male b. _____ Female c. _____ Not by gender
8.3 By age: a. _____ Adults b. _____ Young c. _____ Not by age
8.4 By breeds: a. _____ Yes b. _____ No c. _____ Not by breed
8.5 By usage: a. _____ Milk b. _____ Meat c. _____ Not by usage
d. _____ Other usages, please list below:

_____

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Laboratory Facilities for Surveillance Programs in Uganda

Please describe the **types and levels of laboratories** available for disease surveillance

9. **Primary field facilities:** These are clinics or laboratories that are capable of sample and data collection, and that can conduct ***screening*** tests and some diagnostic tests)

   Estimate the numbers of:

   9.1 Health Care Clinics, by level:

   a. _____ Health Care I Clinics b. _____ Health Care II Clinics

   c. _____ Health Care III Clinics d. _____ Health Care IV Clinics

   9.2 Veterinary Field Laboratories, by level:

   a. _____ Sub-county level b. _____ County level c. _____ District level

10. **Secondary facilities:** These are referral hospitals or laboratories that are capable of accepting referrals from primary facilities, can conduct ***screening*** tests and sample and data collection, and are capable of ***confirmatory diagnostic testing.***

    10.1 Human referral hospitals/diagnostic laboratories:

    a. _____ Number of hospitals b. _____ Number of laboratories

    c. Locations: _____

    10.2 Veterinary diagnostic laboratories

    a. _____ Number of laboratories

    b. Locations: _____

Communications Available for Surveillance Programs in Uganda

11. Please describe **how information is communicated** between different levels of public health and veterinary health, by placing a check/mark next to all that apply:

Method	11.1 Between Primary and Secondary facilities for **human** disease information	11.2 Between Primary and Secondary facilities for **animal** disease information	11.3 Between Human and Animal health institutions
Telephone/cell	a. _____	a. _____	a. _____
Email/Website	b. _____	b. _____	b. _____
FAX	c. _____	c. _____	c. _____
Regular meetings	d. _____	d. _____	d. _____
Meetings when needed	e. _____	e. _____	e. _____
Other, please describe:	f. _____	f. _____	f. _____

Surveillance Data Collection, Storage, and Transmission

12. For any surveillance programs that have been conducted in Uganda, please describe **how field data is collected, stored, and transmitted**, by placing a check/mark next to all that apply**.**

	Method:	**Humans**	**Animals**
12.1	**Data Collection** in the Field		
	Notes written by hand (hard copy)	a) _____	f) _____
	Questionnaire (hard copy)	b) _____	g) _____
	Electronic (computer)	c) _____	h) _____
	Audio or video recording	d) _____	i) _____
	Other: _____	e) _____	j) _____
12.2	**Data Storage** in the Field		
	Paper/hard copy	a) _____	e) _____
	Electronic (computer files, flash drive, CD, DVD)	b) _____	f) _____
	Audio or video recording	c) _____	g) _____
	Other: _____	d) _____	h) _____
12.3	**Transferring Data** from the Field to Diagnostic Referral Laboratories		
	Paper/hard copy	a) _____	e) _____
	Electronic (computer files, flash drive, CD, DVD)	b) _____	f) _____
	Audio or video recording	c) _____	g) _____
	Other: _____	d) _____	h) _____

Laboratory Data Collection and Storage

13. For any surveillance programs that have been conducted in Uganda, please describe **how laboratory data is collected and stored**, by placing a check/mark next to all that apply**.**

	Method:	**Humans**	**Animals**
13.1	**Data Collection** in the Laboratory		
	Notes written by hand (hard copy)	a) _____	e) _____
	Electronic (computer input, instrument output files)	b) _____	f) _____
	Audio or video recording	c) _____	g) _____
	Other: _____	d) _____	h) _____
13.2	**Data Storage** in the Laboratory		
	Paper/hard copy	a) _____	e) _____
	Electronic (computer files, flash drive, CD, DVD)	b) _____	f) _____
	Audio or video recording	c) _____	g) _____
	Other: _____	d) _____	h) _____

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Part 1

Analysis and Reporting of Surveillance Data

14. For any surveillance programs that have been conducted in Uganda, please describe **how data are analyzed and reported**, by placing a check/mark next to all that apply**.**

		Humans	**Animals**
14.1	Describe which **agencies or institutions** are responsible for processing surveillance data from:		
	Regional diagnostic laboratories:	a) _____	c) _____
	Field clinics and laboratories:	b) _____	d) _____
14.2	Describe the **types of reports** produced from surveillance data:		
	Annual summaries of diseases	a) _____	d) _____
	Disease outbreak reports	b) _____	e) _____
	Reports from special Programs	c) _____	f) _____

15. Describe **how summary data reports are distributed:**

15.1	Who are the **stakeholders** receiving reports?	
	For Human diseases:	a) _____
	For Animal diseases:	b) _____
15.2	What is the **frequency** of reporting?	
	For Human diseases:	a) _____
	For Animal diseases:	b) _____

15.3	What is the **format** of these reports?		
	Please place a check/mark next to all that apply	**Humans**	**Animals**
	Printed reports or brochures	a) _____	e) _____
	Electronic (email, text messaging)	b) _____	f) _____
	Audio or video recording	c) _____	g) _____
	Other: _____	d) _____	h) _____

END OF PART 1: CONTINUE TO PART 2: GENDER AUDIT SURVEY

Appendix E.4. CIMTRADZ Monographs

Gender Audit for Capacity Building in Integrated Disease Management

Gender Audit for Capacity Building in Integrated Disease Management:

College of Veterinary Medicine, Animal Resources and Biosecurity, Makerere University, Uganda

MICHIGAN STATE
UNIVERSITY

MISSISSIPPI STATE
UNIVERSITY

UNIVERSITY OF
SASKATCHEWAN

Abstract

The study analyzed factors affecting gender differences in student enrollment and graduation rates, and the overall gender climate to assess gender mainstreaming in the College of Veterinary Medicine, Animal Resources Biotechnology (COVAB) at Makerere University. Semi-structured Focus Group interviews were used to solicit responses from 50 undergraduate and graduate students. Student perceptions of gender revealed conventional assumptions about gender roles, reinforced by institutional silence about the lack of a gender-based curriculum and policy mandates to promote the enrollment, retention and graduation rates for female students in veterinary programs. The study recommends the establishment of gender

Key words: Gender Mainstreaming, Gender Equity and Women's Human Rights, Culture, Leadership and Veterinary Programs

Introduction

Gender Policy at Makerere University.

In 2010, the government of Uganda ratified the Maputo Protocol of the African Charter on Human Rights and made a commitment to integrate gender concerns into national policy and development initiatives (UN Commission for Africa 2012). In part, this commitment resulted from a series of earlier policy reforms designed for implementation in the universities and other tertiary institutions. For example, in 1992, a Government White Paper was published emphasizing equity in educational opportunities and providing guidelines for creating gender equity in the educational system (Kagoda, 2001:4). A few years later in October 2005, the national constitution was adopted, and its clauses included provisions for gender balance and fair representation of men and women in all public sectors (Matembe 2002). These developments provided a platform for the establishment of the Ministry of Gender, Labour, and Human Rights with the main objective of "empowering communities, particularly marginalized groups to realise and harness their potential for sustainable and gender responsive development" (Ministry of Gender and Community Development, 2). Along the same lines the Ministry of Education (MOE) introduced the National Strategy for Girls' Education Scheme to expand the efforts of the African Girls Education Initiative (AGEI) which UNICEF had successfully piloted in a number of schools in Uganda. It was later realized "access" alone is not sufficient to improve girls' education if the quality of education received is not taken into consideration. MOE developed the Gender Education Policy (GEP) in 2007 to address these concerns, and later adopted the 2001 Education Act while establishing the National Council of Higher Education (NCHE) to regulate and oversee the implementation of quality instruction in all educational institutions (MOE Report, 2001).

At Makerere University, affirmative action, also known as the 1.5 Point Scheme for Undergraduate Students, was introduced in 1990. This policy allowed 1.5 additional points added to the scores

of eligible female candidates when they enrolled into the university (Kagoda 2001, Kwesiga and Sendiwala, 2006, Tibatemwa-Ekirikubinza, 2010). This led the university to establish mechanisms ensuring the policy was successfully implemented in various programs and units. The 2007-2018 University Strategic Plan made specific provisions for gender balance to reckon with the gender policy mandates of the MOE. The School of Women and Gender Studies (WGS) and the Directorate of Gender Mainstreaming Program (GMP), took the responsibility of overseeing the implementation of these policies in the curriculum and in extra-curricular activities. In essence, they took on the task of advocating for quality assurance. Specific objectives of the university gender policy plan were to: (a) Reposition the Gender Mainstreaming Division in terms of status and staffing for enhanced effectiveness in service delivery; (b) Formulate and advocate for the enactment of a comprehensive gender policy for the University; (c) Develop and Implement guidelines for engendering existing University policies and programmes (d) Promote gender responsive organizational culture at MAK; (e) Advocate for gender balance in access to University education and contribute to the enhancement of the quality of graduates; (f) Develop a strategy for sustainability of the gender mainstreaming programmes and strengthen the capacity of sentinel sites to mainstream gender

Background

into their Units (Makerere University Strategic Framework, 2007).

Evidence regarding the effectiveness of the gender policy at MAK has been mixed. However, there is consistent agreement enrollments for female students have increased by 48% since 1991 when the 1.5 Point Scheme was first implemented (Interviews with Dean Kabonesa, 2012/2013; Director Kanabahita 2012). In our conversations with the Dean of WGS, and the Director of GMP, it was noted over 1,000 undergraduate students had received degrees in Gender and Development studies since the starting of the School in 1991.

Approximately 100 students have been trained at a Masters level, and a doctoral degree program focused on research has been in progress since 2000 (Kabonesa, July 2012/2013). Gender Mainstream Program (GMP) has also supported several students through a Female Scholarship Initiative (FSI). FSI is supported by funding from the Carnegie Foundation for student enrollment fees which the university has committed since 2006/2007 academic year. At the time of the interview, 691 students had received scholarships, and 654 recipients graduated with undergraduate and post-graduate degrees in various academic programs (Kinabahita, July 2012).

Asio and Mabatsi, 2009 observed MAK had made significant progress in enrolling female students especially in Arts, and Social Sciences fields. A gradual increase was also noted in certain science programs such as Library Science and Information Communication Technology (Asio and Babatsi, 2009). However, the authors noted graduation rates for female students were very low compared to their male counterparts. A qualitative analysis demonstrates female students drop out, or, fail to complete on time at a much higher rate than male students. For example, whereas only 16.9% (38) of the male students admitted in the 2005/2006 academic year to the Bachelor of Laws Degree failed to graduate in February 2008, 35% (80) female students failed to graduate the same year (Asio and Mabatsti, 2009). More recent academic records for 2012/2013 academic year reveal a high dropout rate for women in COVAB. For example, 129 female students admitted to various programs in COVAB that year, 43% did not register for classes. (Makerere University Fact Book 2012/2013).

A baseline study about student enrollment rates in College of Veterinary Medicine, Animal Resources and iosecurity(COVAB) was conducted by the *Capacity building in Integrated Management of Transboundary*

Animal Diseases and Zoonoses (CIMTRADZ) observed low enrollments for female students were very low across the disciplines. Women represented 10% of the undergraduate students, and only 5 out 42 females students pursued graduate degrees. Gender differences in the employment patterns were also revealing, and suggestive of the severe gender gaps student mentoring. Findings in this study revealed 1 full time female faculty out of 11 lecturers taught courses related to Integrated Disease Management. In addition, no female member of the faculty served at the ranks of Associate and full Professor (CIMTRADZ, 2011). The study found similar gender gaps in other veterinary programs of East African Universities partnering on CMTRADZ project.

Purpose of the study:

To conduct a comprehensive analysis of gender integration (gender audit), at MAK using (COVAB) as a case study. Our analysis of students' perceptions of gender issues in the college draws on a sociological premise of gender having a Kaleidoscope of meanings, practices, and relation to femininity and masculinity people create in their daily lives. How people express themselves and perform certain roles, and how they gain access to resources is a function of the interaction of complex prisms of difference and inequality. Spade and Valentine (2008), point out, how gender prisms are "regularized and packaged in ways of thinking, feeling, and acting in society" (Spade and Valentine, 2008: xiii; Tamale, 2012). Our basic assumption is women and men differ in views about the status of women in COVAB, and a lack of gender policy and supportive machineries impacts women and men differently, and gender audits lead to policy practices which contribute to an increase in gender equality and women's empowerment.

Methodology:

This study occurred in two parts. Part 1 consisted of survey questions distributed among members of the faculty and the senior administration. Part 2 with two sections: Section (i) Focus Group Discussions (FGDs) with students, and section (ii) FGDs with the junior clerical/administrative staff. These were particularly useful in eliciting opinions and clarifying meanings and general understandings held by both groups. This paper reports findings of FGDs conducted among students in July 2012 and July 2013. We sampled 50 undergraduate and graduate students, men (n= 30), women (n = 20) using a purposive sampling technique (Sharan, 20091). More in-depth discussions were conducted in July 2013 with a smaller group of students and a select group of key informants including the dean of the School of Women and
Gender Studies, director of gender mainstreaming and two senior women who have played a historical role in promoting gender balance at the university.

Discussions were organized in groupings of the same sex and each group was interviewed by researchers of the same sex. This was done to give respondents an opportunity to freely voice their opinions, thus allowing the research team to collect honest responses. We also analyzed published and unpublished literature on institutional gender policies (how it is articulated and implemented at the university level), and some records from COVAB about student enrollments, course offerings, development opportunities for faculty, and the staff. Data was analyzed by manual and interpretative forms including identification of themes and common voices about gender issues in COVAB and the university as a whole.

Key Findings:

I.0 COVAB is the oldest and leading veterinary academic institution in the East African region. Established in 1922 as a technical certificate training unit growing through the ranks, from a department, offering undergraduate degrees (1953-1970), to a faculty of veterinary medicine in 1971, and now, a college since 2009, offering graduate and undergraduate programs through two schools and six departments. The college is also home to the Africa Institute for Strategic Services and Development (AFRISA) offering fast-track training skills in technology, business and community services through public/private academic partnerships. Since 2011, the college shifted focus from a mono-degree institution offering the state sponsored classical Bachelor of Veterinary Medicine degree, to a multi-degree and multifunction service institution with diverse demand driven undergraduate and graduate training programs, research, and development services.

1.1 Undergraduate Enrollment:

Table 1 (see Appendix 1a) shows the number of male and females enrolled in 4 programs offered through COVAB in the 2011/2012 school year. Females represented twenty-eight percent of the total students enrolled in all programs (N=549). For both sexes, Bachelor of Biomedical Laboratory Technology (BLT) enrolls the highest number of students constituting more than seventy-five percent of female enrollments for the academic year. This trend continued in 2012/2013 school year, for BLT with the largest amount of student enrollment out of three other programs. For both terms, the least enrolled programs for both males and females were Bachelor of Animal Production Technology and Management (BAPTM) and Bachelor of Wildlife Health Management (BSC or WHM), with the greatest disparity in enrollment by gender, evident in the Bachelor of Veterinary Medicine (BVM) program where there is less than a two percent increase in female enrollment between the academic year of 2011/2012. The table demonstrates overall decrease in enrollment for all programs in the subsequent terms following the 2011/2012 academic year for both sexes.

1.2 Postgraduate Enrollment

Table 2 (see Appendix 1b) illustrates gender disparities in postgraduate enrollment in 2012/2013. When comparing female to male enrollments, programs with the least represented females were in Masters degree in Veterinary Preventive Medicine (MVPM) followed by Master of Science in Biomedical Laboratory Sciences (MSBL) where females constituted less than a quarter (¼) of the total class population. Overall, approximately 75% of the students enrolled in postgraduate programs were males.

I.3 Student Perceptions about existing interventions geared to increasing gender equity in COVAB:

Overall, both groups, men = (n=30) and women (n=20) indicated they understood the meaning of gender, and t were aware of the university-wide gender policy. However, when asked if they knew of any specify policy in the college addressing gender issues, a greater percentage of students responded negatively. Some of the views regarding this were expressed as follows: *"I am not aware of any policy in our college besides the gender mainstreaming policy awarding girls extra 1.5 points when they apply to join the university."*

A majority of male students did not see the need for gender equity interventions. When probed if it would be a good idea to have a gender policy in COVAB geared to increasing enrollments for women, female students overwhelmingly supported the idea. Again, a majority of male students felt it was not necessary on the basis unfairness. Some of the comments expressed were: *"In Makerere, gender isn't fair, it's favoring girl students too much… affirmative action is important, it saves girls from marriages… but they should not extend it to academics."* **"***It will be unfair because girls are already getting special treatment from the university …gender issues affect everyone because men also see themselves as different from other men but don't receive special treatment. I don't think it is right."*

The views held by the students interviewed suggest, most male students in the college perceive gender policies as favoring women. However, there are those who support the policy on the basis of it as a corrective measure against past injuries. They recognize there are unique challenges affecting female students from participating in large numbers, in veterinary programs.

1.4 Perceptions of Interventions: Mentoring for Success: When students were queried on knowledge of an individual or office in the college coordinating gender integration, both groups indicated non-awareness of any program in place. However, a small percentage (females and males) thought it was the Deputy Principal of the college, because of her gender. When probed regarding her role, the common expressions were: "*She works on exam schedules... I think she is the one responsible for the curriculum...she helps female students a lot.... Dr. ...is very helpful to both women and men especially when we have problems but I don't know if she is responsible for gender issues…*"

Female students interviewed, expressed concern for the lack of female role models in several academic programs especially in senior administrative positions. At the time of the study, the ratio of female to male full time faculty was approximately 1:3 (Makerere Fact Book 2012/13). One student remarked she appreciated the deputy principal being a woman and she was very helpful in advising them on academic matters: "One day I had a crisis on an experiment…I was the only girl in the lab...I met with Dr. ... the following day, I was crying because I didn't know what to do about my experiment. Dr. ...helped me and encouraged me not to drop out of the program. She was the only person I could talk to. I wish we had many Professors like her."

1.5 Perceptions of Interventions Geared Towards Mainstreaming Gender in the Curriculum

Analysts have observed transforming educational content to reflect student needs is a critical ingredient for gender equality in academia (Hearn 200). Gender equality is not just about structures and procedures but also about the content of academic teaching and research, and the deconstruction of non-gendered curriculum. Morley (2006) observes, a lack of attention given to gender issues in language, resources, representation of women, references and teaching styles, which all reinforce gender inequalities.

In this regard, students were asked to first reflect on their career dreams while taking their gender classification into consideration. Second,they were asked to indicate courses incorporating gender issues.

One hundred percent of students interviewed said there were no such courses in the degree programs they pursued. Some of them expressed students they knew with interest in gender-related courses freely taken from the School of Women and Gender Studies. However, they were concerned courses taken outside their required programs were optional, meaning fewer students can afford the cost of additional course loads.

A review of course offerings revealed there were no courses offered in COVAB incorporating gender content at the time of the study. University-wide documents show gender as a cross-cutting issue and several courses on gender were being offered. However, this is done in departments traditionally attracting female students. A portion of the students interviewed had this to say: "Definitely, we need courses on gender issues to be taught in our college. But, we should have one course required for everyone...I think all other courses should have gender issues [incorporated] so everyone gets awareness, and hopefully we can have more gender sensitivity in the programs." "I would like to take courses to help me to find a job. It is hard for us to find jobs when we compete with our colleagues who already know gender issues." "One of our requirements is to conduct service learning in communities. I will be very helpful for us to understand gender specific needs and problems before we talk to the farmers about rabies or chicken flu outbreaks."

1.6 Organizational Climate: Perceptions of existing interventions geared towards mainstreaming gender in COVAB: While a majority of participants surveyed, agreed the overall climate in the college is conducive for learning, and all faculty (including the female faculty) were very helpful, three fourths of the female students said they preferred to work under a male boss/department chair compared to all male respondents who agreed with them. Some reasons they gave demonstrate deeply ingrained beliefs of the presumed status of women in society, and the varying views they held about women in general. Statements such as these were commonly expressed: "Men are flexible…, men know things more than women…I would rather have a male boss because we are used to them…., women are short tempered especially when seasons come…, they want to show that they are in control, … they cannot endure, they get tired so quickly and give up…they don't help you much when they know they are in power.

One female student expressed herself differently using the example of the status of women in her ethnic group: "Women in Karamoja construct houses…they are responsible for all the work done in a home and they are recognized as great leaders in their own right. I see it from mother…, women can lead if they are given a chance and society supports them. I, personally will not mind having a woman as my boss...actually, we need more women leaders in our college to mentor us."

1.7 Suggestions for a way forward: Conflicting messages exist with regards to students need to improve their learning experiences through gender and promote gender equality, and interventions necessary for implementation. Suggestions made were: "Training seminars focused on gender issues and leadership …., just like they do in the college of social sciences was a frequent response made by both female and male respondents. Don't you think women would be more understanding when you explain how your pregnancy is giving you a hard time?" A student asked.

Students reported they were not aware of any program in the college with support groups interested in having dialogues about gender issues. One female student said, "When we go for field research, we work with male farmers as well as female farmers. Several women ask questions about how to avoid

diseases affecting their poultry farming, or how they can get loans to raise pigs. We can discuss some of these issues in our student club before we go to the field." Both groups indicated they belonged to some kind of organization in their field of study. Approximately seventy percent of the male students and all female students concluded that it would be a good idea to have a support group in the college to advocate for gender balance in academic programs.

1.8 Responses from key informants: The general consensus among key informants interviewed is the need to increase the number of female students in COVAB and establish a gender-focused mentoring program (Discussions with Principal COVAB, Dean SWGs, and Director, GMP). According to the Principal COVAB, "…recent restructuring of the faculty in Veterinary Medicine has opened avenues for us to be more creative in how we teach students to become problem solvers and real change agents in disease management and food security. However, we don't have a gender policy and adequate human capacity to coordinate gender activities. Integrating gender issues in the curriculum and expanding opportunities for students in research and leadership training are key areas of the strategic plan of the college. I would like to see these gender audits culminate into sustainable solutions gender inclusion in all programs (Discussions with the Principal, COVAB, July 2013).

1.9 Conclusion: There is a general recognition by the leadership in COVAB of women occupying precarious and disadvantaged positions in many spheres of their lives. At the same time, there are structural constraints inherent in the policies and practices which perpetuate and reinforce gender disparities. While significant achievements have been made to promote the status of women at MAK, "gender policy silence" is a challenge for COVAB. There are several policies in place but overall conditions, make it difficult for women to pursue degrees in veterinary medicine in large numbers and to advance in their careers once they are enrolled in college. This can be improved by investing in women and holding institutions accountable. As experts caution, "Gender integration, can only be fully implemented with strong political commitment, high level leadership, and an institutional mandate for gender equality, supported by the enhanced capacity to conduct comprehensive gender analysis, sufficient financial resources and greater accountability." (Inter-Action, 2008)

Table 1: Undergraduate Enrollments in COVAB by Year, Gender, and Program of Study

Males	Females	Total	Program	Males	Females	Total
43	5	47	BAPTM	21	27	27
18	6	24	BSC (WHM)	18	2	20
118	118	307	BLT	177	64	241
143	27	170	BVM	98	2193	119
393	**156**	**549**	**TOTAL**	**314**		**407**

Table 2: Post Graduate Enrollment in COVAB by Gender and Program of Study for 2012/2013 academic year.

Program	Males	Females	Total
MSBL	12	2	14
MSBS	24	11	35
MSLD	5	1	6
MVPA	1	0	1
MVPM	8	1	9
MWHM	1	1	2
MWTM	1	1	2
MVMF	0	1	1
MAPPES	6	2	8
PhD	16	10	26104
TOTAL	**74**	**30**	

10.0 Policy Recommendations

Develop a new course (undergraduate & graduate) integrating gender-related issues in veterinary medicine and allied fields;

Establish a female mentoring program with a gender focal person to coordinate and encourage students to form support groups and network with colleagues in the School of Women and gender Studies, and the Directorate of Gender Mainstreaming;

Encourage and support students in a joint organization for women and men to openly communicate with students, staff and professors on concerns and needs. Student leaders of this organization will be invited to serve on the college committees and to participate in the designing of projects, research agendas and community outreach/service learning activities;

Develop a leadership program for women and allocate funds to run seminars and workshops to increase gender awareness, sensitivity and skills responding to college mission;

Set up a long term strategy and policy with a realistic strategic plan (5/10 year) outlined with clear goals to bridge gender gaps. The plan should demonstrate a consistent and coordinated approach for increasing the recruitment of women in academic programs, and steps for their retention, progression, and graduation.

Create gender courses for teacher pre-service education in all university courses;

Establish mentorship programs for both men and women;

Encourage women to create their own networks and trainings along with , provision of counseling and self-assertion training;

Create a framework for improving women's access to higher education particularly in non-conventional fields such as veterinary medicine.

Gender Audit: COVAB, Makerere University

Abbreviations and Acronyms

AFRISA	Africa Institute for Strategic Animal Resource Services and Development
AGEI	African Girls Education Initiative
BAPTM	Bachelor of Animal Production Technology and Management
BLT	Bachelor of Biomedical Laboratory Technology
BSC(WHM)	Bachelor of Wildlife Health Management
BVM	Bachelor of Veterinary Medicine
CIMTRADZ	Capacity Building in Integrated Management of Transboundary Animal Diseases & Zoonoses
COVAB	College of Veterinary Medicine, Animal Resources & Biosecurity
FGDs	Focus Group Discussions
FSI	Female Scholarship Initiative
GEP	Gender Education Policy
GMP	Gender Mainstreaming Program
HERS	Higher Education Resource Services
IDM	Integrated Disease Management
MAK	Makerere University
MAPPES	Master of Science in Animal Products Processing, Entrepreneurship and Safety
MFAP	Masters degree in Food Animal Health and Production
MOE	Ministry of Education
MSBL	Master of Science in Biomedical Laboratory Sciences
MSBS	Master of Science in Molecular Biology
MSLD	Master of Science in Livestock Development
MVPA	Masters degree in Veterinary Pathology
MVPM	Masters degree in Veterinary Preventive Medicine
MWHM	Masters degree in Wildlife Health and Management
NCHE	National Council of Higher Education
PhD	Doctor of Philosophy
SWGS	School of Women and Gender Studies
UN	United Nations
UNICEF	United Nations Save the Children's Fund

Acknowledgment

A number of students, faculty and staff contributed to making the gender audit process at COVAB successful and rewarding. Much appreciation goes first to Dr. Edith Okiria of the School of Women and Gender Studies and Dr. Khamalwa Wotsuna of the College of Humanities and Social Sciences at Makerere University, who participated as a team with the key investigator, in conducting Focus Group Discussions. Dr. Claire Card of the University of Saskatchewan in addition to being a partner on the CIMTRADZ project as a whole, participated in the conceptualization of the research agenda and reviewing of the survey instruments for IRB approval. We extend special thanks to the following students for participating in the planning meetings and assisting with the photocopying and collating of the gender audit surveys: Rita Mwima, David Tendo, Mervin Sema and Paul Sajja Kambwe.

We would particularly wish to thank the secretariat at the Principal's office at COVAB, the Human Resource Department at Makerere University, and the staff at the office of Grants and Sponsored Programs at Columbus State University, for logistical support and continuing assistance provided often at short notice.

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Gender Audit for Strengthening Curriculum Development and Community Engagement in the Management of Transboundary Animal Diseases and Zoonoses: A Comprehensive Review of Surveillance Systems in Uganda

Florence Wakoko & Claire Card

Introduction

This study will explore and identify lessons from the current surveillance systems in Uganda using a gender audit process. The main objective is to produce gender disaggregated data with the aim to foster:

(1) Gender equity in curriculum development, collaborative research, and community engagement activities.
(2) Effectiveness in Surveillance Systems

Gender audit is a research process that is designed to improve the performance of an institution/organization with a focus on promoting gender equality and women's empowerment. It is a participatory, self-reflection survey that takes into account not only the status and role of men and women in the organization, but also the organizational culture to identify deeply held assumptions, norms, values that pose limitations for gender equality. This study therefore reviews information about institutional practices and policies in COVAB as a whole, such as capacity building issues, student enrollments, student involvement in research and community problem solving activities, COVAB's partnerships with the community, budgeting, and management, to provide a comprehensive picture of gender relations within the various units of the institution.

Schedule and Tasks of Gender Audit Process (TENTATIVE)

Date	Task
April	Review back ground materials about gender mainstreaming at Makerere University, and in COVAB specifically. Identify research collaborating team (Faculty, Students) Hold meetings with Gender Audit Implementing Team (GAIT): present overview of gender audit process; Develop a Gender Audit Tool (GAT): photocopy, distribute
May	Distribute survey to selected groups/administrative units Conduct Focus Group discussions
June	Enter & analyze survey data Prepare and submit draft report to AFRUS-IDM/CIMTRADZ Revise report as needed
July **August**	Prepare Gender audit newsletter about final report Present report to the AFRUS-IDM/CIMTRADZ conference **Submit final report to HED**

Appendix 1

Gender Audit in COVAB

Demographic Information

Please select the appropriate box:

Sex: Male _____ Female_____
Age: Under 30_____ 30-45_____ Over 45_____
Employment Status:
Senior Management/Team Leader _____
Professor/Lecturer/Instructor _____
Technical Staff (e.g. Lab technician, other) _____
Administrative Staff (e.g. administrator, clerical, finance_____
Other _____

Gender inclusiveness in institutional planning, design and activity implementation

To what extent…: 1=Not at all 2=To a limited extent 3=To a moderate extent4=To a significant extent 5=Fully						
1. Is gender integration required by Makerere University?	1	2	3	4	5	Don't know
2. Are gender equality/gender equity goals and objectives included in the university's planning process?						
3. Are gender equality/gender equity goals and objectives included in the activity design process?						
4. Is there a needs assessment, including an analysis of gender roles and responsibilities that could have an impact on results, for each program or activity ?						
5. Does your administrative team use participatory methods to incorporate the views and preferences of both men and women stakeholders in project design						
6. Is the design of projects,/programs/activities influenced and advised by women's organization, networks, and gender experts?						
7. Are best practices in gender programming incorporated in subsequent program/activity design?						
8. Do your activity work plans take into account existing gender roles and interests of both men and women?						
9. Is the document "Guidelines for Integrating						

Linkages Themes and Tools (LTT) in Procurement Documents" useful for integrating gender into the procurement process?						
How Often...:1 = Strongly Disagree 2 = Disagree 3 = No Opinion 4 = Agree 5 = Strongly Agree						

10. Are gender questions or criteria included in COVAB's acquisition and assistance procedures (e.g., Annual Program Statements, RFAs, and RFPs)?

11. Do you agree that COVAB has developed the capacity to recognize and handle obstacles to addressing gender issues in its curriculum and other educational activities (e.g. student enrollments, service learning, internships)?

12. Are any of the following obstacles to incorporating gender analysis in program/activity planning, implementation, and evaluation in AFRUS-IDM-COVAB?

Size of the College ☐
Number of staff ☐
Office culture/environment ☐
Cultural patterns of Uganda ☐
Cultural patterns of the USA ☐
Lack of financial resources for gender integration programming ☐
Lack of staff training on gender ☐
Lack of gender analysis tools ☐
Lack of support from senior management ☐
Low organizational priority for gender issues ☐
Other: _____

To What Extent..... **1 = Not at all 2 = To a limited extent 3 = To a moderate extent 4 = To a significant extent 5 = Fully**						
13. Is there a person or division responsible for gender in COVAB?						
14. Are there assigned staff responsibilities for gender integration in different offices and/or Strategic Objectives?						
15. Is there training of program and project staff in gender planning and analysis?						
16. Are there easily accessible resources and reference materials available to staff for improving gender integration?						

17. Do you agree that the technical staff at COVAB have the necessary knowledge, skills, and attitude to carry out their work in a gender-sensitive or gender-aware manner?
1 = Strongly Disagree 2 = Disagree 3 = No Opinion 4 = Agree 5 = Strongly Agree

Monitoring and Evaluation of Programs

To What Extent.....**1 = Not at all 2 = To a limited extent 3 = To a moderate extent 4 = To a significant extent 5 = Fully**

18. Is sex-disaggregated data **collected** at the activity level? 1 2 3 4 5 Don't know

19. Is sex-disaggregated data **analyzed** at the activity level? 1 2 3 4 5 Don't know

20. Is the impact of programs/activities on gender inequalities monitored and evaluated?
1 2 3 4 5 Don't know

21. Is the impact of programs/activities on gender inequalities regularly reported?
1 2 3 4 5 Don't know

22. Do you agree that sex-disaggregated data provides useful information for program/activity evaluation and subsequent program/activity design?

1 = Strongly Disagree 2 = Disagree 3 = No Opinion 4 = Agree 5 = Strongly Agree

23. Do you agree that USAID/Tanzania's programs contribute to the empowerment of women/girls and the changing of unequal gender relations?

1 = Strongly Disagree 2 = Disagree 3 = No Opinion 4 = Agree 5 = Strongly Agree

24. COVAB program/activities collect sex-disaggregated data in the following areas (Check all that apply):

Access to and level of resources ☐
Control over program benefits ☐
Control over resources ☐
Legal status and/or knowledge of legal rights ☐
Physical well-being ☐ Participation in the public sector ☐
Participation in decision-making ☐ Access to/participation in training ☐
Beneficiaries view of the project's benefits to their own lives ☐

Programming: Partner Organizations

How frequently.....
1 = Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Always

25. Is attention to gender integration and/or gender equality in program design and staffing a factor in COVAB' selection of implementing partners? 1 2 3 4 5 Don't know

26. Are requirements for gender integration included in the written agreements outlining COVAB's relationship with implementing partners? 1 2 3 4 5 Don't know

27. Does COVAB provide training and tools on gender planning, analysis, and evaluation to implementing partners? 1 2 3 4 5 Don't know

Organizational Framework and Dynamics: Guidance on Gender

To What Extent..... **1 = Not at all 2 = To a limited extent 3 = To a moderate extent 4 = To a significant extent 5 = Fully**

28. Does COVAB have written guidance that affirms a commitment to gender integration?
1 2 3 4 5 Don't know

29. Does COVAB have an operational plan for gender integration that includes clear allocation of responsibilities and time for monitoring and evaluation?
1 2 3 4 5 Don't know

30. Are gender issues addressed during strategic planning for COVAB?
1 2 3 4 5 Don't know

31. Do you agree that management rather than technical staff is responsible for the development and implementation of the gender guidance?
1 = Strongly Disagree 2 = Disagree 3 = No Opinion 4 = Agree 5 = Strongly Agree

Organizational Framework and Dynamics: Human and Financial Resources

To What Extent..... **1 = Not at all 2 = To a limited extent 3 = To a moderate extent 4 = To a significant extent 5 = Fully**

32. Does management show respect for diversity in work and management styles in COVAB? 1 2 3 4 5 Don't know

33. Is gender awareness included in student enrollment? 1 2 3 4 5 Don't know

34. Is gender awareness included in staff job description? 1 2 3 4 5 Don't know

34. Is gender awareness included in your job performance criteria? 1 2 3 4 5 Don't know

35. Has COVAB budgeted adequate financial resources to support its gender integration work? 1 2 3 4 5 Don't know

36. Is staff training in gender integration and gender analysis systematically budgeted for in COVAB? 1 2 3 4 5 Don't know

Do you agree that..... **1 = Strongly Disagree 2 = Disagree 3 = No Opinion 4 = Agree 5 = Strongly Agree**

37. Good performance in gender integration and achievement of gender equality goals is rewarded at Mak and COVAB in articular? 1 2 3 4 5 Don't know

38. COVAB promotes teamwork, involving both men and women as equal partners? 1 2 3 4 5 Don't know

39. There has been a gradual increase over the past few years of gender expertise among students and staff members in COVAB (e.g., more enrollments, training on gender, hiring more people with knowledge of gender, etc.)? 1 2 3 4 5 Don't know

40. There should be proactive strategies to recruit or promote women (as students as well as staff) in COVAB? 1 2 3 4 5 Don't know

Organizational Framework and Dynamics: Organizational Culture

41. To what extent does COVAB encourage and reinforce gender-sensitive behavior and procedures?

1 = Not at all 2 = To a limited extent 3 = To a moderate extent
4 = To a significant extent 5 = Fully

42. Are gender issues taken seriously and discussed openly by men and women in COVAB ?
1 = Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Always

43. If it occurs, is gender stereotyping challenged by individual staff members in your organization? (For example, if someone makes a generalization related to gender such as "All men are lazy" or "all women are greedy," does anyone contradict the statement?)

1 = Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Always

Do you agree that.....
1 = Strongly Disagree 2 = Disagree 3 = No Opinion 4 = Agree 5 = Strongly Agree

44. There is a gap between how men and women in COVAB view gender issues?
1 2 3 4 5 Don't know

45. The staff members of COVAB are enthusiastic about the gender work they do?
1 2 3 4 5 Don't know

46. COVAB has a reputation of integrity and competence on gender issues among leaders in the field of gender and development?
1 2 3 4 5 Don't know

47. COVAB and Mak in general could do much more than it is currently doing to institutionalize gender integration? 1 2 3 4 5 Don't know

48. Regular meetings (COVAB meetings, staff or department meetings) at tend to be dominated by men? 1 2 3 4 5 Don't know

49. The organizational culture of COVAB places higher value on the way that men tend to work and less value on the way women tend to work.
1 2 3 4 5 Don't know

50. In COVAB, men have an easier time than women in establishing personal and professional networks within the organization. 1 2 3 4 5 Don't know

51. In your opinion, what are the three characteristics of an ideal worker at Makerere University?

52. What more do you think Mak and COVAB should do to promote gender equality in programs?

52. What more do you think Mak and COVAB should do to promote gender equality in its internal operations and policies?

53. Please describe any successes or challenges you have experienced in integrating gender in programming or other aspects of work in your unit

Appendix 2:

Gender Audit in Surveillance Systems

2. Staffing in Surveillance Laboratories

Whole Laboratory				**Virology and Serology Sections**				
Staff	Women	Men	Total	Staff	Women	Men	Total	
Veterinarians				**Veterinarians**				

BVSc				BVSc				
MVSc				MVSc				
PhD				PhD				
Research Officers				**Research Officers**				
BVSc				BVSc				
MVSc				MVSc				
PhD				PhD				
BVSc				BVSc				
Technologists				**Technologists**				
BVSc				BVSc				
MVSc				MVSc				
PhD				PhD				
Technicians				**Technicians**				
Diploma & Cert.				Diploma & Cert.				
Diploma				Diploma				
Certificate				Certificate				
Asst. Technicians				**Asst. Technicians**				
Diploma & Cert				Diploma & Cert				
Diploma				Diploma				
Certificate				Certificate				
Support Staff (Centralized)								
Administrator								
Accountant								
Clerk								
Other (specify)								

Acknowledgement: This report was made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the Africa-U.S. Integrated Disease Management Network (AFRUS-IDM) and do not necessarily reflect the views of USAID or the United States Government.

Appendix E.5. CIMTRADZ Monographs

Exploration of One Health in the Global Environment through Model African Union (MAU)

CVM 5111 Professional Development III

Exploration of One Health in the Global Environment through Model African Union (MAU)

Fall, 2015

Course Coordinators:

Dr. Margaret Khaitsa
Professor
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(662) 325-1365
Email: mkhaitsa@cvm.msstate.edu
L2218 Wise Center
Office hours by appointment

Dr. Florence Wakoko
Associate Professor
Criminal Justice & Sociology
(706) 325-6780
Email: wakoko_florence@columbusstate.edu
323 Faculty Office Building
Office hours by appointment

Course Pre-requisites, Co-requisites, and/or Other Restrictions:

Enrollment is limited to students who have completed Introductory Sociology or, enrolled in the professional DVM program

Course Overview:

This course has two parts:

Part 1 provides an overview for veterinary students of the role of One Health in the global environment. It will identify important global trends, issues and potential solutions to challenges in animal and human health. It will explore the role of animal ***agriculture and veterinary medicine in international development, conservation, disease control and prevention, food security and food safety, animal welfare, and global trade.***

Part II engages students in simulating the policies and procedures of the African Union (i.e., the Model African Union). The simulation is an attempt to address collectively some of the more pressing contemporary African issues discussed in part I and how they relate to Health (animal health & public health) **trade and economic growth, gender empowerment, human development, peace and security, democracy, institution building and human rights issues**. This part has three goals.

i) Provide a theoretical framework to inspire students to look more broadly at how Africa works collaboratively with international bodies to address issues of critical importance (e.g. Trans boundary diseases)
ii) Engage students in conducting research and assessing how these relations play out through diplomacy, which involves making arguments, negotiating, caucusing, "arm-twisting and horse-trading" in the context of the Rules of Order.
iii) Students will learn the formal rules of parliamentary procedure, which involves drafting resolutions, making amendments, and voting. They will take on the character of the heads of African diplomats and learn how to

Student Learning Objectives:

Part I

Describe current global issues impacting One Health, particularly as they relate to animal and livestock production.

Explain linkages among biodiversity, environment and emerging disease; understand the role of animals and livestock in developed and developing countries.

Understand the way cultural norms impact animal care and food production.

List key issues that impact poverty and food security.

Part II

Describe the role, structure, and performance of the African Union

Research current issues impacting livelihoods in Africa, particularly as they relate to social-cultural factors affecting animal care and food production, trade and economic growth, political security and human rights violations.

Demonstrate understanding of the process for developing and debating resolutions within the context of the African Union.

Explain patterns of cooperation and conflict that characterize intra-African diplomacy in search of solutions for continental issues

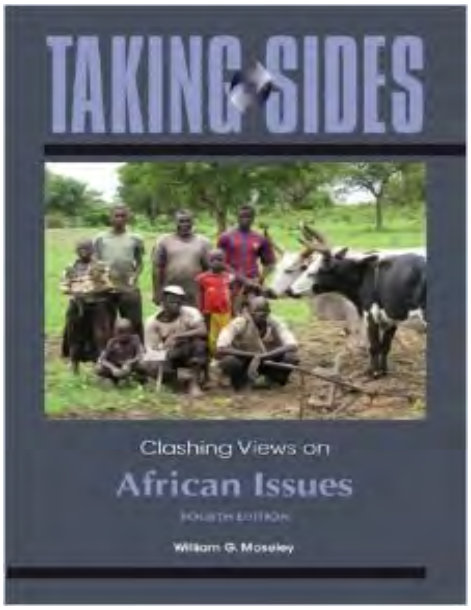
Distinguish and defend personal views from those of others

Demonstrate mastery of the independent research process

List policy recommendations for action by the African Union.

At the end of the course, students are expected to learn *One Health Competencies* developed by the Food and Agriculture Organization (FAO) of the United Nations (UN), the World Organization for Animal Health (OIE), and the World Health Organization (WHO) (AVMA, 2008; OIE, 2012). One Health core competencies are skills and knowledge that all One Health professionals should possess. They incorporate the fundamental values of veterinary, human, and environmental health and include: **management, communication, values and ethics, leadership, teamwork and collaboration, research, systems thinking, policy and advocacy, and cultural competency.**

Required Materials:



Part I. No required text. The following is an excellent resource for interested students: Sherman DM *Tending Animals in the Global Village: A Guide to International Veterinary Medicine*. Lippincott, Williams & Wilkins, Baltimore, 2002, 495 pages. ISBN# 0-683-18051-7. Available on closed reserve in CVM library.

Part II.

1. Moseley, 2011. **Taking Sides** 4th **edition (African Issues).** McGraw-Hill. ISBN-13: 978-0078050084.

2. Legget, 2001. **Uganda (Oxfam Country Profiles Series).** Stylus Publishing, LLC (VA) ISBN: 9780855984540

3. African Union. http://www.au.int/

Assignments & Academic Calendar

The class activities include lecture and a case problem solving session or case study. Attendance at all lectures and activities is mandatory.

Assessment/Grading Policy

The final grade will be based on the following activities. There will be no final exam for this course.

Attendance 10%

Attendance will be taken at least once within each half day session. Unexcused absence in any activity/day will result in attendance of 0 for the entire activity/day.

2. Model African Union : 45%

Written case report: 45%

Contribution will be scored as Satisfactory (90%) or Unsatisfactory (60%) in Logic, Vocabulary (use of medical/ technical vocabulary when appropriate) and Preparation.

Grading Scale

A	≥ 90%
B	80 – 89%
C	70 – 79%
D	60 – 69%
F	< 60%

Course & Instructor Policies

Class lectures will be held in Lindley classroom. Attendance will be taken daily and is mandatory at all activities. No make-up work will be available. Unexcused absence will result in a 0 for that day or event.

MSU Honor Code

As a Mississippi State University student I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do.

Date	Time	Topic	Instructor
7/24/2015	11:00	Introduction	Khaitsa
8/4/2015	11:00	Overview of Global One Health	Khaitsa
8/6/2015	11:00	NO CLASS	
8/11/2015	11:00	Agricultural/Livestock production systems	Khaitsa
8/15/2015	11:00	Food security, livestock, and development	Khaitsa
8/22/2015	1:00	Veterinary Medicine in Uganda	Khaitsa
9/4/2015	1:00	Wildlife in One Health	Khaitsa
9/11/2015	1:00	Opportunities and function of the Food and Agriculture Organization (FAO) of The United Nations (UN).	Khaitsa
9/12/2015	1:00	Global Aquaculture	Khaitsa
9/19/2015	1:00	Veterinary Medicine in Southeast Asia	Khaitsa
9/25/2015	1:00	**Introduction** to the African Union (AU) and related Organizations: EU, UN, USAID, WHO, FAO, WTO, The World Bank.	Wakoko
9/26/2015	1:00	Role of AU in maintaining global health and food security: **Research & Identify** key issues confronting the people of Africa (E.g., HIV/AIDS, Ebola, Food Security, Trade, Gender and Human Rights violations)	Wakoko
10/2/2015	1:00	**Model African Union (MAU):** Review of African Union (AU) Treaties, Conventions, Protocols & Charters; **Explore** their relations to USAID's Emerging Pandemic Threats Program (EPT) capacity building projects (PREDICT, PREVENT, RESPOND and IDENTIFY) **Review** of AU Rules of Procedure, and **Develop** Resolutions	Wakoko
10/7/2015	8:00	AU Simulation: Seminar focused on debates about selected social, economic, political and security issues of significant importance to Africa's development	Wakoko
10/16/2015	1:00	Policy Reports	Wakoko

Student Support Services:

The Office of Student Support Services and Disability Support Services is located in Montgomery Hall. The phone number is (662) 325-3335. The weblink for this office is:

http://www.sss.msstate.edu/

Assignment:

Part 1: Written case reports: 45%

Identify two One Health Strategies/Projects (one within US and one Global) that focus on training professional cadres of leaders responsible for supporting, promoting, and implementing the One Health approach.

In your report:

1. Provide a brief summary of the two Projects (500 words; 10 points)
2. Discuss the One Health competences that the project focuses on (500 words; **10 points)**
3. Describe what impact the project has had in advancing One Health in the Global Environment (500 words; **20 points)**

References (5 points)

Part 2:

1. Model African Union: Research, Resolution writing and AU Simulation **(25 points)**
2. Written Policy Report based on the research topic and input from debates **(15 points)**
3. References **(5 points)**

Report Guidelines: The total report should not exceed 5 pages (single spaced) or 10 pages (double spaced)
Format: font size minimum 12, Times New Roman

References:

African Union Handbook, 2014. http://summits.au.int/en/22ndsummit/events/launch-au-handbook

AVMA, 2008. American Veterinary Medical Association: One Health: A New Professional Imperative

https://www.avma.org/KB/Resources/Reports/Documents/onehealth_final.pdf *(Retrieved April 26, 2015).*

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http://www.oie.int/fileadmin/Home/eng/Support_to_OIE_Members/Vet_Edu_AHG/DAY_1/DAYONE-B-ang-vC.pdf

Southeast Model African Union, Columbus State University, 2013. http://cie.columbusstate.edu/semau/

Acknowledgement: This report was made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the Africa-U.S. Integrated Disease Management Network (AFRUS-IDM) and do not necessarily reflect the views of USAID or the United States Government.

Appendix E.6. CIMTRADZ Monographs

Africa-North America Faculty Exchange: An Accelerated Model for Capacity building

Africa-North America Faculty Exchange: An Accelerated Model for Capacity building

Overall Goal. The overall goal of these faculty exchange programs between North American Universities and East and Central Africa (ECA) universities is to provide an accelerated and sustainable way of developing capacity among junior faculty in ECA higher education institutions (HEIs) while fostering lasting partnerships and collaborations.

Objectives. The specific objectives of the faculty exchange comprised: 1) Accelerated training of junior faculty from ECA in specific areas of expertise 2) Expose junior faculty from ECA to resources in HEIs in North America that will advance their career development including Ph. D proposal development and research completion, and publishing papers in peer-reviewed journals and 3) Identify faculty collaborators for future partnerships and collaborations 4) Link HEIs in ECA with those in North America in other areas of collaboration including Graduate school administration Instructional Development and Distance Learning.

Participating Universities and Faculty Exchange Activities Conducted. North American universities participating in the faculty exchange programs include Michigan State University, North Dakota State University, Mississippi State University, Washington State University, University of Minnesota and Columbus State University in the United States and University of Saskatchewan at Saskatoon in Canada. Participating universities from East and Central Africa (ECA) include Makerere University (Uganda), Sokoine University of Agriculture (Tanzania), University of Nairobi (Kenya), Mekelle University (Ethiopia), and National University of Rwanda (Rwanda). Faculty exchange period lasted for 1 week to 9 months and activities faculty from North America engaged in included the following: 1) facilitation of workshops on various topics including One Health Principals, Rabies Diagnostics, Data Management and Analysis, Disease Outbreak Investigation, Service Learning, and Gender mainstreaming of Capacity building activities at higher education institutions; 2) Seminar Presentations 3) Mentoring Graduate students 4) Joint Curriculum development. Faculty from ECA engaged in several activities at North America higher education institutions including: Seminar presentations, course work in select courses for up to 2 semesters, individual studies in data analysis and presentation and other specialized skill transfer activities.

Outcomes and Impacts of Faculty Exchange Programs. Faculty exchange programs between HEIs in ECA and North America have been extremely successful resulting into several outcomes and impacts including peer review publications, joint symposia and conferences, joint grant submissions and awards and career advancement of faculty from ECA and North America HEIs. Also, student interactions with faculty from various higher education institutions has resulted into joint mentorship and exposure to other additional faculty and their research facilities. This monogram summarizes some of the faculty exchange programs that were conducted between HEIs in ECA and North America, highlighting some of the skills acquired during the exchange.

Summary of short term training/workshops offered by faculty from US and East & Central Africa (ECA) at Makerere University during International Boma and Conferences held 2012 to 2015

Workshops conducted by faculty from US and ECA at Makerere University, 2012 to 2015	
Year	Short term training/Workshops
2012	Grants and collaboration management do's and don'ts Rabies Diagnosis Data Analysis (SAS, R software), Disease Outbreak Investigation Preparation and delivery of effective presentations Professionalism in today's world: opportunities and challenges
2013	Grant writing skills, Data Analysis (R software) How to prepare media and policy briefs: translating research findings from technical to popular versions Preparation and delivery of effective presentations One Health in practice (training, research and outreach)
2014	Media Communication, Grant writing, Fish Pathology & Diagnostics Data Management & Analysis (Excel Database), Tips for design and analysis of ethnographic studies How to start and run a profitable business From science in a small corner to big global business: how to translate scientific innovations and findings into big businesses
2015	Grant writing, Disease outbreak investigation: principles and case studies Model African Union Simulation Data Analysis (SAS, R, Epi-Info software) Conquering Ebola in West Africa: experiences of an epidemiologist Handling Ebola samples: experiences of a laboratory technologist

Summary of Eight Junior faculty visit from Makerere University to Mississippi State University and Michigan State University, September 13 to December 15, 2014

Sam G. Okech -

Mississippi State University (MSSTATE)

While Sam Okech was at MSSTATE, he received mentorship, guidance and support from Dr. Margaret Khaitsa and Dr. Skip Jack (both of the College of Veterinary Medicine), He was privileged to meet Dr. Kathleen Ragsdale of the Social Sciences Research Center (SSRC), Dr. April Heiselt and Dr. Laura Downey of the Center for Advancement of Service-Learning Excellence (CASLE). The guidance, advice, tips and resource materials they recommended and shared have greatly enhanced his capacity to write his PhD study methodology. While at Mississippi State, he improved upon and submitted the PhD concept to Makerere University in Uganda and was offered provisional admission. Upon returning to Uganda, he is now developing the concept into a full proposal to gain full admission. Sam also made several outreach trips to shelters in Mississippi and observed service learning activities conducted by students at CVM. He also visited a beef farm and participated in extension provided by MSSTATE faculty.

Outreach:
Sam Okech on one of outreach trips to a beef farm in Mississippi owned by a veterinarian, Dr. Hazard.

Cultural Exposure:
Sam Okech and Margaret Nabulime participate in Thanksgiving celebration with a host family at Mississippi State University

Prof. April Heiselt with Dr. Sam G. Okech after a meeting at CASLE, Mississippi State University

Saphan Muzoora – Mississippi State University

Saphan was able to bring back several skills that he acquired while studying at Mississippi State. He was able to see how good working relationships between professors and students enhance the learner's experience. He now finds time to learn about the learners' profile and make appointments with students to address their unique concerns. This was a great achievement because the practice in most African Universities and other institutions of higher learning is that there is always a big gap between the teacher and the student. This does not only create a poor learning environment but also ill trained graduates are churned out.

In addition, he observed that the students are heavily involved in the daily running of the labs and that faculty work with students particularly in research. This creates an opportunity for the students to acquire the necessary practical skills. With this experience, he developed an action plan of establishing a mini research laboratory at Makerere University to enable both the junior faculty and students do research and acquire the necessary practical skills. This action plan was presented to the faculty at Makerere University, College of Veterinary Medicine and Biosecurity. Makerere University approved of the plan and the space for this lab has already been secured and renovations are ongoing. It is anticipated that by the end of April, the lab will be fully operational.

Meat Quality; Joelia Nasaka and Saphan Muzoora preparing patties for texture analysis; Mississippi State University

Collecting Blood: Saphan is collecting blood from fish at the Cochran National Warm Water Aquaculture Center, Mississippi State University

Joelia Nasaka –
Mississippi State University

Joelia's interest was in gaining skills in poultry nutrition, feed formulation and food quality since these are very core to her PhD research that she is currently undertaking. In addition she also teach game bird nutrition and value addition. While at Mississippi State she gained a lot of experience working with graduate students in the poultry department under the leadership of Dr. Kelley Wamsley. She was able to work at the poultry farm, participate in feeding experiments and attend classes in feed formulation as well practically mixing feeds, batching them and pelleting them.

Joelia also worked with Prof. Wes Schilling under whose lab she was exposed to food quality and safety training. She gained skills on how to conduct consumer and trained panel sensory evaluation of meats, texture analysis as well as use of first class equipment used in proximate analysis for nutrient analysis of the meats.

Poultry Management; Evaluation of pen set up, aeration, lighting watering and feeding at the poultry farm, Mississippi State University South Farm

Feed Production: Joelia participating in the mixing and batching of feeds at the feed mill at Mississippi State University

Margaret Nabulime – Mississippi State University

During Margaret Nabulime's studies at Mississippi State she completed data cleaning and analysis of results from the first part of her PhD research and was able to publish a paper: Nabulime Margaret, Justus Rutaisire, Joseph Ssekaayi, David Smith and John David Kabasa (2014). Development of Fry Diets for African Catfish (*C. Gariepinus*) Larvae in Uganda: *Journal of Fisheries and Aquatic Science.*

Further to this, Margaret was able to improve the fish research unit at Makerere University using the knowledge and technology adopted from the training at Mississippi State University. She was able to upgrade a laboratory at Makerere University that will be used for training students and performing research in fish experiments. In addition, she is using the feed formulation software obtained during her stay at Mississippi State University & the training, to develop formulations for fish feeds at the Makerere University feed lab. The software will also be used to formulate feeds for other species of fish.

Activities Conducted

Histological collection of fish specimens. Procedures included the collection of tissues of interest from whole organs, as well as using young fish and the microscopic examination of tissues.

Fish Nutrition:
Margaret Nabulime and Professor Menghe H. Li discussing fish nutrition at at Mississippi State University

Hatchery Management:
Margaret Nabulime and Saphan Muzoora learn about hatchery management with Dr. Skip Jack at Mississippi

Procedures for fish blood sampling for analysis. These included disinfection of bleeding site and choice of site for blood collection. Blood samples were used for PCV test as a test for hemorrhage, stress and Red blood cell lysis. **Histological collection of specimens** Procedures included the collec-

Julius Okuni – Michigan State University

Julius's main interest at the beginning of the training at Michigan State was to improve his skills in diagnostic pathology of animal diseases. He also wanted to experience how pathology is taught in American Universities. During the training under the mentorship of Dr. J.B. Kaneene and Dr. Dalen Agnew, he gained a lot of experience in diagnosis of various animal diseases which has improved the level of diagnostic services I offer to clients at Makerere University. Since I came back, I have been engaging my students in class discussions to arouse interest in the subject and tried to introduce the humorous atmosphere in which pathology is taught at Michigan State University. I am now working on a re-organization of our pathology facilities in line with the standard operating procedures and protocols that I learned during my training in the USA. With the contacts I got during the training, I have developed a concept note for funding on the improvement of the pathology training in Uganda. I am also spearheading the establishment of a telepathology network of Pathologists in Makerere University College of Veterinary Medicine with several pathologists in in North American Universities.

Biosafety: Necropsy exam

Safety: Working under the BSL 2 Cabinet in the Diagnostic Center for Population and Animal Health, Michigan State University

Norah Gulaita –
Michigan State University

The main goal for Norah's training was to build a critical mass of academic staff with the ability to provide intellectual leadership along the dairy value chain. To achieve her project goal, she was attached to various sections under different leadership where she achieved the objectives of dairy product development, dairy product processing and safety; and methods used to analyze for nutrients in feeds/food.

Under dairy product processing and safety, she gained new skills in making cheese of various types and flavors through manipulation of the ingredients and processing parameters. She also learned how to make premium ice cream using cream and milk. From that exposure, she was able to learn how to properly plan a profitable dairy processing enterprise taking into consideration the consumer's preferences to ensure that it is self-sustaining. Upon returning to Makerere University she went and bought some yogurt and ice cream that our AFRISA dairy value chain students are making. Whereas there has been improvement in the quality of these two products, more research is needed to take them to a level where they are very competitive on market like the Michigan State University dairy ice cream.

Secondly, before she went to Michigan State she was ignorant about how new products are generated on the commercial market. She was introduced to the sensory evaluation lab in the Department of Food Science and Human Nutrition, College of Agriculture and Natural Sciences where she met Dr. Harte. Through the lectures and lab sessions she learned the principles of food product development ranging from carrying out consumer market surveys, coming up with new ideas and recipes for developing alternative products to designing and performing the sensory evaluation of new foods.

Finally before she attended Michigan State, she was very good in teaching the principles of chemical analysis of nutrients in animal feeds and food. However all of her teachings were theoretical in nature. It was a difficult task to explain GC-MS, HPLC and ICP to the students. Norah was able to work in the Nutrition section of the Diagnostic Center for Population and Animal Health (DCPAH). This helped her appreciate how those instruments are used in analysis of fat soluble vitamins, free fatty acids, phytochemicals and micro minerals in food and feed. Now she is able to explain the principles behind chemical analysis of nutrients in feed and food and blood with more confidence. In addition, she can advise the students on some of the methods to use in their research.

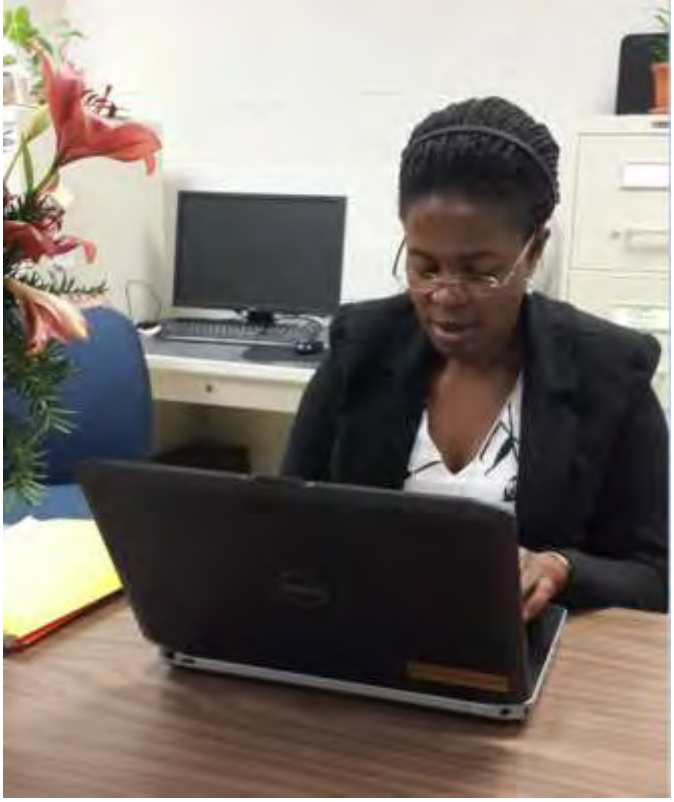
Sensory evaluation: Norah Gulaita preparing salsa samples at Michigan State University

Product Development: Norah hands on training
Michigan State University

Florence Tushemerirwe – Michigan State

Florence's participation in the capacity building program at Michigan State University was timely for her. She received guidance from her mentors Prof. John B. Kaneene and Dr. Won. O. Song. She was to develop her sketchy PhD concept into a draft PhD proposal. Through this exposure at Michigan State, she gained better seminar preparation and presentation skills that she is currently using to enhance the Seminar Series course that she coordinates under the Master of Public Health Nutrition program at Makerere University. Also with the regular support of here mentors, Florence is now more motivated to be more supportive to others, in particular the students. Further, while she contributed towards community nutrition seminars; and with support from her mentor and lab group members, she learned a better way to communicate to people/express myself without being offensive; to create opportunities for continued discussions instead of closing them off. This is feedback that she will always treasure and work hard to perfect; it is definitely shaping her current and future career development.

Florence scheduled regular meetings with her mentors to review her proposal writing progress. These were opportunities for further learning; to plan early and give others opportunities to support her, respect supervisor/mentor's time, maintain my mentor relationship, be open about who she was and the challenges she was facing. Her experience was the beginning of a collaboration/partnership in teaching and research that she will work to maintain with her mentors as they regularly share updated literature.

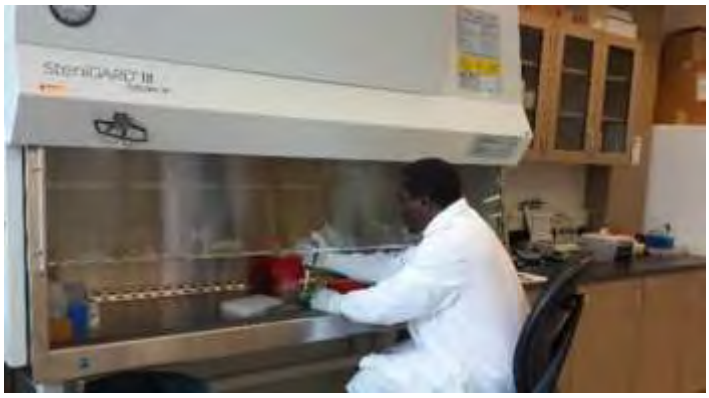


Florence Tushemerirwe busy at her tasks during the attachment at Michigan State University

Florence, on behalf of the visiting scholars, handing over a souvenir to Prof. John B. Kaneene after the last presentations at Michigan State University

Celsus Sente – Michigan State

Last year Celsus was struggling to read and comprehend molecular diagnostic techniques, and the use of GIS/remote sensing in disease mapping, He was then given the opportunity under the CIMTRADZ program through the USAID/HED initiative to go and acquire practical skills in these fields at Michigan State University, USA. To him this was a miraculous opportunity. While at Michigan, he was first attached at the Immunodiagnostic/ parasitology section, Diagnostic Center for Population and Animal Health (DCPAH), where he met Dr Ailam Lim and Professor Steve Bolin, his immediate superiors. The two molecular diagnosticians did a great job in instilling in him the very essential practical aspects of molecular diagnostics, right from DNA extraction procedures to designing PCR primers, performing PCR assays, nucleic acid sequencing analysis, and construction of phylogenetic trees. He was amazed at how much he gained in these practical skills in just a couple of months. In addition he was also introduced to ArGIS, ERDAS& QGIS; obtaining data from "GLOVIS" and importing it to ArcMap and "QGIS" at Global Observatory for Ecosystem Services, Department of Forestry; these practical skills coupled with his initial knowledge of satellite tracking in wildlife species, have enabled him to have an understanding of one of the most modern technologies in disease epidemiological investigation, disease ecology and wildlife forensics. Practical skills in the recent advances in molecular diagnostics technologies, and GIS/ Remote sensing has not only enabled him to excel in his daily wildlife work like studying the raptors, scavenging birds, bats, wild rodents, and herptile spatio-temporal distribution, but has also changed his mode of disseminating such knowledge to my students, some of whom are currently using the same skills for their special projects.



Celsus Sente working at the Molecular Lab Diagnostic Section: Michigan State University

Celsus and Dr Ailam Lim and Michael Lee's family, Thanks

Exchange faculty from Makerere University with mentors at MSState

The four Makerere University junior faculty at the Mississippi State University **Animal** Emergency and Referral Center at Flowood, MS.

Policy Course, Sacramento, California; Eight junior faculty from Makerere University attended a policy course in California-Sacramento on how to translate science into policy. The course was led by Professor William (Bill) Sischo from Washington State University.

Mentors from Mississippi State University

Margaret L Khaitsa,
B.V.M., MSc., Ph.D.

Richard W. Meiring,
D.V.M., DACVPM

R. Hartford Bailey,
M.S., Ph.D.

S. W. Jack, D.V.M., M.S., Ph.D

Lester Khoo, V.M.D., Ph.D.

Lora Petrie-Hanson, B.S., M.S., Ph.D.

Danny L. Magee, DVM, MAM, Depl. ACPV

David R. Smith, DVM, PhD, DACVPM

Robert W. Wills, M.S., D.V.M., Ph.D., A.C.V.P.M

Dr. Menghe H. Li

Dr. Kelley Wamsley

Mentors from Michigan State University

John Kaneene, DVM, MPH, PhD, Dipl. AVES

Steve Bolin, DVM, PhD

James Sikarskie, DVM, MS, DACZM

Dalen Agnew, DVM, PhD

David Skole, PhD.

Janice B. Harte, Ph.D.

Professor Ashton Shortridge

Dr. Won O. Song

Dr. Zeynep Usunol

Tom Herdt

Mr. Dan Zelenak, Research Assistant

Mr. Dan Zelenak, Research Assistant

Acknowledgement: This brief is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the Africa-U.S. Integrated Disease Management Network (AFRUS-IDM) and do not necessarily reflect the views of USAID or the United States Government.

Appendix F. Additional Success Stories

SUCCESS STORIES – JUNIOR FACULTY FROM MAKERERE UNIVERSITY

Dr Muzoora Saphan – Mississippi State University

Department of Biomolecular Resources and Biolab Sciences, College of Veterinary Medicine, Animal Resources and Biosecurity (COVAB), Makerere University, Kampala Uganda

September 15, 2014 was the day I left Uganda for USA specifically to a state with Southern hospitality-the Mississippi State where the prestigious Mississippi State University (MSU) is located. Although there were many reasons I went to MSU, the overarching objective was capacity building. While at MSU, I got an opportunity to undertake various trainings in the fields of pedagogy, laboratory diagnostics, grant writing, policy brief formulation, research proposal writing among others.

I must emphasize that I went to USA with an open mind and therefore could not afford to close my senses to any learning opportunity that came by. For instance, I appreciated the good working relationships between professors and students. On this note, I must report that my working relationships with students have greatly improved. I now find time to learn about the learners' profile and make appointments with students to address their unique concerns. This was a great achievement because the practice in most African Universities and other institutions of higher learning is that there is always a big gap between the teacher and the student. This does not only create a poor learning environment but also ill trained graduates are churned out. The situation is bad when it comes to gender issues where it is perceived that interacting with students of opposite sex tantamount to a crime.

While in different laboratories (labs), I observed that students are heavily involved in the daily running of the labs and that faculty work with students particularly in research. This creates an opportunity for the students to acquire the necessary practical skills. With this experience, I developed an action plan of establishing a mini research laboratory at my University to enable both the junior faculty and students do research and acquire the necessary practical skills. This action plan was presented to the faculty at MSU and later to the administration at Makerere University, COVAB. I am happy to report that the space for this lab has already been secured and renovations are ongoing. It is anticipated that by the end of April, the lab will be fully operational. On this note, allow me thank the CIMTRADZ team and USAID for giving me the necessary support to undertake this training. I would also like to thank my colleagues in the division of Biochemistry for making this dream a reality.

In addition, I was able to write several PhD concept notes under the guidance of my mentors Prof. Hart Bailey and Prof. Khaitsa Margaret. What is interesting about this experience is that together with my mentors basing on one of PhD concepts I developed, we wrote and submitted a mini research grant worth USD 5000 on "Strengthening and advancing Food safety Education (SAFE)": The Case study of Uganda. I am happy to note that we won this grant and the International Institute of Mississippi State University is funding it. One of the objectives of this grant proposal was to develop my PhD concept on chronic human aflatoxicosis in Uganda into a full proposal. Thus, one of my mentors will travel to Uganda in June to do a ground assessment of the physical facilities

needed for execution of this work and continue with physical mentorship. It also anticipated that the full PhD proposal will be used in applying for a bigger funding. I must report that before I went to USA, I had no grant writing skills. Thank you my mentors!

Lastly, while at MSU I attended several lectures and appreciated the different teaching approaches including video recording and provision of notes to students through various avenues in advance. With support from USAID, I was able to acquire the necessary teaching aids to improve my teaching skills. I would like to state that students are now interfacing with a more knowledgeable and practical skilled faculty.

Collecting blood samples from fish at the Cochran National Warm Water Aquaculture Center, Mississippi State University

Discussing diagnostic techniques at the Mississippi Veterinary Research and Diagnostic Laboratory, Mississippi State University

Dr. Sam G. Okech – Mississippi State University

Enhanced capacity in designing service-learning impact assessment tools

I am one of the faculties from the College of Veterinary Medicine, Animal Resources and Biosecurity (COVAB), Makerere University (Mak) who visited universities in the United States with support from the CIMTRADZ project for capacity enhancement over a period of three months (September to December 2014). I was stationed at Mississippi State University (MSSTATE) where I learned a lot from the people I interacted with, places I visited and practices I saw and engaged in.

One of the key areas of interest for me was to gain deeper understanding and capability in designing studies for assessment of service-learning impact, which is the subject of my PhD study interest. Coming from a largely science background, designing studies and data collection tools in social sciences was not one of my strengths and yet I had a deep desire to carry out studies (in service-learning) that required these skills. My draft concept therefore needed greater improvement in the methodology area.

While at MSSTATE, through the mentorship guidance and support from Dr. Margaret Khaitsa and Dr. Skip Jack (both of the College of Veterinary Medicine), I was privileged to meet Dr. Kathleen Ragsdale of the Social Sciences Research Center (SSRC), Dr. April Heiselt and Dr. Laura Downey of the Center for Advancement of Service-Learning Excellence (CASLE). Their guidance, advice, tips and resource materials recommended and shared have greatly enhanced my capacity to write my PhD study methodology. While still in MSSTATE, I improved on and submitted the PhD concept to Makerere University and was offered provisional admission. I am now in the process of developing the concept into a full proposal to gain full admission. I am very sure I am on the right track in writing especially the methodology section of the proposal and particularly developing data collection tools, among others. I am confident that I will soon embark on the study, obtain very good data, successfully complete the PhD studies and write joint publications and grant applications with colleagues in MSSTATE. I am also now in a better position to guide my students in design and execution of social sciences-related studies. Thanks to the opportunity presented by the USAID-funded CIMTRADZ project managed by HED.

Prof. April Heiselt with Dr. Sam G. Okech after a meeting at CASLE, Mississippi State University

Dr. Norah Gulaita – Michigan State University

Department of Biomolecular resources and Biolab Sciences, (BBS)

My name is Dr. Norah Gulaita, one of the junior College staff in the Department of Bimolecular resources and Biolab Sciences, COVAB. I was selected to undertake a three months training in Michigan State University under the dairy product processing and safety value chain. The main goal of this training was to build a critical mass of academic staff with ability to provide intellectual leadership along the dairy value chain. To achieve the project goal, I was attached to various sections under different leadership where I achieved the objectives of dairy product development, dairy product processing and safety; and methods used to analyze for nutrients in feeds/food.

Under dairy product processing and safety, I gained new skills in making cheese of various types and flavors through manipulation of the ingredients and processing parameters. I also learnt how to make premium ice cream using cream and milk. I learnt that it is important to concentrate on products that one can process to the best and give them ample time to come up with new customized items. It was such an amazing experience to note that over one hundred flavors of ice cream are made in the Michigan State University (MSU) dairy. Moreover, each of those flavors was made to suit a particular occasion. I could not believe ice cream flavors existed for such occasions like Halloween, Thanksgiving, College football, to mention but a few. The MSU dairy sales point would get full to the brim during those seasons. The sales from the different products would be used to pay the employees of the dairy plant and also contribute a percentage to the unit where the plant is housed. In that way, the plant was self-sustaining and yet it was used to

train students of Food Science and Technology, something worth copying. From that exposure, I learnt how to properly plan a profitable dairy processing enterprise taking into consideration the consumer's preferences to ensure that it is self-sustaining. Such an enterprise if properly managed can generate income while acting as a training ground or a business incubation center for other people. Loaded with all that experience, when I came back to the college, I went straight away and bought some yogurt and ice cream that our AFRISA dairy value chain students are making. Whereas there has been improvement in the quality of these two products, more research is needed to take them to a level where they are very competitive on market like the MSU dairy ice cream. I pledge to work hand – in- hand with the dairy value chain coordinator to improve the quality of the products that are currently being processed and in future to incorporate in new ones.
Secondly, before I went to MSU, I was ignorant about how new products are generated on market and yet I wanted to carry out value addition on milk. I was lucky to be attached to the sensory evaluation lab in the Department of Food Science and Human Nutrition, College of Agriculture and Natural Sciences where I met Dr. Harte. Through the lectures and lab sessions I learnt the principles of food product development ranging from carrying out consumer market surveys, coming up with new ideas and recipes for developing alternative products to designing and performing the sensory evaluation of new foods. I m going to help our students offering AFRISA courses to improve their products as I plan on which product to develop for the market.

Last but not least, before I attended this training, I was very good in teaching the principles of chemical analysis of nutrients in animal feeds and food. However all this was theoretical in nature. It was a difficult task altogether to explain those principles to the students. In fact imagining how the GC-MS, HPLC and ICP work was a nightmare. My attachment to the Nutrition section of the Diagnostic Center for Population and Animal Health (DCPAH) helped me appreciate how those instruments are used in analysis of Fat soluble vitamins, free fatty acids, phytochemicals and micro minerals in food and feed. I can now explain the principles behind chemical analysis of nutrients in feed and food and blood with more confidence. In addition, I can ably advise students on some of the methods to use in their research. This training has groomed me into a better teacher.

I am grateful to my Mentors at MSU namely Dr. Zeynep Ustunol and Dr. Kaneene for arranging such a training for me and the USAID government through the HED arm for sponsoring me for that training. Further gratitude goes to the principal investigators of the CIMTRADZ project namely Prof. Margaret Khaitsa and Prof. JD Kabasa for including the staff capacity building component in the project activities. Lastly, I am grateful to all the staff and employees of MSU in the different sections who helped train me to achieve the above objectives.

Figure 1: Preparing salsa samples for sensory evaluation

Figure 2: Chocolate cheddar cheese

Figure 3: Jalapeno cheese

Figure 4: Matching cookies to make ice cream- cookies sandwiches

Figure 5: Preparing fish for vitamin E analysis

Dr. Julius Boniface Okuni – Michigan State University

Stories from Junior Faculty

My name is Dr. Okuni Julius Boniface. I am one of the trainees that were at Michigan State University for three months training from September to December 2014. My major interest at the beginning of the training was to improve my skills in diagnostic pathology of animal diseases. I also wanted to experience how pathology is taught in American Universities. During the training under the mentorship of Dr. J.B. Kaneene and Dr. Dalen Agnew, I gained a lot of experience in diagnosis of various animal diseases which has improved the level of diagnostic services I offer to clients at Makerere University. Since I came back, I have been engaging my students in class discussions to arouse interest in the subject and tried to introduce the humorous atmosphere in which pathology is taught at Michigan State University. I am now working on a re-organization of our pathology facilities in line with the standard operating procedures and protocols that I learned during my training in the USA. With the contacts I got during the training, I have developed a concept note for funding on the improvement of the pathology training in Uganda. I am also spearheading the establishment of a telepathology network of Pathologists in Makerere University College of Veterinary Medicine with several pathologists in in North American Universities.

Working under BSL 2 Cabinet in the Diagnostic Center for Population and Animal Health, Michigan State University

Doing a necropsy exam in the necropsy section of the Diagnostic Center for Population and Animal Health (DCPAH) at Michigan State University

Joelia Nasaka – Mississippi State University

Joelia Nasaka is my name, an Assistant Lecturer in the College of Veterinary Medicine, Animal resources and Biosecurity-Makerere University. I was part of the capacity building team that was sent to USA-Mississippi state University from 13th September to 13th December 2014.

I was particularly interested in gaining skills in poultry nutrition, feed formulation and food quality aspects since these are very core to my PhD research that I am currently undertaking. I also teach game bird nutrition and value addition. I got a lot of experience working with graduate students in the poultry department under the leadership of Dr. Kelley Wamsley. I worked at the poultry farm, participated in feeding experiments and attended classes in feed formulation as well practically mixing feeds, batching them and pelleting them.

I also worked with Prof. Wes Schilling under whose lab I was exposed to food quality and safety training. I gained skills in how to conduct consumer and trained panel sensory evaluation of meats, texture analysis as well as use of first class equipment used in proximate analysis for nutrient analysis of the meats.

On return to Kampala, having used the three months to finalize my PhD proposal, I presented it to my supervisors and am yet to defend it to the doctoral committee to allow me start data collection this March. My teaching has improved with the exposure and pictures taken in the USA that I am using to teach as visual aids. My research is focused and teaching has improved especially the relationship between me and my students and the teaching content.

I also got an opportunity to visit Princeton University, where I presented a paper and Rutgers University in New Jersey. I made strong contacts/connections with Prof. Dan Rubenstein who also works in Kenya and has offered 3weeks visit to their summer camp in Kenya and also internship opportunities for two of my students.

While in the USA, I also submitted two abstracts to international conferences and one paper has been accepted for presentation at the International One health Congress in Amsterdam, I will be travelling on the 14th of March 2015 to present this paper.

Evaluation of feed with different vitamin premixes at the Poultry Science Farm, Mississippi State University

Joelia consulting with Prof. Kelly Wamsley on the feeding trial at the Poultry Science Farm, Mississippi State University

I am grateful to HED, USAID, Mississippi State University and Makerere University for the 3months training and funding opportunity.

GOD BLESS AMERICA and FOR GOD AND MY COUNTRY-UGANDA.

Nabulime Margaret – Mississippi State University

I completed data cleaning and analysis of results from the first part of the PhD research and was able to publish a paper: " Development of Fry Diets for African Catfish (*C. Gariepinus*) Larvae in Uganda" Author's Name: NABULIME MARGARET, JUSTUS RUTAISIRE, JOSEPH SSEKAAYI, **DAVID SMITH** and JOHN DAVID KABASA In the Journal of Fisheries and Aquatic Science.

Further to this, I have improved the fish research unit at Makerere University using the knowledge and technology adopted from the training at Mississippi State University. The facility shall be used for training students and performing research in fish experiments.

I am currently using the feed formulation software availed to me Under the CIMTRAZ project together with knowledge from the training, to develop formulations for fish feeds at the University feed lab. The software is also being used to formulate feeds for other species.

I have improved skills in delivery of practical training and lectures to students.

Fish Hatchery layout for rearing young fish at Mississippi State University

Nitrogen analyzer in the feed lab at Mississippi State University

Florence Tushemerirwe – Michigan State University

My participation in the capacity building program at Michigan State University was timely for me to receive guidance from mentors (Prof. John B. Kaneene and Dr. Won. O. Song) to develop my sketchy PhD concept into a draft PhD proposal. Through this exposure, I gained better seminar preparation and presentation skills that I am currently using to enhance the Seminar Series course that I coordinate under the Master of Public Health Nutrition program. Also, I received regular support from my mentors, which motivated me to be more supportive to others (generally and to students). Further, while I contributed towards community nutrition seminars; and with support from my mentor and my lab group members, I learnt a better way to communicate to people/express myself without being offensive; to create opportunities for continued discussions instead of closing them off. This is feedback that I will always treasure and work hard to perfect; it is definitely shaping my current and future career development.

My mentors and I had scheduled regular meetings to review my proposal writing progress. These were opportunities for further learning; to plan early and give others opportunities to support me, respect supervisor/mentor's time, maintain my mentor relationship, be open about what I am doing and the challenges I am facing. My experience was the beginning of a collaboration/partnership in teaching, research that I will work to maintain, my mentor regularly shares updated literature which is very helpful while I update my proposal.

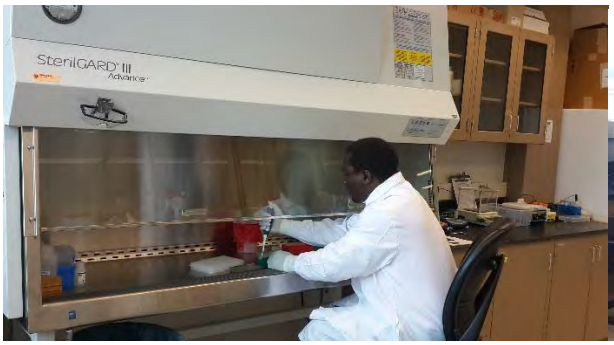
Thank you to my sponsors, for this support at this stage in my career development, I am indebted to you, I currently look out for opportunities to support others, in my means. Thank you!

Dr. Celsus Sente – Michigan State University

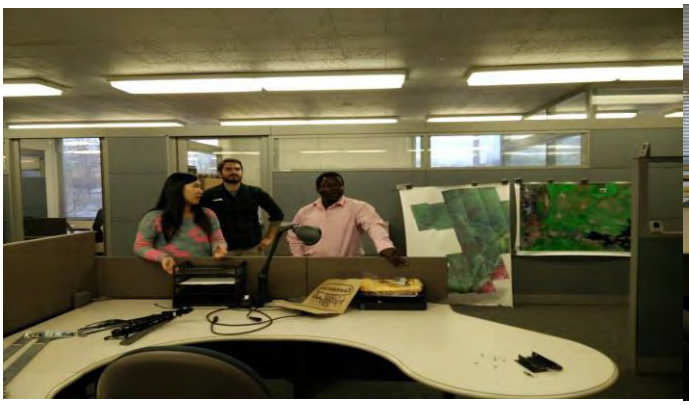
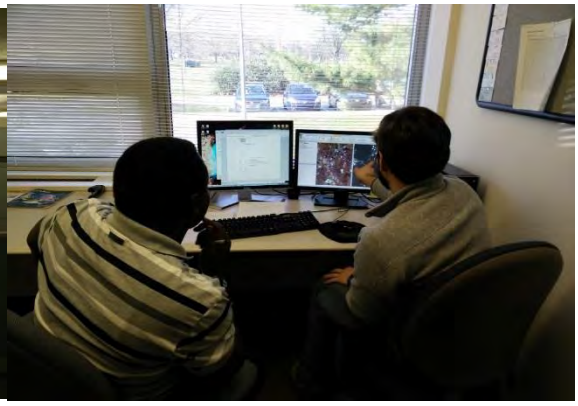
Department of Wildlife and Aquatic Animal Resources (WAAR)

Last year 2014, while I was struggling to read and comprehend molecular diagnostic techniques, and the use of GIS/remote sensing in disease mapping, I suddenly got an opportunity under the CIMTRADZ program through the USAID/HED initiative to go and acquire practical skills in these fields at Michigan State University, USA. To me, this was a miraculous opportunity. While at Michigan, I was first attached at the Immunodiagnostic/parasitology section, Diagnostic Center for Population and Animal Health (DCPAH), where I met Dr Ailam Lim and Professor Steve Bolin, my immediate superiors. The two molecular diagnosticians did a very good job in instilling in me very essential practical aspects of molecular diagnostics, right from DNA extraction procedures to designing PCR primers , performing PCR assays, nucleic acid sequencing analysis, and construction of phylogenetic trees. I was amazed at how I gained these practical skills in just a couple of months. On the other hand, I was also introduced to ArGIS, ERDAS& QGIS; obtaining data from "GLOVIS" and importing it to ArcMap and "QGIS" at Global Observatory for Ecosystem Services, Department of Forestry; these practical skills coupled with my initial knowledge of satellite tracking in wildlife species, have enabled me have grip of one of the most modern technologies in disease epidemiological investigation, disease ecology and wildlife

forensics. Practical skills in the recent advances in molecular diagnostics technologies, and GIS/Remote sensing has not only enabled me to excel in my daily wildlife work like studying the raptors, scavenging birds, bats, wild rodents, and herptile spatio-temporal distribution, but has also changed my mode of disseminating such knowledge to my students, some of whom are currently using the same skills for their special projects. I am deeply humbled!



Dr. Celsus Sente at the Molecular Diagnostic Section, DCPAH, Michigan State University

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Acknowledgement: This brief is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the Africa-U.S. Integrated Disease Management Network (AFRUS-IDM) and do not necessarily reflect the views of USAID or the United States Government.